Prevalence, Correlates, and Treatment of Lifetime Suicidal Behavior Among Adolescents

Results From the National Comorbidity Survey Replication Adolescent Supplement

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Context: Although suicide is the third leading cause of death among US adolescents, little is known about the prevalence, correlates, or treatment of its immediate precursors, adolescent suicidal behaviors (ie, suicide ideation, plans, and attempts).

Objectives: To estimate the lifetime prevalence of suicidal behaviors among US adolescents and the associations of retrospectively reported, temporally primary *DSM-IV* disorders with the subsequent onset of suicidal behaviors.

Design: Dual-frame national sample of adolescents from the National Comorbidity Survey Replication Adolescent Supplement.

Setting: Face-to-face household interviews with adolescents and questionnaires for parents.

Participants: A total of 6483 adolescents 13 to 18 years of age and their parents.

Main Outcome Measures: Lifetime suicide ideation, plans, and attempts.

Results: The estimated lifetime prevalences of suicide ideation, plans, and attempts among the respondents are 12.1%, 4.0%, and 4.1%, respectively. The vast majority of adolescents with these behaviors meet lifetime crite-ria for at least one *DSM-IV* mental disorder assessed in the survey. Most temporally primary (based on retrospective age-of-onset reports) fear/anger, distress, disruptive behavior, and substance disorders significantly predict elevated odds of subsequent suicidal behaviors in bivariate models. The most consistently significant associations of these disorders are with suicide ideation, although a number of disorders are also predictors of plans and both planned and unplanned attempts among ideators. Most suicidal adolescents (>80%) receive some form of mental health treatment. In most cases (>55%), treatment starts prior to onset of suicidal behaviors but fails to prevent these behaviors from occurring.

Conclusions: Suicidal behaviors are common among US adolescents, with rates that approach those of adults. The vast majority of youth with suicidal behaviors have pre-existing mental disorders. The disorders most powerfully predicting ideation, though, are different from those most powerfully predicting conditional transitions from ideation to plans and attempts. These differences suggest that distinct prediction and prevention strategies are needed for ideation, plans among ideators, planned attempts, and unplanned attempts.

JAMA Psychiatry.
Published online January 9, 2013.
doi:10.1001/2013.jamapsychiatry.55

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SUICIDAL BEHAVIORS ARE among the leading causes of death worldwide, especially among adolescents and young adults.[1-4] Despite the scope and seriousness of the problem, relatively little is known about the prevalence, correlates, or treatment of suicidal behavior (ie, suicide ideation, plans, and attempts) among US adolescents because nationally representative studies of this problem are rare. Although some prior studies have reported on these aspects of adolescent suicidal behavior[5-8] and death,[9-11] virtually all of them were based on small regional samples, limiting the generality of findings and precluding fine-grained analyses. Comprehensive national data on suicidal behavior among adolescents are needed to improve our understanding of the nature of this perplexing and devastating problem, to arm clinicians with information about risk profiles, and to help inform decisions about promising prevention targets.

Our report presents data on the epidemiology of adolescent nonlethal suicidal behaviors from the National Comorbidity Survey Replication Adolescent Supplement (NCS-A), the first national survey of

US adolescents to assess a wide range of *DSM-IV* mental disorders and suicidal behaviors using fully-structured diagnostic interviews. Several recent studies have reported on the NCS-A design,[12,13] measures,[14,15] the lifetime and 12-month prevalence of mental disorders,[16-18] and 12-month prevalence and treatment of suicidal behaviors.[19] Here, we present new data on lifetime prevalence and age at onset of suicidal behaviors, as well as information on correlations with temporally primary mental disorders and treatment.

SAMPLE

The NCS-A is a survey of 10 148 adolescents (13-17 years of age at the time of selection, although some respondents turned 18 years before their interview) in the continental United States completed in conjunction with the National Comorbidity Survey Replication.[20] The design and field procedures of this study are reported in detail elsewhere.[12-15] The NCS-A used a dual-frame sample composed of (1) a household subsample of adolescents (n=904) selected from the National Comorbidity Survey Replication households and (2) a school subsample of adolescents (n=9244) selected from schools (day and residential schools of all types, with probabilities proportional to size) in the same nationally representative counties as those in the National Comorbidity Survey Replication. The overall response rate was 82.9%.

One parent or parent surrogate (subsequently referred to as "parents") of each adolescent provided written informed consent, and the adolescents provided written informed assent before adolescent interviews. Parents also completed self-administered questionnaires about the adolescent's mental health. The self-administered questionnaire response rate was in the range of 82.5% to 83.7% in the household-school samples. Our report focuses on the 6483 adolescent-parent pairs with complete data. The use of this subsample reduces the precision of the estimates compared with analyses based on the full sample, but it eliminates the bias introduced by having missing parent reports on adolescent disorders.

Each parent and adolescent was paid $50 for participating in the study. All study procedures were approved by the human subjects committees of Harvard Medical School in Boston, Massachusetts, and the University of Michigan at Ann Arbor. Completed cases were weighted for within-household probability of selection (for the household subsample) and residual discrepancies between sample and population on demographic-geographic variables. Weighting procedures are described elsewhere.[12,13] Adolescents in the weighted NCS-A parent-adolescent sample are very similar to the population of US adolescents on a wide range of sociodemographic/geographic variables.[12,13]

MEASURES

Suicidal Behaviors

Suicidal behaviors were assessed using a modified version of the Suicidal Behavior Module of the Composite International Diagnostic Interview (CIDI).[21,22] This module assesses the lifetime occurrence and age at onset of suicide ideation ("You seriously thought about killing yourself") and, among respondents who reported lifetime ideation, suicide plans ("You made a plan for killing yourself") and suicide attempts ("You tried

to kill yourself"). To examine transitions among behaviors, we focus on not only predictors of lifetime suicide attempts but also predictors of lifetime suicide ideation, lifetime suicide plans among ideators, and lifetime attempts among ideators with and without a plan.

