

# Suicide and Friendships Among American Adolescents

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Although suicide rates for most subpopulations tend to be stable over time, the suicide rate among adolescents has risen dramatically in recent years. Suicide is now the third leading cause of death among adolescents and young adults aged 15 to 24 years.<sup>1</sup> Although only 1 in 200 suicide attempts results in death, more than one third of all suicide attempts result in injuries serious enough to require professional treatment. Four percent of American adolescents reported at least 1 attempted suicide in the past year, and 13% of adolescents had seriously considered suicide at least once in the past year.<sup>2</sup> The broader impact of suicide on adolescents is substantial. Twenty percent of adolescents reported knowing a friend who had attempted suicide in the past year, and 60% reported knowing a teenager who had ever attempted suicide.<sup>2,3</sup> Because of this prevalence, it is critical that we understand the determinants of adolescent suicidality for effective identification of adolescents at risk.

Many of the basic risk factors for adolescent suicidality are well known; among these, the most important are depression,<sup>2,4-6</sup> exposure to suicide or suicide attempts by family or friends,<sup>7,8</sup> substance or alcohol abuse,<sup>9</sup> and having guns in the home.<sup>2,10,11</sup> Furthermore, in light of the differential rates of suicidal ideation and suicide attempts for adolescent males and females, some studies have suggested different etiologies for girls and boys.<sup>6,9,12-14</sup> However, most of the previous studies of adolescent suicide have relied on small samples of psychiatric inpatients,<sup>4,15</sup> case-control designs,<sup>16,17</sup> or autopsy studies of completed suicides. Few longitudinal population-based studies have examined risk factors from multiple domains.

We used data from a nationally representative sample of adolescents in the United States and examined the relative importance of various risk factors associated with both suicidal ideation and suicide attempts. In addition to measuring previously identified risk factors, we assessed the potential role that

**Objectives.** We investigated the relationship between friendships and suicidality among male and female adolescents.

**Methods.** We analyzed friendship data on 13 465 adolescents from the National Longitudinal Survey of Adolescent Health to explore the relationship between friendship and suicidal ideation and suicide attempts. We controlled for known factors associated with suicidality.

**Results.** Having had a friend who committed suicide increased the likelihood of suicidal ideation and attempts for both boys and girls. Socially isolated females were more likely to have suicidal thoughts, as were females whose friends were not friends with each other. Among adolescents thinking about suicide, suicide attempts appear largely stochastic, with few consistent risk factors between boys and girls.

**Conclusions.** The friendship environment affects suicidality for both boys and girls. Female adolescents' suicidal thoughts are significantly increased by social isolation and friendship patterns in which friends were not friends with each other. (*Am J Public Health.* 2004;94:89-95)

friendship patterns play in shaping adolescent suicidality. Because our sample was large, we were able to compare the patterns of risks for boys and girls separately and to model the risks of both suicidal thoughts and suicide attempts.

Adolescent well-being is largely the product of interactions among the multiple contexts in which adolescents are embedded.<sup>2</sup> Central contexts for adolescents include family, school, friendships, romantic relationships, peer groups, and larger social networks. The National Longitudinal Study of Adolescent Health (Add Health) provides unique data on adolescents' relationships with their friends, in that it is the only national level data set to provide information on network structure. These data allow for measurement of adolescent social network position, the quality of adolescents' social relations with peers, and the structural position adolescents occupy in the adolescent social world. Bearman<sup>18</sup> suggested that adolescent suicidality may be a product of network positions characterized by either relative isolation or structural imbalance (Moody J, unpublished data, 1999), and a growing body of research links social isolation to suicide.<sup>18,19</sup> Researchers have known for some time that isolation from peers leads to lower estimations of self-worth and self-confidence.<sup>22,23</sup>

We examined 2 individual-level network factors. First, isolated adolescents have few or no ties to the remainder of the school. Students in such positions may internalize isolation as low self-worth and may be more likely to consider suicide. This hypothesis follows directly from Bearman's extension of Durkheim<sup>18,24</sup> and previous evidence concerning sense of self.<sup>22</sup> Second, cultural pressures for social balance,<sup>25</sup> particularly among youths,<sup>26,27</sup> suggest that one's friends should be friends with each other. Adolescents whose friends are not friends with each other are subject to competing normative pressures that lower effective normative regulation and increase suicidal ideation.<sup>22</sup> For the school as a whole, communities with many relations provide stronger moral integration and greater opportunities for monitoring, which likely results in lower suicidal ideation and suicide attempts, respectively.

