# Suicide Patterns and Association With Predictors Among Rhode Island Public High School Students: A Latent Class Analysis

Yongwen Jiang, PhD, Donald Kent Perry, MPA, and Jana Earl Hesser, PhD

*Objectives.* We analyzed Rhode Island's 2007 Youth Risk Behavior Survey (YRBS) data to investigate suicide patterns and their association with suicide risk predictors among public high school students.

*Methods.* We used latent class regression analysis of Rhode Island's 2007 YRBS data (from a random sample of 2210 public high school students) to model latent classes of suicide risk and identify predictors of latent class membership.

*Results.* Four latent classes of suicide risk were modeled and predictors were associated with each: class 1 (emotionally healthy, 74%); class 2 (considered and planned suicide, 14%) was associated with being female, having low grades, being gay/lesbian/bisexual/unsure, feeling unsafe at school, having experienced forced sexual intercourse, and self-perceived overweight; class 3 (attempted suicide, 6%) was associated with speaking a language other than English at home, being gay/lesbian/bisexual/unsure, feeling unsafe at school, and forced sexual intercourse; and class 4 (planned and attempted suicide, 6%) was associated with the previously mentioned predictors and with being in 9th or 10th grade and currently smoking.

*Conclusions.* A single model characterized and quantified 4 patterns of suicide risk among adolescents and identified predictors for 3 at-risk classes. Interventions for high-risk youths may help prevent adolescent suicides. (*Am J Public Health.* 2010;100:1701–1707. doi:10.2105/AJPH.2009.183483)

Suicide by youths is devastating for families and communities and represents a significant and preventable loss of life. In the United States, 12% of all deaths among youths and young adults aged 10 to 24 years result from suicide[1]; suicide is the fourth leading cause of death among adolescents.[2] The 2007 national Youth Risk Behavior Survey (YRBS) found that 28.5% of high school students reported sad or hopeless feelings, 14.5% had seriously considered attempting suicide, 11.3% had made a plan about suicide, 6.9% had attempted suicide, and 2.0% had attempted a suicide that resulted in an injury needing treatment by a doctor or nurse.[1] Attempts are much more common than completed suicides among youths by a ratio of as much as 150 to 1.[3] Reducing the adolescent suicide attempt rate is one of the Healthy People 2010 objectives.[4] To meet this objective, it will be necessary to increase public awareness of adolescent suicide and risk factors, identify at-risk youths, and provide appropriate mental health services to them.

Researchers use a variety of indicators to assess suicide risk. Many published papers have examined relationships between specific suicide indicators and various predictors by using multiple logistic regression models.[5–7] Results overlap considerably across these single-indicator models, and individual suicide indicators are often correlated with one another. We sought a single model that would combine results of the individual suicide models. Building on our previous analysis of suicide indicators for Rhode Island public high school students, we also hoped to answer these questions: Is it possible to characterize patterns of suicide-related behavior in this population? Can we quantify the percentage of each pattern? What are the predictors of different patterns of suicide risk? To explore these questions and develop a single model, we applied latent class regression modeling with 5 suicide indicators from Rhode Island's 2007 YRBS.

## METHODS

The YRBS is an anonymous and voluntary survey of randomly sampled public high school students. Sponsored by the Centers for Disease Control and Prevention (CDC), the YRBS is conducted biennially in more than 60 large US cities and states. The YRBS monitors risk behaviors related to the major causes of mortality, disease, injury, and social problems among youths and adults in the United States. The 2007 Rhode Island YRBS contained 92 questions addressing demographics; safety; violence; sad feelings and attempted suicide; tobacco use; alcohol, marijuana, and other drug use; sexual behavior; body weight; nutrition; physical activity; and other health-related topics. In 2007, Rhode Island public high school students (n=2210; 1095 males, 1109 females [6 students did not answer the question about gender]) completed the YRBS questionnaire. The school response rate (88%) was multiplied by the student response rate (75%) for an overall response rate of 66%. These weighted, self-reported data are representative of 9th to 12th grade public high school students statewide and can be used to make important inferences concerning health-risk behaviors. The YRBS data and technical details are available on the CDC Web site.[8]

### Indicators and Predictors

Five questions on the YRBS, representing the continuum of suicide-related behavior, served as suicide risk indicators. The questions appeared as follows:

> The next 5 questions ask about sad feelings and attempted suicide during the past 12 months. (1) Did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities? [felt sad or hopeless]; (2) Did you ever seriously consider attempting suicide? [considered suicide]; (3) Did you make a plan about how you would attempt suicide? [planned suicide]; (4) How many times did you actually attempt suicide? [attempted suicide]; (5) If you attempted suicide, did any attempt result in an injury, poisoning, or overdose that had to be treated by a doctor or nurse? [suicide attempt treated by a physician or nurse].