DSM-IV Mental Disorders

All adolescents completed a modified version of the World Health Organization CIDI, a fully-structured diagnostic interview administered by trained lay interviewers[16,21] modified for administration to adolescents.[15] The disorders examined were organized into 4 broad categories based on the results of an exploratory factor analysis reported elsewhere[23]: fear and anger disorders (panic disorder and/or agoraphobia, specific phobia, social phobia, and intermittent explosive disorder [IED]), distress disorders (separation anxiety disorder [SAD], posttraumatic stress disorder, major depressive disorder and/or dysthymia [MDD/DYS], and generalized anxiety disorder), disruptive behavior disorders (attention-deficit/hyperactivity disorder, oppositional defiant disorder, conduct disorder, and eating disorders [including anorexia nervosa, bulimia nervosa, and binge-eating disorder]), and substance abuse (alcohol and illicit drug abuse). We also assessed bipolar disorder (I or II). Parent reports were also obtained and were combined with adolescent reports to derive *DSM-IV* diagnoses for the 4 disorders shown in prior research to benefit most from inclusion of parental reports: MDD/DYS, attention-deficit/hyperactivity disorder, oppositional defiant disorder, and conduct disorder.[24,25] Adolescent and parent reports were combined using an "or" rule at the symptom level. An NCS-A clinical reappraisal study[14] showed good concordance between diagnoses based on the CIDI and self-administered questionnaire and independent clinical diagnoses in a subsample of NCS-A parent-adolescent pairs based on blinded administration of the Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present and Lifetime Version.[14,26]

Sociodemographic Variables

A number of sociodemographic variables were assessed using the CIDI: sex, race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, or other), parental education (less than a high school degree, a high school degree or General Education Development credential, some postsecondary education, or a college degree), birth order (first, last, and other), number of siblings (0, 1, 2, or ≥3), and number of biological parents living with the adolescent (0, 1, or 2). Information was collected in the surveys to date the transitions in time-varying variables (eg, respondent's age at birth of siblings and at parental death or divorce), allowing us to redefine these variables for each year of the respondent's life as time-varying predictors of onset of suicidality.

Treatment

Lifetime history of treatment for emotional or behavioral problems was assessed using questions from the Service Assessment for Children and Adolescents.[27,28] The entry question asked respondents whether they (for adolescent self-reports) or their child (for parent reports) ever "received services" for problems with "emotions or behavior" or "alcohol or drug use" from each of 11 different types of professionals or settings. Responses were collapsed into 6 treatment sectors: (1) mental health specialty (eg, psychiatrist or psychologist); (2) general medical (eg, primary care physician, nurse, or pediatrician); (3) human services (eg, counselor, crisis hotline, or religious/

Table 1. Lifetime Prevalence of Adolescent Suicidality in the National Comorbidity Survey Replication Adolescent Supplement

	Adolescents, % (SE)						
	Total Sample (N=6483)			Lifetime Ideators			
Variable	Ideation	Plan	Attempt	Plan (n=717)	Attempt (n=717)	Attempt Among Those With a Plan (n=203)	Attempt Among Those With No Plan (n=514)
Sex							
Female	15.3 (1.2)[a]	5.1 (0.8)[a]	6.2 (0.9)[a]	33.3 (4.1)	40.6 (3.9)[a]	69.9 (4.6)[a]	25.9 (5.8)[a]
Male	9.1 (0.8)	3.0 (0.6)	2.1 (0.5)	33.4 (5.2)	23.3 (4.9)	46.3 (9.8)	11.7 (2.8)
Total	12.1 (0.9)	4.0 (0.5)	4.1 (0.6)	33.4 (3.2)	33.9 (3.7)	60.8 (4.8)	20.4 (4.1)

[a] Significant sex difference at $P < .05$, determined by a 2-sided test.

spiritual advisor); (4) complementary-alternative medicine (eg, self-help group, support group, or other healer); (5) juvenile justice (eg, probation or juvenile corrections officer or court counselor); and (6) school services (eg, special school for emotional/behavioral problems, school counseling, or school nurse). No information was obtained about the content of the "services" received, which means that the characterization of services as "treatment" can be called into question with regard to human services, juvenile justice, and school services.

STATISTICAL ANALYSIS

Cross-tabulations were used to estimate the lifetime prevalence of suicidal behaviors, mental disorders, and treatment. Discrete-time survival analysis, with person-year the unit of analysis and a logistic link function, was used to examine associations of temporally primary (based on retrospective age-at-onset reports) mental disorders and subsequent first onset of suicidality.[29] Time was modeled as a separate dummy predictor variable for each year of life up to age at interview or age at onset of the outcome, whichever came first. Survival coefficients and their standard errors were exponentiated and reported as odds ratios (ORs) with 95% CIs. The results of both bivariate and multivariate models are reported to provide information on both gross and net associations of disorders with suicidal behaviors.

Multivariate survival models either assumed additivity (in predicting logits) or included nonadditive associations among comorbid mental disorders. The latter models included a separate dummy predictor variable for each disorder ("type dummies") and dummy predictor variables for number of disorders ("number dummies"). Relative odds of suicidal behaviors associated with a given comorbid cluster (compared with respondents with no disorders) correspond to the product of the type dummies and the number dummy for the respondent's number of disorders. For example, the relative odds of suicidal behaviors among respondents with a given set of 3 comorbid disorders would be the product of the 3 ORs for those particular disorders multiplied by the 3-disorder number dummy, where the latter was assumed to be constant for all respondents with any combination of exactly 3 or more comorbid disorders. This means that the ORs associated with the number dummies can be interpreted as multiplicative deviations from the associations of comorbid disorder clusters with the outcomes expected based on an additive model (ie, a model with type dummies but no number dummies).[30]

The Taylor series method[31] was used to estimate standard errors in the SUDAAN software system,[32] to adjust for sample weighting and clustering. Multivariate significance was examined using Wald χ^2 tests based on design-corrected coefficient variance-covariance matrices. Statistical significance was consistently evaluated using 2-sided tests with an α level of .05.

Individually significant coefficients were interpreted only if the equation in which they were estimated was significant as a whole in a multivariate test, an approach that minimizes the problem of false positives due to multiple comparisons while avoiding the problem of low power to detect true associations of moderate magnitude that is introduced by more conservative methods (eg, Bonferroni corrections).[33] Model comparisons were made using the Akaike information criterion.[34]

RESULTS

PREVALENCE AND AGE AT ONSET OF SUICIDAL BEHAVIORS

The lifetime prevalences of suicide ideation, plans, and attempts are 12.1%, 4.0%, and 4.1%, respectively (**Table 1**). One-third (33.4%) of ideators go on to develop a suicide plan, and 33.9% make an attempt. The proportions of ideators who go on to make an attempt are 60.8% of those with a plan compared with 20.4% of those without a plan, resulting in roughly 60% of first attempts being planned (57% among boys and 66% among girls) and the other 40% unplanned. All of these prevalence estimates are higher among girls than boys, with the exception of the proportion of ideators who go on to develop a plan and the proportion of attempts that are planned vs unplanned.

Age-at-onset curves show that the lifetime prevalence of suicide ideation is very low (<1%) through 10 years of age, then increases slowly through 12 years of age, and then more rapidly between 12 and 17 years of age (**Figure 1**). The prevalence of plans and attempts, in comparison, remains very low (<1%) through 12 years of age, then increases in roughly linear fashion through 15 years of age, and then more slowly until 17 years of age. Speed-of-transition curves show that the vast majority of adolescent transitions from ideation to plan (63.1%) and from ideation to attempt (86.1%) occur within the first year of onset of ideation (**Figure 2**). The vast majority (88.4%) of adolescent transitions from plan to attempt occur within the year of developing the plan.