## METHODS

Data were drawn from Add Health, a longitudinal study of American adolescents in grades 7 through 12. All students who attended a nationally representative sample of middle schools and high schools completed in-school questionnaires during the fall of 1994 and the spring of

1995 (n=90 118). The in-school questionnaire measured the social and demographic characteristics, parental background, household structure, risk behaviors, visions of the future, self-esteem, health status, friendships, extracurricular activities, and consequences of health risk behaviors of respondents.

The primary sampling frame for Add Health was derived from information provided by Quality Education Data Inc (Denver, Colorado). From this frame, Add Health selected a stratified sample of 80 high schools with probability proportional to size. For each high school, Add Health identified and recruited one of its feeder schools (typically a middle school) with probability proportional to its student contribution to the high school, yielding one school pair for each of 80 different communities. Schools varied in size from <100 students to >3000 students. The Add Health sample includes private, religious, and public schools located in urban, suburban, and rural areas. Overall, 79% of the schools that were contacted agreed to participate in the study. Each in-school instrument administration occurred on a single day within one 45–60 minute class period. Students not attending school on the day of administration did not complete the in-school instrument. Detailed design specifications are available at: <http://www.cpc.unc.edu/addhealth/focus.html>.

Approximately 1 year after the in-school survey, Add Health officials interviewed 20 745 adolescents in their homes. Data collected during the in-home phase of Add Health provided measurement of sensitive health risk behaviors, such as drug and alcohol use, sexual behavior, and criminal activities, in addition to detailed measurement of health status, health care utilization, peer networks, decisionmaking, family dynamics, aspirations, and attitudes. The adolescent in-home interview was conducted with automated computer-assisted interviewing (ACASI) technology for all sensitive health status and health risk behavior questions. Adolescents listened to questions through earphones and entered their responses directly into a laptop computer, thereby minimizing interviewer or parental effects on their responses. Add Health was one of the first national surveys to use ACASI technology with an adolescent population.<sup>28</sup> No paper questionnaires were used during the in-home adolescent interviews.

The data for our analyses were drawn from both the in-school surveys and the in-home adolescent interviews. Of the 20 745 students who completed an in-home interview, sample weights required for national estimates were available for 18 924; 5459 adolescents did not complete the in-school interview, were not on the school network roster, or attended schools for which friendship data were not included. The resultant sample of 13 465 adolescents was used in all of our analyses. We used multiple imputation<sup>29,30</sup> to correct for missing values on individual questionnaire items.

### Models

We used logistic regression to model the determinants of adolescent suicidal ideation and suicide attempts. We modeled suicidality separately for boys and girls, thereby capturing gender differences in the pattern of covariates. Each model regressed suicidal thoughts or suicide attempts for adolescent social-demographic characteristics, characteristics of the adolescents' school and community, adolescent religiosity, measures of family and household characteristics (including distance from parents, household structure, experience with suicide in the family, and parental supervision), adolescent friendships and experience with friends' suicide attempts, and adolescent personal characteristics.

Many of the risk factors, including network position, troublesome behavior, self-esteem, and depression, were measured 1 year prior to our measurements of suicidality. Hence, problems associated with the endogeneity of these risk factors were lessened. Because Add Health used a stratified clustered sample design, we adjusted for potential design effects with the Survey Logistic Regression procedure in Stata (Stata Corp, College Station, Tex), which corrected for school clustering and strata based on grade range, school size, ethnic mix, region, and urbanization.

### Variables

Table 1 shows the definition, mean, SD, and range for all variables used in our analyses.

### Dependent Variables

Our dependent variables were binary indicators of suicidal ideations in the past year

and suicide attempts in the past year. Each was measured at the in-home interview. As expected, suicidal ideation was 3 times as prevalent as suicide attempts.

### Independent Variables

*Demographics.* Demographic controls included age, binary indicators of race/ethnicity (White was the omitted category), and parental socioeconomic status.

*School and community.* We distinguished between junior high school and senior high school, anticipating lower rates of suicidality in junior high schools. Measured for the school as a whole, the relative density of the school friendship network captured the extent to which the school provided a focal point for adolescent relationships. In schools with low density, the effect of isolation in the school community and the effect of attitudes and behaviors of other adolescents in the community are likely to be lower than in schools where the relational network linking adolescents is more dense. For individuals, attachment to school captured the extent to which an adolescent reported feeling a member of the school community. Attachment—a critical component of school climate (Moody J, unpublished data, 1999)—was hypothesized to be negatively associated with suicidality. Additionally, we controlled for community type (suburban is the omitted category).