Depressed mood (sad or hopeless feelings) in adolescents is associated with suicide,[9,10] so we included depressed mood as one component of suicidal ideation along with considered and planned suicide. One or more suicide attempts was coded as attempted suicide; injury treated by a physician or nurse represents an attempt serious enough to require medical attention. These suicide questions have demonstrated substantial reliability. The 2-week test–retest conducted by CDC[11,12] showed Kappas of 83.8% for suicidal ideation and 76.4% for suicide attempts.

We used multivariable logistic regression models to identify 9 predictors significantly related to suicidal ideation or attempts, while eliminating many others. These 9 predictors were: gender, grade level in school (grade), academic performance, language spoken at home (home language), sexual orientation, feeling unsafe going to or at school, forced sexual intercourse, smoking cigarettes in the past 30 days (smoking), and self-perception of weight (perceived weight). These questions have demonstrated substantial reliability.[12] Eight predictors were dichotomized for the analysis, but "academic performance" was split into 3 categories (Table 1). "Unsure" was included in the gay/lesbian/bisexual group because it usually indicates a gay/lesbian/bisexual orientation.[13,14] These predictors were examined as potential confounders in the latent class regression analyses. Detailed definitions of the 5 suicide indicators and 9 predictors are provided on CDC's YRBS Web site.[8]

### Data Analysis

In our study, 27.9% of records were missing responses to 1 or more of the 9 predictor and 5 suicide indicator variables. To maximize valid data for analysis, we computed missing values for all of these variables by using multiple imputation. Described in detail elsewhere,[15,16] multiple imputation has been extensively applied to handle missing data from surveys. A basic assumption of multiple imputation is that missing data are missing at random.[15] We compared frequencies based on the completed data with those from the incomplete data and found no significant differences for any of the variables.

A latent class regression model is a statistical technique for categorical data that is used to identify implicit classes of respondents and examine the association between predictors and those classes.[17] This model highlights the set of identified latent classes rather than considering the observed indicators separately as do logistic or linear regression models.[18] Detailed descriptions of the latent class regression model are available elsewhere.[19–22]

In stage 1 of our analysis, conventional latent class models excluding predictors were fit to the depressed mood or suicide indicator data, starting with a 1-class model, and progressing to a 4-class model. In stage 2, with predictors included, the 4-class latent class regression model with 9 predictors was selected because it had the lowest Bayesian Information Criterion score.

We used Mplus version 5 (Muthén & Muthén, Los Angeles, CA) to execute analyses because it can accommodate the YRBS' complex sampling design. We used the *t* test to identify statistically significant relationships (2-sided $P \leq .05$). Reference groups in the latent class regression model were those having the lowest risk for the depressed mood or suicide indicators.

## RESULTS

Results of the individual depressed mood or suicide indicators during the 12 months prior to the YRBS survey were as follows: 23.6% of Rhode Island public high school students felt sad or hopeless, 12.1% had considered suicide, 11.5% had planned suicide, 9.3% had attempted suicide, and 4.0% had a suicide attempt injury treated by a physician or nurse.

On the basis of results of the latent class regression modeling, we grouped Rhode Island public high school students into 4 latent classes of suicide risk. Class 1 (74% of students) was defined as "emotionally healthy"; class 2 (14%) was defined as "considered and planned suicide"; class 3 (6%) was defined as "attempted suicide"; and class 4 (6%) was defined as "both planned and attempted suicide."

Figure 1 displays the relationship between latent class membership and each of the 5 suicide indicators. There was a divergence between classes 2 and 3 and a great overall difference between classes 1 and 4. Class 1 (emotionally healthy) had low probabilities for all 5 indicators. Class 2 had high probabilities for felt sad or hopeless, considered suicide, and planned suicide and low probabilities for attempted suicide and suicide attempt treated by a physician or nurse. Class 3 had low probabilities for the first 3 indicators, high probability for attempted suicide, and the highest probability for treatment of suicide attempt. Class 4 had the highest probabilities for the first 4 indicators and a high probability for treatment of suicide attempt.