SOCIODEMOGRAPHIC CORRELATES

Girls have significantly elevated odds of lifetime suicide ideation (OR = 1.7) and attempt (OR = 2.9) and, among
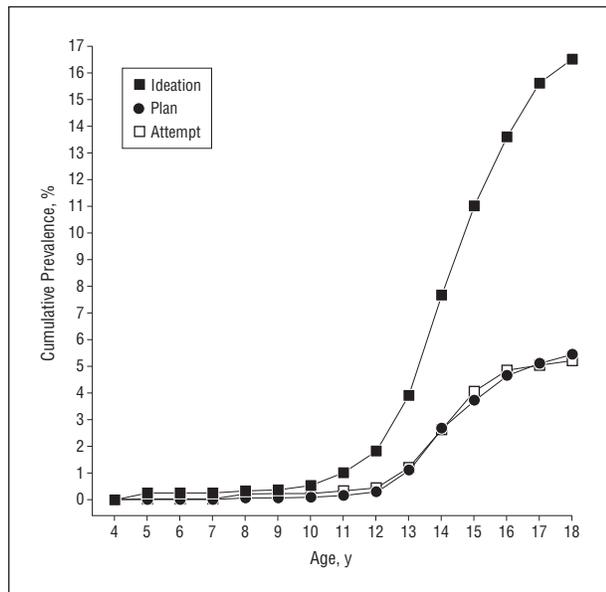
Figure 1. Age-at-onset curves of suicidal behaviors. Values are all 0.0 for children 1 to 4 years of age.
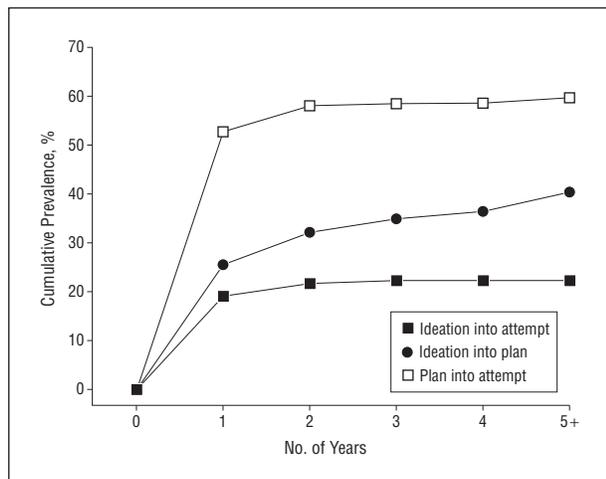
Figure 2. Speed of transition across suicidal behaviors.

ideators, of making an unplanned attempt (OR = 3.7), but they do not differ significantly from boys in either the transition from ideation to a plan (OR = 1.0) or the transition from plan to attempt (OR = 1.7) (**Table 2**). Non-Hispanic blacks have significantly lower odds of attempts (OR = 0.3) than do non-Hispanic whites, which can be traced to significantly lower odds of ideation (OR = 0.5) in conjunction with insignificantly lower conditional odds of plans among ideators (OR = 0.7) and attempts among both planners (OR = 0.4) and ideators without a plan (OR = 0.4). Hispanics and other race/ethnic groups, in comparison, do not differ significantly from non-Hispanic whites with regard to any of these odds.

The odds of an attempt are elevated among youths with a parent who graduated from high school (OR = 2.0) or completed some college (OR = 3.0) compared with those with a parent with either more (ie, college graduates) or less (ie, did not graduate from high school) education. These associations are due to significantly el-

evated odds of ideation among respondents whose parents have had some college education (OR = 1.4), nonsignificantly elevated conditional odds of a plan (OR = 1.9-2.0) and a planned attempt (OR = 1.3-1.4) among respondents whose parents completed high school or some college, and elevated odds of an unplanned attempt (significant only for the offspring of parents with some college education) in these 2 subsamples. Birth order and number of siblings are related only to one aspect of suicidality: significantly reduced odds of an unplanned attempt among the youngest children and those with 2 or more siblings (OR = 0.1). Finally, a significant relationship exists between living with 0 (OR = 4.1) or 1 parent (OR = 2.0) vs both biological parents and suicide attempt due to significantly elevated odds of ideation (OR = 2.8-1.8) and, among youth living with no biological parents, of both planned (OR = 6.2) and unplanned (OR = 3.7) attempts.

PREVALENCE OF MENTAL DISORDERS AMONG ADOLESCENTS WITH SUICIDAL BEHAVIORS

The vast majority of adolescents with a lifetime history of suicide ideation (89.3%) and attempts (96.1%) meet lifetime criteria for at least 1 of the 15 *DSM-IV*/CIDI disorders considered (**Table 3**). The prevalence of each disorder is elevated in virtually all subsamples of youths with suicidal behaviors, with 78.7% of these differences statistically significant at an α level of .05. The most prevalent lifetime disorder among suicidal adolescents is MDD/DYS, followed by specific phobia, oppositional defiant disorder, IED, substance abuse, and conduct disorder. The prevalence of mental disorders generally increases with increasing severity of suicidal behaviors (ie, suicide ideation < suicide plan < suicide attempt), although SAD shows the opposite pattern.

ASSOCIATIONS OF TEMPORALLY PRIMARY LIFETIME MENTAL DISORDERS WITH SUICIDE ATTEMPTS

Discrete-time survival analysis was used to examine associations of temporally primary lifetime mental disorders with the subsequent first onset of a suicide attempt. The results of bivariate models (ie, including only one disorder at a time) suggest that 13 of the 15 lifetime *DSM-IV* disorders examined are associated with significantly elevated odds of a subsequent suicide attempt (**Table 4**). Panic/agoraphobia and SAD are the exceptions. Significant ORs range from 4.5 to 7.4 for disruptive behavior disorders, from 4.1 to 12.3 for distress disorders, from 2.8 to 4.8 for substance disorders, and from 2.5 to 3.5 for fear/anger disorders. The OR for bipolar disorder is 8.8. The ORs become smaller in an additive multivariate survival model that includes all 15 mental disorders as predictors. The only significant positive predictors of suicide attempt in this additive model are posttraumatic stress disorder (OR = 3.3), MDD/DYS (OR = 6.2), oppositional defiant disorder (OR = 2.1), eating disorder (OR = 3.2), and bipolar disorder (OR = 2.9). Interestingly, there is a significant protective effect for SAD (OR = 0.3).