*Religion.* We included a binary indicator of whether the adolescent attended religious services at least once a week, because previous studies have suggested that religiosity is negatively related to suicide ideation and attempts.<sup>31</sup>

*Family and household.* Parental distance captured the extent to which parents were involved in their adolescent child's life. High values indicate greater distance and fewer shared activities. Social closure measured the extent to which parents have met the friends and the parents of their adolescents' friends. Higher values indicate greater parental connection with the adolescent's social world. We compared the effects of stepfamilies and single-parent families on suicidality (2 biological parents [60%] is the omitted category). We also assessed the impact of guns in the household and of previous suicides in the family, both of which have previously been identified as significant correlates of adolescent suicidality.

**TABLE 1—Description, Survey Source, and Univariate Statistics for Each Variable Used in the Analyses**

	Source	Mean (SD)	Range (Minimum, Maximum)
<b>Dependent variable</b>			
Suicidal thoughts: During the past 12 months, did you ever seriously think about committing suicide?	In-home interview	0.13 (0.34)	0 = No, 1 = Yes
Attempted suicide: During the past 12 months, how many times did you actually attempt suicide? (Recoded to 1 if any attempts)	In-home interview	0.04 (0.19)	0 = No, 1 = Yes
<b>Demographic</b>			
Female respondent	In-home interview	0.50 (0.50)	0 = No, 1 = Yes
Age, y	In-home interview	15.82 (1.75)	11.4, 21.4
Black	In-home interview	0.14 (0.34)	0 = No, 1 = Yes
Other race/ethnicity: Native American, Asian, Hispanic, and mixed-race/ethnicity students	In-home interview	0.25 (0.43)	0 = No, 1 = Yes
Socioeconomic status based on education level and occupation status of parent	In-school survey	5.91 (2.47)	1 = Low, 10 = High
<b>School and community</b>			
Junior high school: School has a 7th–8th or a 7th–9th grade range	In-school survey	0.32 (0.46)	0 = No, 1 = Yes
Relative density: Network density corrected for nomination limitations	In-school survey	0.45 (0.10)	0.19, 0.83
Plays team sport: Plays an in-school sport	In-school survey	0.55 (0.50)	0 = No, 1 = Yes
Attachment to school: Mean of 3 items—feel close to people at this school, feel like I am part of this school, am happy to be at this school ( $\alpha = .80$ )	In-school survey	3.57 (0.99)	1 = Low, 5 = High
Rural: Interviewer assessment of respondent's neighborhood as rural	In-home interview	0.32 (0.47)	0 = No, 1 = Yes
Urban: Interviewer assessment of respondent's neighborhood as urban	In-home interview	0.28 (0.45)	0 = No, 1 = Yes
<b>Religion</b>			
Church attendance: Attend church at least once a week	In-home interview	0.66 (0.47)	0 = No, 1 = Yes
<b>Family and household</b>			
Parental distance: Mean of 11 items related to parental involvement in respondent's life ( $\alpha = .88$ )	In-home interview	1.69 (0.68)	1 = Close, 5 = Distant
Social closure: Parents have met the adolescent's best friend's parents and friends' parents	In-home interview	1.55 (0.77)	0 = Know none, 2 = Know both
Stepfamily: 2 parents, at least 1 a stepparent	In-home interview	0.17 (0.38)	0 = No, 1 = Yes
Single-parent household: Single parent	In-home interview	0.22 (0.42)	0 = No, 1 = Yes
Gun in household: Gun easily available in home	In-home interview	0.26 (0.44)	0 = No, 1 = Yes
Family suicide: Have any of your family members tried to kill themselves during the past 12 months?	In-home interview	0.04 (0.21)	0 = No, 1 = Yes
<b>Relationships</b>			
Isolated: respondent has limited social relations	In-school survey	0.16 (0.37)	0 = No, 1 = Yes
Intransitivity index: Proportion of all 2-step relations, starting from the respondent, that are not also direct relations	In-school survey	0.69 (0.34)	0 = None, 1 = All
Friend suicide: Have any of your friends tried to kill themselves during the past 12 months?	In-home interview	0.18 (0.38)	0 = No, 1 = Yes
Trouble with people: Mean of 2 items—have trouble getting along with teachers and students	In-school survey	1.83 (1.08)	0 = Never, 4 = Every day
<b>Personal characteristics</b>			
Depression: In the past month, how often did you feel depressed or blue?	In-school survey	1.20 (1.19)	0 = Never, 4 = Every day
Self-esteem: Mean of 5 items: good personal qualities, a lot to be proud of, like yourself, feel loved and wanted, as good as other people ( $\alpha = .83$ )	In-school survey	3.92 (0.83)	1 = Low, 5 = High
Drunkenness frequency: Over the past 12 months, on how many days have you gotten drunk or "very, very high" on alcohol?	In-home interview	1.6 (1.18)	0 = Never, 6 = Every day
Grade point average: Mean grade in school	In-school survey	2.92 (0.84)	1 = D or F, 4 = A
Sexually experienced: Ever had sexual intercourse	In-home interview	0.36 (0.48)	0 = No, 1 = Yes
Homosexual attraction: Ever had a same-sex romantic attraction	In-home interview	0.06 (0.23)	0 = No, 1 = Yes
Forced sexual relations (asked of females only): Were you ever physically forced to have sexual intercourse against your will?	In-home interview	0.07 (0.23)	0 = No, 1 = Yes
Body mass index: weight (kg)/height (meters) <sup>2</sup>	In-home interview	22.38 (4.47)	11.2 to 56.4
Fight: No. of physical fights in past year	In-school survey	0.71 (0.93)	0 = None, 3 = 5 or more