Table 1 shows the adjusted odds ratios (AORs) and 95% confidence intervals (CIs) for each of the 9 predictors regressed on the 3 suicide-related latent classes, using class 1 (emotionally healthy) as the reference group and adjusting for all other confounding effects. Table 1 also indicates which AORs are statistically significant.

### Significant Predictors in Latent Classes 2, 3, and 4

Statistically significant AORs occurred in all 3 latent classes for students who were gay/lesbian/bisexual/unsure, felt unsafe going to and being at school, or had been forced to have sexual intercourse (Table 1). These 3 characteristics were highly relevant predictors for suicidal ideation and suicide attempts. Students who felt unsafe going to or being at school had exceptionally high AORs for each class of suicide: for class 2, the AOR was 5.2; for class 3, it was 4.3; and for class 4, it was 8.1. The highest AORs for both planned and attempted suicide occurred in class 4; for gay/lesbian/bisexual/unsure, the AOR was 6.5; for students who do not feel safe going to or being at school, it was 8.1; and for those forced to have sexual intercourse, it was 7.2.

### Significant Predictors in Classes 2 and 4 or Class 2 Only

Table 1 shows that academic performance of "C" grades in school had a significantly increased association with class 2 (AOR=2.2) and class 4 (AOR=2.0). By contrast, "D" and "F" grades had significantly increased association with class 2 only (AOR=3.1). Being female, perceived overweight, and current smoking were associated significantly with classes 2 and 4. Current cigarette smokers were 5.2 times more likely than were nonsmokers to be in class 4.

### Significant Predictors in Classes 3 and 4 or Class 4 Only

Not speaking English at home was associated significantly with classes 3 and 4. Students in

**TABLE 1—Suicide Risk Predictors Among Public High School Students, Regressed on Feeling Sad or Hopeless and Suicide Indicators: Rhode Island Youth Risk Behavior Survey, 2007**

| | Unweighted No. (Weighted %) | Class 2—Considered and Planned Suicide, AOR[a] (95% CI) | Class 3—Attempted Suicide, AOR[a] (95% CI) | Class 4—Both Planned and Attempted Suicide, AOR[a] (95% CI) |
|---|---|---|---|---|
| Gender | | | | |
| Male (Ref) | 1095 (49.8) | 1.0 | 1.0 | 1.0 |
| Female | 1109 (50.2) | 2.1** (1.3, 3.2) | 0.6 (0.3, 1.3) | 3.1*** (1.7, 5.8) |
| Grade | | | | |
| 9–10 | 1223 (54.2) | 1.1 (0.7, 1.6) | 1.7 (0.9, 3.3) | 2.2** (1.3, 3.4) |
| 11–12 (Ref) | 960 (45.8) | 1.0 | 1.0 | 1.0 |
| Academic performance | | | | |
| Mostly As and Bs (Ref) | 1403 (67.8) | 1.0 | 1.0 | 1.0 |
| Mostly Cs | 492 (24.7) | 2.2*** (1.4, 3.5) | 1.2 (0.6, 2.6) | 2.0* (1.1, 3.6) |
| Mostly Ds and Fs | 160 (7.6) | 3.1*** (1.6, 6.1) | 0.5 (0.1, 3.7) | 1.8 (0.7, 4.5) |
| Usual language spoken at home | | | | |
| English (Ref) | 1790 (84.6) | 1.0 | 1.0 | 1.0 |
| Not English | 386 (15.4) | 1.6 (0.9, 2.6) | 2.4*** (1.5, 4.0) | 3.2*** (1.6, 6.2) |
| Sexual orientation | | | | |
| Heterosexual (Ref) | 1954 (90.1) | 1.0 | 1.0 | 1.0 |
| Gay, lesbian, bisexual, or unsure | 225 (9.9) | 2.6*** (1.5, 4.5) | 3.7*** (1.8, 7.4) | 6.5*** (3.4, 12.4) |
| Feel unsafe going to or being at school | | | | |
| No (Ref) | 2093 (95.8) | 1.0 | 1.0 | 1.0 |
| Yes | 102 (4.2) | 5.2*** (2.0, 13.6) | 4.3* (1.4, 13.0) | 8.1*** (2.9, 23.0) |
| Physically forced to have sexual intercourse | | | | |
| No (Ref) | 1962 (89.9) | 1.0 | 1.0 | 1.0 |
| Yes | 211 (10.1) | 2.2* (1.04, 4.8) | 3.1** (1.6, 6.1) | 7.2*** (3.7, 13.9) |
| Smoking | | | | |
| Not current cigarette smoker (Ref) | 1771 (84.9) | 1.0 | 1.0 | 1.0 |
| Current cigarette smoker | 303 (15.1) | 1.7* (1.03, 2.7) | 1.7 (0.7, 3.7) | 5.2*** (2.9, 9.4) |
| Perceived weight | | | | |
| Normal or underweight (Ref) | 1526 (70.9) | 1.0 | 1.0 | 1.0 |
| Overweight | 640 (29.1) | 2.1*** (1.4, 3.2) | 0.9 (0.4, 1.8) | 2.3** (1.3, 4.2) |