Table 2. Sociodemographic Predictors of Lifetime Suicidality[a]

	Odds Ratio (95% CI)					
	Total Sample (N=6483)		Lifetime Ideators			
Variable	Ideation	Attempt	Plan (n=717)	Attempt[b] (n=717)	Attempt Among Those With a Plan (n=203)	Attempt Among Those With No Plan (n=514)
Sex						
Female	1.7 (1.4-2.1)[c]	2.9 (1.8-4.8)[c]	1.0 (0.6-1.6)	2.4 (1.4-4.2)[c]	1.7 (0.6-4.6)	3.7 (1.7-8.2)[c]
Male						
χ^2_1 Value	36.1[c]	18.5[c]	0.0	10.1[c]	1.1	11.0[c]
Race/ethnicity						
Non-Hispanic white						
Non-Hispanic black	0.5 (0.3-0.7)[c]	0.3 (0.2-0.6)[c]	0.7 (0.3-1.3)	0.7 (0.3-1.8)	0.3 (0.0-3.0)	0.4 (0.1-1.7)
Hispanic	1.4 (0.9-2.0)	1.7 (0.8-3.5)	0.7 (0.4-1.5)	2.2 (0.8-5.6)	2.8 (0.6-13.1)	2.1 (0.6-6.9)
Other	0.9 (0.6-1.3)	0.7 (0.2-1.9)	0.4 (0.1-1.2)	1.0 (0.2-4.4)	0.8 (0.1-4.7)	0.7 (0.1-4.1)
χ^2_3 Value	36.8[c]	22.2[c]	5.1	3.5	3.4	3.3
Highest level of parental education						
<High school	0.9 (0.6-1.3)	1.0 (0.4-2.9)	1.9 (0.9-4.2)	1.0 (0.3-3.2)	0.3 (0.1-1.3)	1.6 (0.4-6.3)
High school	1.0 (0.7-1.4)	2.0 (1.0-3.9)[c]	1.9 (1.0-3.9)	1.7 (0.8-4.0)	1.3 (0.5-3.5)	1.8 (0.5-6.3)
Some college	1.4 (1.1-1.9)[c]	3.0 (2.0-4.6)[c]	2.0 (1.0-4.2)	2.2 (1.1-4.4)[c]	1.5 (0.5-4.1)	3.4 (1.4-8.4)[c]
College graduate						
χ^2_3 Value	8.1[c]	37.9[c]	5.1	8.6[c]	5.2	8.5[c]
Birth order						
Oldest	1.1 (0.8-1.4)	0.9 (0.5-1.5)	0.9 (0.3-2.5)	1.0 (0.5-2.2)	2.0 (0.5-8.5)	0.5 (0.2-1.0)
Youngest	0.9 (0.7-1.3)	0.8 (0.4-1.6)	1.7 (0.7-4.0)	0.6 (0.3-1.6)	2.7 (0.5-14.8)	0.1 (0.0-0.4)[c]
Other						
χ^2_2 Value	0.8	0.3	3.9	1.6	1.5	11.7[c]
No. of siblings						
None						
1	0.9 (0.6-1.5)	0.5 (0.2-1.5)	0.7 (0.3-1.9)	0.4 (0.1-1.2)	0.2 (0.0-1.1)	0.3 (0.0-1.7)
2	0.9 (0.5-1.7)	0.5 (0.2-1.2)	0.6 (0.2-1.6)	0.3 (0.1-1.0)	0.3 (0.0-1.9)	0.1 (0.0-0.9)[c]
≥3	1.0 (0.6-1.6)	0.5 (0.2-1.3)	1.1 (0.3-3.7)	0.4 (0.1-1.4)	1.1 (0.1-8.2)	0.1 (0.0-0.5)[c]
χ^2_3 Value	0.1	2.6	5.6	3.9	8.5[c]	9.7[c]
No. of biological parents living with adolescent						
None	2.8 (2.0-3.9)[c]	4.0 (2.3-7.0)[c]	1.0 (0.5-2.1)	3.0 (1.4-6.2)[c]	7.1 (2.6-19.6)[c]	3.4 (1.1-9.8)[c]
1	1.8 (1.2-2.7)[c]	2.0 (1.1-3.8)[c]	1.6 (1.0-2.5)	1.3 (0.6-2.8)	0.9 (0.3-3.1)	1.3 (0.5-3.3)
2						
χ^2_2 Value	43.0[c]	30.4[c]	4.0	10.4[c]	17.4[c]	5.5
χ^2_{13} Value	255.6[c]	336.2[c]	29.4[c]	119.6[c]	50.0[c]	34.2[c]

[a] Results are based on multivariate discrete-time survival models with person-year the unit of analysis, a logistic link function, and person-year defined as a separate dummy predictor variable for each year of life.
[b] An additional control was included in this model for lifetime suicide plan.
[c] Significant sex difference at $P < .05$, determined by a 2-sided test.

The additive multivariate survival model implicitly assumes that the odds of a suicide attempt among respondents with comorbid disorders will equal the product of the ORs associated with individual disorders. However, a nonadditive model that includes additional number-of-disorder dummies for exactly 2 and 3 or more disorders fits the observed data better than the additive model (Akaike information criterion of 2354.8 for the additive model and of 2340.4 for the nonadditive model, with the preferred model being the one with the lower Akaike information criterion) (**Table 5**). A comparison of coefficients in the 2 models shows that 5 of the same 6 disorders are significant, but with positive ORs consistently lower in the nonadditive model because the odds of an attempted suicide are 1.5 times the product of the ORs of the component disorders among respondents with 2 comorbid disorders and 3.4 times that product among respondents with 3 or more comorbid disorders.

We used the same nonadditive model to predict lifetime ideation in the total sample and lifetime plans and attempts among ideators, in an effort to decompose the associations of temporally prior mental disorders with suicide attempts through the more proximal outcomes. The results show that prior mental disorders are most strongly associated with suicide ideation (12 disorders have ORs greater than 1.0 [7 of them significant], and the ORs of comorbidity are significantly greater than 1.0). Conditional associations of mental disorders with suicide plans among ideators are weaker and less consistent (6 disorders have ORs greater than 1.0 [1 of them significant], but with the OR for illicit drug abuse significantly less

Table 3. Lifetime Prevalence of *DSM-IV*/CIDI Mental Disorders Among Respondents With vs Without Lifetime Suicidality[a]