**TABLE 2—Logistic Regression of Suicidal Ideation on Individual, School, Family, and Network Characteristics**

	Suicide Ideation Among Adolescents, OR (95% CI)	
	Males	Females
Demographic		
Age	1.031 (0.951, 1.118)	0.885 (0.830, 0.944)
Race/ethnicity		
Black	0.864 (0.628, 1.187)	0.873 (0.685, 1.112)
Other	1.079 (0.852, 1.367)	1.190 (0.986, 1.436)
Socioeconomic status	1.017 (0.979, 1.057)	1.000 (0.970, 1.031)
School and community		
Junior high school	1.281 (0.938, 1.751)	0.808 (0.637, 1.023)
Relative density	1.061 (0.375, 2.999)	0.333 (0.142, 0.783)
Plays team sport	0.831 (0.685, 1.008)	1.164 (0.999, 1.357)
Attachment to school	0.994 (0.891, 1.109)	0.952 (0.871, 1.041)
Religion		
Church attendance	0.822 (0.683, 0.989)	1.008 (0.863, 1.176)
Family and household		
Parental distance	1.573 (1.361, 1.818)	1.743 (1.567, 1.939)
Social closure	0.904 (0.805, 1.015)	1.012 (0.921, 1.111)
Stepfamily	1.101 (0.870, 1.394)	0.998 (0.821, 1.212)
Single-parent household	1.212 (0.959, 1.533)	1.119 (0.930, 1.345)
Gun in household	1.329 (1.083, 1.630)	1.542 (1.288, 1.848)
Family member attempted suicide	2.136 (1.476, 3.092)	1.476 (1.120, 1.943)
Network		
Isolation	0.665 (0.307, 1.445)	2.010 (1.073, 3.765)
Intransitivity index	0.747 (0.358, 1.558)	2.198 (1.221, 3.956)
Friend attempted suicide	2.725 (2.187, 3.395)	2.374 (2.019, 2.791)
Trouble with people	0.999 (0.912, 1.095)	1.027 (0.953, 1.106)
Personal characteristics		
Depression	1.632 (1.510, 1.765)	1.445 (1.348, 1.549)
Self-esteem	0.811 (0.711, 0.925)	0.808 (0.730, 0.894)
Drunkenness frequency	1.112 (1.041, 1.187)	1.114 (1.039, 1.194)
Grade point average	1.061 (0.948, 1.188)	0.993 (0.905, 1.089)
Sexually experienced	1.201 (0.972, 1.484)	0.993 (0.823, 1.198)
Homosexual attraction	1.385 (1.015, 1.891)	1.544 (1.155, 2.063)
Forced sexual relations		1.873 (1.435, 2.445)
No. of fights	1.017 (0.924, 1.120)	1.142 (1.046, 1.246)
Body mass index	1.004 (0.983, 1.026)	1.027 (1.010, 1.044)
Response profile (n = 1/n = 0)	632/5867	1114/5852
F statistic	17.08 (P < .0001)	16.28 (P < .0001)

Note. OR = odds ratio; CI = confidence interval. Logistic regressions; standard errors corrected for sample clustering and stratification on the basis of region, ethnic mix, and school type and size.

these nominations to construct social network variables that captured the pattern and the structure of networks at multiple levels of observation, including the composition of individual networks, student membership in peer groups, and student position and popularity in the school.<sup>32</sup>

Approximately 16% of the adolescents had limited social relations. Social isolation refers to those adolescents who had no friends to name, received no friendship nominations from others, or named as a friend a person who had no other friends. This variable captured the extent to which individual social relations were absent or were severely limited. Social isolation and school density correlated at  $-0.14$ .