*Notes.* AOR = adjusted odds ratio; CI = confidence interval. Class 1 (emotionally healthy students) was the reference group for classes 2–4.
[a]Data are reported as AORs adjusted by all other variables in the model.
*$P < .05$; **$P < .01$; ***$P < .001$.

grades 9 or 10 were 2.2 times more likely to fall into class 4 than were students in grades 11 or 12.

Class 2 was associated with female students, academic performance of mostly "C," "D," and "F" grades, being gay/lesbian/bisexual/unsure, unsafe feelings about school, forced sexual intercourse, smoking, and perceived overweight. Class 3 was associated with speaking a language other than English at home, being gay/lesbian/bisexual/unsure, unsafe feelings about school, or forced sexual intercourse. Class 4 was associated with all 9 predictors (Table 1). The highest-risk students—those with the highest AORs for "attempted suicide" or "planned and attempted suicide"—were those who spoke a language other than English at home, were gay/lesbian/bisexual/unsure, had unsafe feelings about school, or had experienced forced sexual intercourse.

## DISCUSSION

Our results from simultaneously modeling 5 depressed mood and suicide indicators and 9 demographic and health risk predictors are consistent with previous studies.[23] They also identified new predictors (academic performance, immigrant status, not feeling safe at school, cigarette smoking), suggested avenues for further investigation, and identified populations to target for health interventions.

### Gender, Grade, Academic Performance, and Home Language

Class 3 had the highest probability (69%) of having made a suicide attempt that was treated by a medical professional, but it did not having the highest probability of feeling sad or hopeless or of having considered or

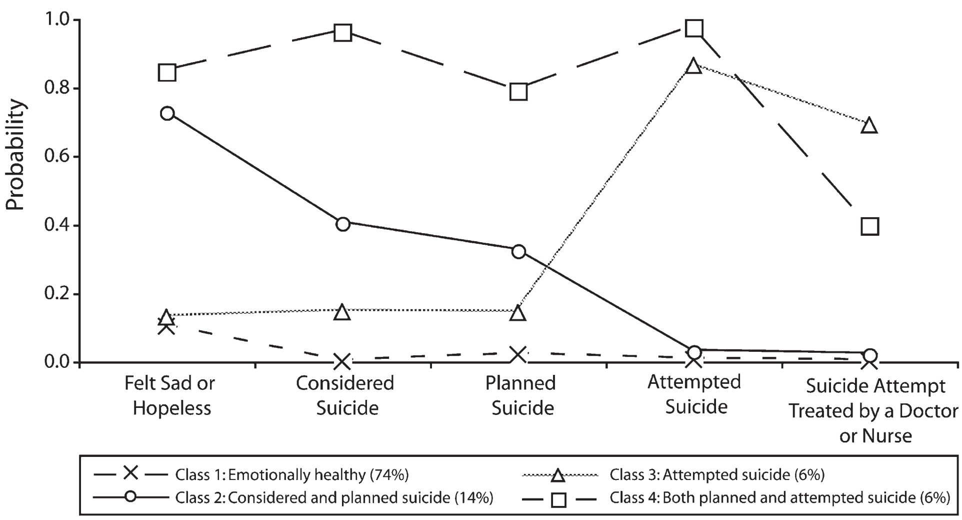


**FIGURE 1—Latent class membership of public high school students in relation to suicide indicators: Rhode Island Youth Risk Behavior Survey, 2007.**

planned suicide. Female students were less likely (AOR=0.6) to fall into class 3 than were male students, though the difference was not significant.