	Adolescents, % (SE)					
	Total Sample			Lifetime Ideators		No Lifetime Suicidality[c] (n = 5766)
Disorder	Ideation (n = 717)	Plan (n = 203)	Attempt (n = 196)	Planned Attempt[b] (n = 112)	Unplanned Attempt (n = 84)	
Fear/anger disorders						
Specific phobia	36.8 (2.7)[d]	39.0 (6.2)[d]	44.3 (6.3)[d]	40.7 (8.8)[d]	49.6 (12.8)[d]	17.6 (1.0)
Panic disorder and/or agoraphobia	10.1 (1.8)[d]	10.6 (2.7)[d]	10.4 (3.0)	10.8 (3.6)	9.8 (4.1)	4.0 (0.5)
Social phobia	19.9 (2.9)[d]	16.2 (2.8)[d]	25.6 (7.0)[d]	17.7 (4.3)[d]	37.5 (15.0)	7.0 (0.5)
Intermittent explosive disorder	29.4 (2.6)[d]	35.7 (5.5)[d]	35.2 (7.0)[d]	42.1 (8.4)[d]	24.9 (8.8)	11.5 (0.7)
Distress disorders						
Separation anxiety disorder	11.9 (2.1)	8.9 (2.7)	7.0 (2.2)	3.9 (1.6)	11.5 (4.8)	7.0 (0.5)
Posttraumatic stress disorder	16.1 (2.1)[d]	27.9 (4.3)[d]	25.7 (5.4)[d]	34.2 (5.9)[d]	13.0 (6.2)	3.1 (0.3)
MDD/DYS	56.8 (3.4)[d]	69.7 (4.7)[d]	75.7 (4.7)[d]	76.7 (6.7)[d]	74.3 (8.2)[d]	13.3 (0.9)
Generalized anxiety disorder	8.4 (1.7)[d]	10.3 (3.1)	9.2 (3.5)[d]	11.2 (5.0)	6.2 (2.7)	1.6 (0.3)
Disruptive behavior disorders						
ADHD	16.3 (2.6)[d]	19.0 (5.4)[d]	21.5 (4.6)[d]	23.5 (8.0)	18.5 (6.0)	7.0 (0.6)
Oppositional defiant disorder	34.4 (3.9)[d]	41.6 (5.0)[d]	50.0 (8.0)[d]	51.5 (6.1)[d]	47.8 (13.9)[d]	9.6 (0.8)
Conduct disorder	20.2 (4.4)[d]	22.8 (5.3)[d]	33.5 (10.2)[d]	26.9 (7.6)[d]	43.3 (13.8)[d]	5.0 (0.7)
Any eating disorder	15.8 (2.8)[d]	11.9 (3.7)	26.7 (6.9)[d]	15.3 (5.9)	43.7 (14.4)[d]	4.0 (0.6)
Substance abuse[e]						
Alcohol abuse	18.4 (2.0)[d]	28.6 (5.3)[d]	24.3 (4.4)[d]	34.4 (7.9)[d]	9.2 (3.5)	4.6 (0.5)
Illicit drug abuse	27.4 (2.9)[d]	28.0 (4.5)[d]	34.7 (6.1)[d]	27.5 (6.0)[d]	45.3 (13.9)[d]	6.4 (0.6)
Other disorders						
Bipolar I or II	9.1 (1.8)[d]	11.9 (4.2)[d]	13.2 (4.3)[d]	18.6 (6.5)[d]	5.2 (2.5)	2.2 (0.3)
Any disorder	89.3 (1.3)[d]	93.6 (2.2)[d]	96.1 (1.8)[d]	96.7 (2.5)[d]	95.2 (2.8)[d]	49.5 (1.3)

Abbreviations: ADHD: attention-deficit/hyperactivity disorder; CIDI, Composite International Diagnostic Interview; MDD/DYS, major depressive disorder and/or dysthymia.
[a] The sample was restricted to adolescents with the outcomes defined in the column headings.
[b] The sample was restricted to adolescents who had a lifetime plan.
[c] The sample was restricted to adolescents who never displayed any suicidal behavior.
[d] Significant difference in prevalence from respondents who had no history of suicidal behavior at $P < .05$, determined by a 2-sided test.
[e] With or without a history of dependence.

than 1.0). Conditional associations of mental disorders with attempts among ideators, controlling for plans, are somewhat weaker and less consistent than with plans (9 disorders have ORs greater than 1.0 [3 of them significant], but with the OR for alcohol abuse significantly less than 1.0). Having a plan, in comparison, is strongly associated with elevated odds of an attempt among ideators (OR = 5.3).

We also found that significant global interactions between type/number of disorders and plans were predictors of attempts among ideators ($\chi^2_{17} = 65.0$, $P < .001$). However, the multicollinearity due to high comorbidity among respondents with suicide plans made it impossible to estimate a model with all 17 type/number coefficients separately for ideators with and without a plan. We were able to estimate a stable model, though, by constraining ORs for particular types/numbers of disorders to be the same in predicting both planned and unplanned attempts unless the interaction of the predictor with plans in the pooled model was significant at the α level of .05 and had an estimated variance inflation factor (a diagnostic test suggesting that a regression coefficient might be affected by multicollinearity) of less than 10.0. The final model, constrained in this way, included the interactions of 3 disorders with plans: IED, SAD, and conduct disorder. This model fits the data better than a model with no interactions between disorders and plans (an Akaike information criterion of 1041.9 for the model with interac-

tions vs an Akaike information criterion of 1083.6 without interactions). Only half of the 12 disorders with the same ORs predicting planned and unplanned attempts are greater than 1.0, of which 2 are significant (OR = 2.5 for attention-deficit/hyperactivity disorder and OR = 5.3 for eating disorders), and one other OR is significantly less than 1.0 (OR = 0.3 for alcohol abuse). Two of the 3 disorders with ORs that differ in predicting planned and unplanned attempts are significant only in predicting planned attempts (OR = 4.2 for IED and OR = 0.1 for SAD). The other is significant only in predicting unplanned attempts (OR = 8.0 for conduct disorder).

It is instructive to trace out the significant associations of type/number of disorders with suicide attempts in the total sample through more proximal outcomes (ie, ideation, plans among ideators, and attempts among ideators with or without a plan). All 4 of the disorders with significant ORs greater than 1.0 predicting suicide attempt in the total sample (posttraumatic stress disorder, MDD/DYS, eating disorders, and bipolar disorder) have significant ORs predicting ideation (1.7-4.1). This is the only significant OR for 2 of these 4 disorders (posttraumatic stress disorder and bipolar disorder), although the ORs of these disorders with other intermediate outcomes are all elevated (1.2-2.2). In the case of MDD/DYS, in comparison, most of the ORs with intermediate outcomes are also significantly greater than 1.0, although the OR with ideation (4.1) is higher than the ORs with the intermediate