*Network intransitivity* measured the structure of the extended social networks in which adolescents were embedded. Consider 3 adolescents: if  $i$  names  $j$  as a friend, and  $j$  names  $k$  as a friend, then  $i$  and  $k$  are 2 friendship steps apart. If  $i$  also names  $k$  as a friend, the resultant triad ( $i, j, k$ ) is *transitive*. If  $i$  does not nominate  $k$ , despite  $j$ 's friendship with  $i$  and  $k$ , then the triad is *intransitive*. Transitive relations reflect closed, dense friendship groups, in which an individual's friends are friends with one another. Intransitivity indicates dissonant relations, where an individual's friendship circle spans multiple disconnected members. The intransitivity index measured the proportion of an individual's friends' friends who were not also the individual's friends. Intransitivity and school density correlated at 0.19.

*Personal characteristics.* Depression, self-esteem, frequency of drunkenness, and grade point average in school were drawn from the in-school survey that was administered 1 year before the in-home survey. Sexual experience, homosexual attraction, experience of forced sexual relations (for females only), and body mass index were drawn from the in-home interview. Sexual experience, homosexual attraction, and forced sexual experience items were reported during the ACASI section of the survey.

## RESULTS

To assess the relative impact of social factors on the suicide risk of adolescent males and females, we estimated all our models separately for each gender. This method is equiv-

*Relationships.* In addition to self-report of having a friend who has attempted suicide in the past year, we included 2 individual-level measures of social network position that provide insight into the relational world of adolescents: social isolation and network intransitivity.

As part of the in-school survey, each student was asked to name his or her 5 best female and 5 best male friends. Students could name friends from both inside and outside the school, although only in-school names could be matched to one another. We used

**TABLE 3—Logistic Regression of Suicide Attempts, Among Adolescents With Suicidal Ideation, on Individual, School, Family and Network Characteristics**

	Suicide Attempts, OR (95% CI)	
	Males	Females
<b>Demographic</b>		
Age	0.956 (0.808, 1.131)	0.920 (0.810, 1.046)
Race/ethnicity		
Black	0.872 (0.414, 1.839)	1.086 (0.680, 1.736)
Other	1.069 (0.662, 1.728)	1.134 (0.810, 1.586)
Socioeconomic status	0.948 (0.872, 1.031)	1.008 (0.951, 1.069)
<b>School and community</b>		
Junior high school	1.588 (0.793, 3.180)	1.271 (0.811, 1.993)
Relative density	0.049 (0.005, 0.521)	0.415 (0.086, 1.996)
Plays team sport	0.985 (0.633, 1.532)	1.020 (0.763, 1.364)
Attachment to school	1.079 (0.823, 1.414)	1.066 (0.920, 1.235)
<b>Religion</b>		
Church attendance	0.975 (0.635, 1.496)	0.818 (0.618, 1.082)
<b>Family and household</b>		
Parental distance	0.925 (0.681, 1.256)	0.955 (0.801, 1.139)
Social closure	1.004 (0.775, 1.299)	0.933 (0.781, 1.115)
Stepfamily	1.058 (0.617, 1.814)	1.368 (0.967, 1.935)
Single-parent household	1.142 (0.698, 1.866)	1.117 (0.800, 1.560)
Gun in household	1.599 (1.042, 2.455)	1.094 (0.800, 1.494)
Family member attempted suicide	1.712 (0.930, 3.150)	1.067 (0.689, 1.651)
<b>Network</b>		
Isolation	0.767 (0.159, 3.707)	1.187 (0.380, 3.708)
Intransitivity index	0.444 (0.095, 2.085)	1.076 (0.373, 3.103)
Friend attempted suicide	1.710 (1.095, 2.671)	1.663 (1.253, 2.207)
Trouble with people	1.107 (0.902, 1.357)	1.119 (0.976, 1.284)
<b>Personal characteristics</b>		
Depression	1.160 (0.960, 1.402)	1.130 (0.997, 1.281)
Self-esteem	1.056 (0.777, 1.434)	0.798 (0.677, 0.942)
Drunkenness frequency	1.124 (0.962, 1.312)	1.235 (1.115, 1.368)
Grade point average	0.913 (0.715, 1.166)	0.926 (0.781, 1.097)
Sexually experienced	1.323 (0.796, 2.198)	1.393 (0.990, 1.961)
Homosexual attraction	1.709 (0.921, 3.169)	1.248 (0.796, 1.956)
Forced sexual relations		1.081 (0.725, 1.613)
No. of fights	0.966 (0.770, 1.213)	1.135 (0.983, 1.310)
Body mass index	0.981 (0.933, 1.032)	1.014 (0.982, 1.047)
Response profile (n = 1/n = 0)	139/493	353/761
F statistic	1.84 (P = .0170)	2.88 (P < .0001)