Table 4. Bivariate and Multivariate Associations of Temporally Primary *DSM-IV*/CIDI Disorders With First Onset of Lifetime Suicide Attempts in the Total Sample (N=6483)[a]

| | Odds Ratio (95% CI) | |
Disorder	Bivariate Model[b]	Multivariate Model[b]
Fear/anger disorders		
Specific phobia	2.5 (1.7-3.8)[c]	1.2 (0.8-1.8)
Panic disorder and/or agoraphobia	1.9 (0.9-4.3)	1.1 (0.4-3.1)
Social phobia	2.5 (1.4-4.3)[c]	0.8 (0.4-2.0)
Intermittent explosive disorder	3.5 (1.7-7.5)[c]	1.7 (0.8-3.6)
Distress disorders		
Separation anxiety disorder	0.8 (0.3-1.7)	0.3 (0.1-0.7)[c]
Posttraumatic stress disorder	7.3 (3.7-14.4)[c]	3.3 (2.0-5.5)[c]
MDD/DYS	12.3 (8.0-19.0)[c]	6.2 (3.8-10.0)[c]
Generalized anxiety disorder	4.1 (1.4-11.8)[c]	0.9 (0.2-3.4)
Disruptive behavior disorders		
ADHD	4.8 (2.9-8.0)[c]	1.9 (1.0-3.7)
Oppositional defiant disorder	7.2 (4.0-12.8)[c]	2.1 (1.2-3.6)[c]
Conduct disorder	4.5 (2.6-7.9)[c]	1.0 (0.5-2.2)
Any eating disorder	7.4 (4.1-13.6)[c]	3.2 (1.5-7.0)[c]
Substance abuse[d]		
Alcohol abuse	2.8 (1.2-6.3)[c]	1.1 (0.5-2.4)
Illicit drug abuse	4.8 (2.5-9.1)[c]	1.3 (0.5-3.3)
Other disorders		
Bipolar I or I	8.8 (3.8-20.1)[c]	2.9 (1.0-7.9)[c]

Abbreviations: ADHD: attention-deficit/hyperactivity disorder; AIC, Akaike information criterion; CIDI, Composite International Diagnostic Interview; MDD/DYS, major depressive disorder and/or dysthymia.

[a] Results are based on multivariate discrete-time survival models with person-year the unit of analysis, a logistic link function, and person-year defined as separate dummy predictor variables for each year of life. Both models control for the sociodemographic variables in Table 2. Lifetime predictor disorders are coded as present only if their age at onset is less than or equal to the age when the respondent made his or her first suicide attempt.

[b] The bivariate model includes only 1 mental disorder in each equation, whereas the multivariate model includes all 15 mental disorders in the same equation. The addition of the 15 disorders to the predictor set in the multivariate model is an improvement on the sociodemographic model in Table 2 (AIC=2862.4 for the sociodemographic model and AIC=2354.8 for the model that added the 15 mental disorders; the model with the lower AIC is the preferred model).

[c] Significant at $P < .05$, determined by a 2-sided test.

[d] With or without a history of dependence.

outcomes (all of which are in the range of 2.0-2.4). In the case of eating disorders, the OR predicting ideation is significantly elevated (1.5), the OR predicting a plan among ideators is insignificant (0.6), and the OR predicting an attempt among ideators, controlling for a plan, is significantly elevated (4.5). The only significant component OR in the case of SAD, the one disorder associated with significantly reduced odds of a suicide attempt in the total sample (0.3), is with attempt among planners (0.1). Finally, the elevated ORs of comorbidity with suicide attempts in the total sample are due to significant ORs with ideation (1.9) and insignificantly elevated ORs with a plan among ideators (1.5-2.3).

TREATMENT OF SUICIDAL ADOLESCENTS

Most adolescents with suicide ideation (80.2%), a plan (87.5%), or an attempt (94.2%) have received some form of treatment, although it is important to remember the

caution raised in the section on measures that some proportion of the "services" received in the human services, juvenile justice, and school services sectors might not have qualified as "treatment" (**Table 6**). The most common form of treatment was from a mental health specialist (66.4%-86.2% across outcomes), followed by school-based services (40.6%-68.0%), general medical treatment (25.8%-41.1%), human services (21.1%-40.2%), complementary-alternative medicine (17.3%-25.1%), and the juvenile justice system (10.2%-17.7%).

We next examined whether lifetime treatment was first received before the year the adolescent first experienced each type of suicidal behavior, the same year, or only after the first instance of suicidal behavior. These analyses reveal that most suicidal adolescents (55.3%-73.2% across outcomes) receive some form of treatment before the onset of suicidal behavior—most often mental health or school-based services. The prevalence of first receiving treatment is substantially lower during the same year as the onset of suicidal behavior (10.8%-18.2%) and in the years following the first instance of suicidal behavior (8.1%-12.4%).

COMMENT

Our study presented nationally representative data on the lifetime prevalence, correlates, and treatment of adolescent suicidal behaviors. We estimate that 12.1% of US adolescents experience suicide ideation, 4.0% develop a suicide plan, and 4.1% attempt suicide. These estimates are consistent with those reported in prior studies using smaller samples.[1-3] Nationally representative studies of adults have reported that the first onset of suicidal behaviors increases dramatically during adolescence.[35] The present study provides a more fine-grained picture of these increases and extends prior studies in documenting that approximately one-third of youth with suicide ideation go on to develop a suicide plan during adolescence, approximately 60% of those with a plan will attempt suicide, and most of the adolescents who make this transition do so within the first year after onset. This information is important not only for a scientific understanding of suicidal behaviors but for the monitoring of risk among suicidal adolescents and for public health efforts to identify those at risk for attempting suicide. These findings also inform the debate about the use of suicide ideation as a surrogate end point in clinical trials[36] and argue strongly for the close monitoring of adolescents with a suicide plan, especially during the first year of onset.

The elevated odds of suicidal behavior among girls and the lower odds among non-Hispanic blacks are consistent with prior studies.[1,3,7,37] It is well documented that, although females have higher rates of nonlethal suicidal behavior, males have higher rates of suicide death—a difference due in part to the more lethal methods used by males in their suicide attempts (eg, firearms). We also observed elevated odds of suicidal behavior among adolescents whose parents had intermediate levels of education and lower odds of suicidal behavior among those living with biological parents and having more siblings. These latter 2 findings, also consistent with previous re-