Note. OR = odds ratio; CI = confidence interval. Logistic regressions; standard errors corrected for sample clustering and stratification on the basis of region, ethnic mix, and school type and size.

in the pattern of risk factors by gender, striking differences are also evident.

Both boys and girls were more likely to have suicidal thoughts if they engaged in fewer activities with their parents (male odds ratio [OR]=1.57, female OR=1.74), if there was a gun in the household (male OR=1.33, female OR=1.54), and if a family member had attempted suicide in the past year (male OR=2.14, female OR=1.48). Similarly, the odds of having suicidal thoughts increased for both boys and girls when a friend has attempted suicide in the past year (male OR=2.73, female OR=2.37). The effect of a friend's suicide attempt on the respondent's suicidal ideation was extremely strong for both boys and girls. Finally, being depressed (male OR=1.63, female OR=1.45), experiencing homosexual romantic attraction (male OR=1.39, female OR=1.54), or getting drunk or high frequently (male OR=1.11, female OR=1.11) increased the odds of thinking about suicide for all adolescents. For both boys and girls, having high self-esteem lowered the likelihood of suicidal ideation (male OR=0.81, female OR=0.81). (Although other studies have identified an interaction between depression and alcohol abuse as a significant covariate of suicidality, this interaction was not significant for our study population [analyses not shown].) These findings are consistent with those of previous studies.

In addition to revealing these general risk factors, the models of suicidal ideation showed marked differences by gender. Specifically, although we found no age effect for boys, younger girls were more likely than older girls to think about suicide (OR=0.89). Beyond the age effect, however, we found important gender differences in the effect of social network and relational variables. For girls, being socially isolated from peers (OR=2.01) or having intransitive friendships (OR=2.19) substantially increased the odds of thinking about suicide. Additionally, being in a school with dense social networks lowered the risk of suicidal ideation for girls (OR=0.333). Social network effects for girls overwhelmed other variables in the model and appeared to play an unusually significant role in adolescent female suicidality. These variables did not have a significant impact on the odds of suicidal ideation among boys.

alent to running a global interaction with gender in a pooled model.

**Suicidal Thoughts**

Table 2 shows the odds ratios and 95% confidence intervals for models that regressed

suicidal ideation on the full set of explanatory variables. The overall model fits were quite good (F=17.08 for males, F=16.28 for females; P<.0001 for both males and females). Close examination of the odds ratios reveals that although some general similarities exist

Additionally, for girls, having experienced forced sexual relations (OR=1.87), having gotten into more fights in the past year (OR=1.14), and having a higher body mass index (OR=1.03) all increased the odds of suicidal thoughts. None of these factors increased the likelihood of thinking about suicide for boys. In general, differences in model coefficients (as indicated by nonoverlapping confidence intervals) suggest a different suicidal ideation process for boys and girls.

### Suicide Attempts

Table 3 shows the additional impact of selected variables on the likelihood of attempting suicide among those adolescents who reported having suicidal thoughts in the past year. As for suicidal thoughts, separate models were estimated for adolescent males and females. Both models suggest that it is relatively difficult to identify factors that distinguish adolescents who think about suicide from those who attempt it. Nevertheless, some significant differences between boys and girls in the patterning of risk factors remain.

For both adolescent males and females, having a friend who had attempted suicide increased their own odds of attempting suicide, above and beyond the effect on suicidal ideation (male OR=1.71, female OR=1.68). This was the only commonality; the differences between the boys and the girls were marked. For girls, having high self-esteem prevented attempts among girls reporting suicidal ideation (OR=0.80), whereas frequency of drunkenness increased suicide attempts (OR=1.24). For boys, having a gun in the household increased the likelihood of an attempt (OR=1.60), whereas being part of a school with a higher relative density of friendship ties (a more tightly knit school community) strongly reduced the odds of attempting suicide (OR=0.05).