Lifetime DSM-IV Disorder	Odds Ratio (95% CI)				
	Total Sample (N=6483)		Lifetime Ideators		
	Ideation	Attempt	Plan (n=717)	Attempt With a Control for Plan[b] (n=514)	Attempt With Interactions by Plan[b] (n=203)
Fear/anger disorders					
Specific phobia	1.2 (0.9-1.6)	1.0 (0.6-1.6)	1.1 (0.6-2.0)	0.9 (0.5-1.8)	1.0 (0.5-2.0)
Panic disorder and/or agoraphobia	1.1 (0.6-1.8)	0.9 (0.4-2.3)	0.9 (0.4-2.2)	0.9 (0.3-2.9)	0.8 (0.3-2.3)
Social phobia	1.0 (0.7-1.4)	0.7 (0.3-1.7)	0.7 (0.3-1.4)	1.0 (0.3-3.6)	1.0 (0.3-3.9)
Intermittent explosive disorder	1.5 (1.0-2.1)[c]	1.4 (0.7-3.0)	1.4 (0.8-2.4)	1.6 (0.7-3.4)	
With a suicide plan					4.2 (1.7-10.0)[c]
Without a suicide plan					0.5 (0.1-1.7)
Distress disorders					
Separation anxiety disorder	0.7 (0.4-1.2)	0.3 (0.1-0.6)[c]	0.4 (0.1-1.2)	0.4 (0.1-1.1)	
With a suicide plan					0.1 (0.0-0.3)[c]
Without a suicide plan					1.0 (0.4-2.9)
Posttraumatic stress disorder	1.7 (1.2-2.4)[c]	2.6 (1.5-4.5)[c]	2.0 (0.9-4.2)	1.2 (0.5-2.7)	1.6 (0.7-3.7)
Major depressive disorder or dysthymia	4.1 (3.0-5.5)[c]	4.3 (2.3-8.3)[c]	2.0 (1.1-3.8)[c]	2.4 (1.1-5.2)[c]	2.0 (1.0-4.1)
Generalized anxiety disorder	1.1 (0.6-1.8)	1.0 (0.3-3.1)	0.8 (0.4-1.8)	0.8 (0.2-2.7)	0.8 (0.2-2.9)
Disruptive behavior disorders					
Attention-deficit/hyperactivity disorder	1.1 (0.7-1.7)	1.6 (0.9-2.9)	0.9 (0.5-1.5)	2.1 (0.9-4.8)	2.5 (1.1-5.5)[c]
Oppositional defiant disorder	1.6 (1.1-2.3)[c]	1.5 (0.8-2.9)	0.7 (0.4-1.4)	1.3 (0.6-2.6)	1.4 (0.7-2.9)
Conduct disorder	0.8 (0.5-1.2)	0.9 (0.5-1.8)	0.9 (0.5-1.7)	3.2 (1.6-6.3)[c]	
With a suicide plan					1.0 (0.4-2.7)
Without a suicide plan					8.0 (3.5-18.3)[c]
Any eating disorder	1.5 (1.1-2.2)[c]	2.8 (1.4-5.4)[c]	0.6 (0.2-1.8)	4.5 (1.8-11.2)[c]	5.3 (2.0-14.0)[c]
Substance abuse[d]					
Alcohol abuse	2.5 (1.5-4.1)[c]	0.9 (0.4-1.9)	1.4 (0.5-3.8)	0.4 (0.2-0.8)[c]	0.3 (0.1-1.0)[c]
Illicit drug abuse	1.5 (0.9-2.6)	1.3 (0.6-2.9)	0.4 (0.2-0.8)[c]	1.0 (0.4-2.3)	0.8 (0.3-2.1)
Other disorders					
Bipolar I or II	1.7 (1.0-2.8)[c]	2.6 (1.1-6.0)[c]	1.9 (0.8-4.9)	2.3 (0.8-6.4)	2.2 (0.7-7.2)
No. of disorders					
2 disorders	1.9 (1.3-2.9)[c]	1.5 (0.7-3.3)	1.5 (0.7-3.3)	0.7 (0.3-1.7)	0.7 (0.2-2.1)
≥3 disorders	1.9 (1.0-3.7)[c]	3.4 (1.0-11.9)[c]	2.3 (0.7-7.4)	0.7 (0.2-2.4)	0.7 (0.2-2.4)
Suicide plan				5.3 (3.2-8.8)[c]	5.0 (2.4-10.5)[c]

[a] Results are based on discrete-time survival models. Models control for all the demographic variables from Table 2 and person-years (each year coded as a dichotomous dummy, starting from year 4). Time-varying disorders were not time-lagged (turns on the year of onset for the disorder).

[b] A dummy predictor variable for having a plan was included in both models. In the model that merely controlled for plan, this was the only additional predictor, which means that it was implicitly assumed that the odds ratios of temporally primary disorders predicting a subsequent attempt were the same for planned and unplanned attempts. In the model that also included interactions, subgroup coding was used to estimate odds ratios of disorders separately with planned and unplanned attempts for the subset of disorders in which the difference between these 2 odds ratios was found to be statistically significant and stable.

[c] Significant at $P < .05$, determined by a 2-sided test.

[d] With or without a history of dependence.

ports,[11,38,39] might reflect the influences of social support, which acts as a buffer against stress or psychopathology, or might be a marker of low exposure to adversity and/or low genetic risk.

Our study also provides new information about the associations of temporally primary mental disorders with subsequent adolescent suicidal behaviors.[1,5,6,8,9] The rates of prior mental disorders among suicidal adolescents found in our study are somewhat higher than the rates found in previous community studies of adolescents[1-3] and adults,[40] possibly reflecting the fact that the NCS-A examined more disorders than previous studies. Although virtually all of the mental disorders examined were predictors of a suicide attempt in bivariate models, these associations were largely explained by mental disorders as predictors of suicide ideation. Among adolescents with ideation, only MDD/dysthymia predicted the development of a suicide plan, and only a handful of disorders

were predictors of the transition from ideation to a suicide attempt (ie, MDD/dysthymia, eating disorders, attention-deficit/hyperactivity disorder, conduct disorder [only for unplanned attempt] and IED [only for planned attempt]). These findings are consistent with recent findings in epidemiological studies of adults, in which MDD emerged as the strongest predictor of suicidal thoughts compared with disorders characterized by anxiety, agitation, and poor behavioral control, which were the strongest predictors of a suicide attempt among ideators.[22,40]

Several of the findings raise questions that require further study and theorizing. Our finding that IED is a predictor of only planned, not unplanned, suicide attempts is surprising given the impulsive nature of IED. Notably, though, we observed this same pattern in 2 prior studies,[22,40] which suggests that it is not merely a chance finding in the present study. Future research is needed to study this association in more depth in the context of a broader

Table 6. Lifetime Treatment Among Respondents With Suicide Behavior[a]