When we limited the analysis to the population of adolescents who had suicidal thoughts, there were few identifiable risk factors that significantly increased the likelihood of a suicide attempt. For both boys and girls, having a friend who had attempted suicide continued to have an impact. For girls, self-esteem still played a significant role, as did frequent drunkenness. Characteristics of the school

social network exerted powerful effects on boys. Adolescent males who had contemplated suicide and who attended schools in which the friendship network was dense and interlocked were much less likely to attempt suicide than were comparable boys who attended socially disconnected schools.

### CONCLUSIONS

Previous research on adolescent suicidality has identified many of the risk factors associated with suicidal ideation and suicide attempts, yet only a few of these studies can generalize on the basis of a nationally representative sample of adolescents. None had access to the detailed social network and friendship data available in Add Health for a sufficient number of respondents to allow for robust measurement of the determinants of attempted suicide among those experiencing suicidal ideation.

Our findings revealed significant social network effects on suicidal ideation for adolescent females, after we controlled for previously identified correlates of suicidal ideation. Adolescent females who are isolated from the adolescent community or whose social relationships are intransitive and likely dissonant<sup>18</sup> are at greater risk for suicidal thoughts than are girls who are embedded in cohesive friendship groups. Health care providers can assess this risk for girls through simple screens that allow adolescents to describe the relational world in which they are embedded. Adolescent males are more impervious to social context than are adolescent females.

The transition from ideation to action appears largely stochastic; health providers, parents, and teachers gain little predictive power from observations of relatively stable personal and contextual factors. This inability to predict suicide likely stems from the strongly opportunistic nature of suicide among adolescents, because feelings about suicide require a unique constellation of opportunity factors to be realized. For adolescent females, the social network variables that shaped suicidal ideation fail to predict suicide attempts. For adolescent males who had contemplated suicide, those who attended schools with few social ties were at increased risk relative to those attending schools with tightly knit friendship net-

works, perhaps because of increased peer-monitoring capacity in schools with dense social relationships. For both boys and girls, knowing a friend (but not a family member) who had attempted suicide was a significant predictor of moving from thought to action. Also, for both boys and girls, having a gun in the household increased ideation, perhaps because an available weapon may function as a tool to extend self-destructive thoughts. Possibly, males' well-established general preference for lethal means of suicide increases the odds of suicide attempts by males if a gun is available in the house.

Our inability to identify a clear and consistent set of predictor variables that can distinguish between adolescents who consider suicide and those who attempt suicide has specific policy implications. If the transition from thought to action is stochastic and insensitive to structural or personal characteristics, health care providers, parents, and teachers need to rapidly respond to all reports of suicidal ideation, because a false positive is preferable to a false negative. For girls, the most effective interventions are those that transform the structure of their friendships with other adolescents. Changing schools, joining clubs and new extracurricular activities, and participating in more activities with parents are interventions that are likely to have a major effect.

Evidence of a substantial social-network effect on adolescent girls' suicidal ideation suggests specific indicators for heightened suicidality that health providers can watch for and respond to with appropriate interventions. The determinants of suicidality are different for boys and girls, that female suicidality is strongly shaped by the relational networks in which adolescent girls are embedded, and that some of the correlates of suicide attempts identified in the literature as important are of less significance than previously thought. Physician interventions directed toward identifying adolescents at heightened risk should focus on adolescents isolated from, or in a dissonant relationship to, the larger peer community surrounding them. ■

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Both authors contributed equally to this article.

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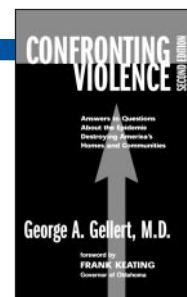
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## Human Participant Protection

No protocol approval was needed for this study.