	Adolescents, % (SE)				
	Total Sample			Lifetime Ideators	
Treatment Sector for Lifetime Cases	Ideation (n=717)	Plan (n=203)	Attempt (n=196)	Planned Attempt[b] (n=112)	Unplanned Attempt (n=84)
Any lifetime treatment					
Mental health specialty	66.4 (2.6)	72.7 (4.5)	82.1 (4.3)	79.4 (5.4)	86.2 (5.5)
General medical	25.8 (2.5)	34.0 (5.3)	37.0 (4.4)	41.1 (8.3)	30.9 (9.1)
Human service	25.3 (2.8)	34.0 (5.0)	32.6 (6.1)	40.2 (6.6)	21.1 (7.4)
CAM	19.6 (2.3)	25.1 (4.2)	21.9 (4.7)	25.0 (5.3)	17.3 (5.8)
Juvenile justice	10.2 (2.1)	12.6 (3.7)	16.8 (4.4)	17.7 (5.2)	15.4 (5.9)
School service	46.4 (2.4)	61.9 (5.1)	57.0 (4.9)	68.0 (6.0)	40.6 (11.7)
Any treatment	80.2 (1.8)	87.5 (2.8)	94.2 (1.9)	93.6 (3.0)	95.1 (2.1)
Treatment before onset of suicidal behavior					
Mental health specialty	39.6 (2.7)	43.2 (4.9)	48.4 (4.7)	40.5 (6.8)	60.2 (10.7)
General medical	13.1 (2.1)	20.5 (5.4)	21.0 (4.7)	28.0 (8.0)	10.7 (4.9)
Human service	12.9 (2.6)	17.1 (5.0)	14.7 (4.3)	17.1 (5.6)	11.0 (4.6)
CAM	9.2 (1.8)	13.4 (4.3)	12.8 (3.9)	13.4 (5.0)	11.8 (4.5)
Juvenile justice	1.8 (0.6)	2.0 (1.1)	3.7 (1.5)	2.2 (1.5)	5.9 (3.4)
School service	30.6 (2.1)	43.3 (5.4)	39.0 (5.3)	45.5 (8.7)	29.2 (8.5)
Any treatment	55.3 (3.2)	61.7 (4.7)	67.1 (5.7)	63.0 (5.9)	73.2 (7.3)
Treatment in the same year as onset of suicidal behavior					
Mental health specialty	12.7 (1.9)	14.8 (3.8)	11.8 (3.5)	12.2 (3.7)	11.2 (5.1)
General medical	5.0 (0.9)	7.4 (2.6)	4.9 (1.8)	3.7 (2.2)	6.6 (3.1)
Human service	5.4 (1.2)	10.1 (3.3)	8.7 (3.0)	12.4 (4.7)	3.1 (2.2)
CAM	4.5 (1.2)	4.1 (2.5)	3.1 (1.3)	3.3 (1.7)	2.8 (1.7)
Juvenile justice	2.4 (1.0)	1.3 (0.8)	2.1 (1.0)	1.9 (1.2)	2.4 (1.7)
School service	5.1 (1.2)	7.7 (2.7)	3.8 (1.4)	2.8 (1.3)	5.4 (2.7)
Any treatment	13.1 (1.6)	17.7 (4.2)	15.2 (3.7)	18.2 (5.3)	10.8 (3.7)
Treatment after onset of suicidal behavior					
Mental health specialty	14.1 (2.0)	14.7 (5.6)	22.0 (3.9)	26.8 (7.9)	14.8 (5.7)
General medical	7.8 (1.3)	6.0 (2.1)	11.1 (2.6)	9.4 (4.3)	13.6 (5.8)
Human service	7.0 (1.4)	6.8 (3.1)	9.2 (3.1)	10.7 (4.7)	7.0 (2.7)
CAM	5.9 (1.0)	7.6 (1.8)	6.0 (1.8)	8.3 (2.7)	2.7 (1.6)
Juvenile justice	6.0 (1.6)	9.3 (3.3)	11.0 (3.7)	13.6 (5.0)	7.1 (4.4)
School service	10.8 (2.0)	10.9 (3.3)	14.2 (3.9)	19.7 (5.4)	6.1 (2.6)
Any treatment	11.9 (2.4)	8.1 (3.2)	11.9 (4.4)	12.4 (5.1)	11.1 (5.0)

Abbreviation: CAM, complementary-alternative medicine.
[a] The sample was restricted to adolescents with the outcomes defined in the column headings.
[b] The sample was restricted to adolescents who had a lifetime plan.

investigation of the roles of impulsiveness and planning in suicidal behaviors. Another interesting finding was that SAD was associated with consistently low odds of all subsequent suicidal behaviors (and significantly so for planned suicide attempts). Although speculative, it may be that adolescents who fear leaving their parents are less likely to act on suicidal thoughts and plans for fear of losing them. Prior studies have found that anxiety disorders protect against oppositional/aggressive behavior.[41] A similar process might exist for suicidal behavior. Nevertheless, given the large number of coefficients examined, the significant association of SAD with reduced odds of a suicide attempt among planners should be considered no more than provisional until replicated in independent samples.

Several aspects of the results regarding treatment are especially noteworthy. The fact that most suicidal adolescents who receive treatment see a mental health specialist suggests that these adolescents are getting access to those most qualified to treat them. In addition, the fact that the proportion of adolescents in treatment increases with severity (ie, from ideation to having a plan to attempting suicide) implies that the treatment system is responsive to variation in severity. However, it is noteworthy that suicidal adolescents typically enter treatment before rather than after the onset of suicidal behaviors. This means that mental health professionals are not simply meeting with adolescents in response to their suicidal thoughts or behaviors, but that adolescents who are clinically severe enough to become suicidal more typically enter treatment before the onset of suicidal behaviors. There is no way to know from the NCS-A data how often this early intervention prevents the occurrence of suicidal behaviors that would otherwise have occurred but were not observed in our data. It is clear, though, that treatment does not always succeed in this way because the adolescents in the NCS-A who received treatment prior to their first attempt went on to make an attempt anyway. This finding is consistent with recent data highlighting the difficulty of reducing suicidal thoughts and

behaviors among adolescents.[42] We are unaware of any prior epidemiologic data on the lifetime treatment of suicidal adolescents, so there is no basis for comparison of our findings with those of previous studies. However, a recent report found that the rate of 12-month treatment of adults with suicidal behavior in 21 countries averaged 40% and was higher in the United States (63%-82%).[43,44] The slightly higher rate of treatment observed in the present study than in these adult studies reflects the fact that we examined lifetime treatment rather than 12-month treatment and that the prevalence of mental disorders among those with suicidal behaviors, which is associated with increased probability of treatment,[45] was higher in the NCS-A than in the other studies.

These findings should be interpreted in light of several limitations. First, the results are based on retrospective self-reports that may be subject to recall bias. Second, mental disorders were assessed with a fully-structured instrument rather than by clinical assessment, although this limitation is tempered somewhat by the good concordance between survey diagnoses and blinded clinical diagnoses.[14] Third, several disorders known to be associated with suicidal behavior were not examined (eg, schizophrenia and personality disorders). Fourth, some of the disorders that were found to be significant are likely to have been false positives owing to the large number of tests performed. Consequently, regarding these associations, it is important to consider the results to be provisional until they are replicated. Fifth, we examined only a limited set of predictors. For example, we did not consider health risk behaviors, protective factors, or family-community predictors. Sixth, we focused only on onset of suicidal behaviors and did not examine either severity or persistence or inquire specifically about intent to die. Seventh, we did not validate reports of treatment, nor did we examine the adequacy of treatment. These limitations notwithstanding, our study provides valuable new information about suicidal behaviors among adolescents. The results point to the need for future work to increase our understanding of the dramatic increase in suicidal behaviors during adolescence, of the causal pathways linking child-adolescent mental disorders to adolescent suicidal behaviors, and of actionable strategies for clinical prediction and prevention of these behaviors.

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