## References

1. *Statistical Abstract of the United States: 1996*. Washington, DC: US Bureau of the Census; 1996.
2. Resnick MD, Bearman P, Blum RW, et al. Protecting adolescents from harm: findings from the National Longitudinal Study on Adolescent Health. *JAMA*. 1997;278:823-832.
3. Ackerman GL. A congressional view of youth suicide. *Am Psychol*. 1993;48:183-184.
4. Morano CD, Cicler RA, Lemerond J. Risk factors for adolescent suicidal behavior: loss, insufficient familial support, and hopelessness. *Adolescence*. 1993;28:851-865.
5. Ladame F. Suicide prevention in adolescence: an overview of current trends. *J Adolesc Health*. 1992;13:406-408.
6. Spirito A, Hart K, Overholser J, Halverson J. Social skills and depression in adolescent suicide attempters. *Adolescence*. 1990;25:543-552.
7. Hazell P, Lewin T. Friends of adolescent suicide attempters and completers. *J Am Acad Child Adolesc Psychiatry*. 1993;32(11):76-81.
8. Grossman DC, Milligan BC, Deyo RA. Risk factors for suicide attempts among Navajo adolescents. *Am J Public Health*. 1991;81:870-874.
9. Brent DA. Risk factors for adolescent suicide and suicidal behavior: mental and substance abuse disorders, family environment factors, and life stress. *Suicide Life Threat Behav*. 1995;25(suppl):55-63.
10. Brent DA, Perper JA, Allman CJ, Moritz GM, Wartella ME, Zelenak JP. The presence and accessibility of firearms in the homes of adolescent suicides. *JAMA*. 1991;266:2989-2995.
11. Brent DA, Perper JA, Moritz GM, Baugher M, Schweers J, Roth C. Firearms and adolescent suicide: a community case-control study. *Am J Dis Child*. 1993;147:1066-1071.
12. Adcock AG, Nagy S, Simpson JA. Selected risk factors in adolescent suicide attempts. *Adolescence*. 1991;26:817-828.
13. Jeanneret O. A tentative epidemiologic approach to suicide prevention in adolescence. *J Adolesc Health*. 1992;13:409-414.
14. Simons R, Murphy P. Sex differences in the causes of adolescent suicide ideation. *J Youth Adolesc*. 1985;14(5):423-434.
15. Negron R, Piacentini J, Graae F, Davies M, Schaffer D. Microanalysis of adolescent suicide attempters and ideators during the acute suicidal episode. *J Am Acad Child Adolesc Psychiatry*. 1997;36:1512-1519.
16. Brent DA, Moritz GM, Grudge J, Perper JA, Canobio R. Long-term impact of exposure to suicide: a three-year controlled follow-up. *J Am Acad Child Adolesc Psychiatry*. 1996;35:646-653.
17. Swedo SE, Rettew DC, Kuppenheimer M, Lum D, Dolan S, Goldberger E. Can adolescent suicide attempters be distinguished from at-risk adolescents? *Pediatrics*. 1991;88:620-629.
18. Bearman P. The social structure of suicide. *Sociol Forum*. 1991;6:501-524.
19. Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. *Soc Sci Med*. 2000;51:843-857.
20. Bradford S, Urquhart C. The making and breaking of young men: suicide and the adolescent male. *Youth Policy*. 1998;61:28-41.
21. Crawford MJ, Prince M. Increasing rates of suicide in young men in England during the 1980s: the importance of social context. *Soc Sci Med*. 1999;49:1419-1423.
22. Coleman JS. *The Adolescent Society*. New York, NY: Free Press; 1961.
23. Tani CR, Chavez EL, Deffenbacher JL. Peer isolation and drug use among White non-Hispanic and Mexican American adolescents. *Adolescence*. 2001;36:127-139.
24. Durkheim E. *Suicide*. New York: Free Press; 1951.
25. Cartwright D, Harary F. Structural balance: a generalization of Heider's theory. *Psychol Rev*. 1956;63:277-293.
26. Hallinan MT. A structural model of sentiment relations. *Am J Sociol*. 1974;80:364-378.
27. Moody J. *The Structure of Adolescent Social Relations: Modeling Friendship in Dynamic Social Settings*. Chapel Hill, NC: University of North Carolina Press; 1999.
28. Turner CF, Ku L, Rogers SM, Lindberg LD, Pleck JH, Sonenstein FL. Adolescent sexual behavior, drug use, and violence: increased reporting with computer survey technology. *Science*. 1998;280:867-873.
29. King G, Honaker J, Joseph A, Scheve K. Analyzing incomplete political science data: an alternative algorithm for multiple imputation. *Am Political Sci Rev*. 2001;95:49-69.
30. Honaker J, Joseph A, King G, Scheve K, Singh N. *Amelia: A Program for Missing Data*. Cambridge, Mass: Harvard University Press; 1999.
31. Donahue MJ, Benson P. Religion and the well-being of adolescents. *J Soc Issues*. 1995;51:145-160.
32. Bearman P, Moody J, Stovel K. The Add Health network variable codebook. 1997. Available at: <http://www.cpc.unc.edu/addhealth/codebooks.html>. Accessed November 24, 2003



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