Our study showed, after adjustment, that female students were twice as likely as male students to consider and plan suicide and 3 times as likely to both plan and attempt suicide, but they were less likely to attempt suicide without forethought. Eaton et al.[11] showed that suicide risk varies by gender among overweight and obese adolescents specifically. Although male adolescents were more likely to die from suicide, female adolescents were more likely to plan and attempt suicide. High school YRBS data[11] indicate that more females than males reported thinking, planning, or trying suicide. Chatterji et al.[3] concluded that although completed suicides were much more common among male adolescents, female adolescents were about twice as likely as male adolescents to report suicide attempts. Chatterji et al.[3] also found that female adolescents who attempted suicide were more likely than were male adolescents to have family dysfunction, low self-esteem, anxiety disorders, and a history of sexual abuse. Boys who attempted suicide were more likely than were girls to report chronic stress, alcohol problems, and financial problems.[3] Hallfors et al.[23] demonstrated that girls were less likely than were boys to engage in high-risk behaviors, but those who did tended to be more vulnerable to depression, suicidal ideation, and suicide attempt. However, these studies differ from our research in that they used individual suicide indicators instead of a summary measure.

The higher odds of 9th- and 10th-grade students being at risk for planning and attempting suicide in class 4 may be attributed at least in part to high school drop-out patterns. All students in Rhode Island have to stay in school until they are aged 16 years, so most 9th- and 10th-grade students are not old enough to drop out. Students may begin dropping out in 11th grade, and high-risk students may be more likely than are low-risk students to drop out. Entry into high school is a major transition for 9th-grade students that requires significant adjustments at a time in life when students may experience greater stress. Eaton et al.[1] found that 9th, 10th, and 11th graders (11%, 9%, and 8%, respectively) were significantly more likely than were 12th graders (5.5%) to have attempted suicide in the past year.

Our findings demonstrate a significant correlation between low grades (“C”s; and “D”s and “F”s) and considering and planning suicide or planning and attempting suicide. Richardson et al.[24] reported that students with low academic performance had a higher suicide rate than did all other students, and concluded that perceived low academic performance was an indicator of risk for attempted suicide in adolescents. School suicide prevention interventions should target students with low grades, not just those with failing grades.

One study showed that youths from immigrant families were at greater risk of engaging in risk behaviors.[25] After adjustments for major sociodemographic confounders, findings from Hjern et al.[25] showed that children from immigrant families were more likely than were native Swedish-born children to die from suicide, to attempt suicide, to be admitted for a psychiatric disorder, to abuse drugs or alcohol, or to commit a crime. They advised professionals to give appropriate consideration to the high suicide risk among immigrant children.[25] Our Rhode Island findings indicated that immigrant status might be a risk factor for suicide among public high school students. Planners should consider recent immigrant youths in the development of community-based suicide prevention programs.

### Sexual Orientation, Unsafe Feelings, and Forced Sexual Intercourse

The odds ratios (ORs) associated with each class for gay/lesbian/bisexual/unsure students were exceptionally high (ORs=2.6–6.5) and conformed with findings from other studies.[26–28] Rhode Island YRBS data indicate that sexual minority youths were 2 to 3 times more likely than were heterosexual youths to attempt suicide.[13] Pinhey et al.[26] used Guam's 2001 YRBS and reported that same-sex orientation was associated with a greater risk of suicide attempt, especially for males. Students who are gay/lesbian/bisexual/unsure frequently encounter social and environmental situations that contribute to suicide and suicide attempts, including prejudice, discrimination, harassment, alienation, isolation, victimization, stress associated with sexual orientation, limited support structures, HIV/AIDS, drugs, and alcohol.[29,30] Internalized homophobia and fear of rejection often lead to depression, anxiety, and substance use and other high-risk behaviors.[13]

Our study concluded that students who felt unsafe going to school or being at school had significantly higher AORs across the 3 classes. Brener et al.[31] reported that students completing the 1999 YRBS after the Columbine incident were more likely to report feeling unsafe regarding school but less likely to report considering or planning suicide than were students completing the 1999 YRBS before the incident. The Columbine study[31] differed from our results, but we also know Columbine was an exceptional event. Unfortunately, we could not identify other studies that explored the relationship between unsafe feelings at school and suicide.

Our results identified that students physically forced to have sexual intercourse had significantly higher AORs for classes 2, 3, and especially class 4 (AOR=7.2). These findings are consistent with previous studies. Clements-Nolle et al.[32] found that forced sexual intercourse was a predictor for suicidal behaviors among transgender persons. Andover et al.[33] showed that childhood physical and sexual abuse were both associated with later suicide attempts. Laederach et al.[34] concluded that sexual abuse in childhood was a main risk factor for suicide.

### Smoking and Perceived Overweight

Current cigarette smokers in our study had a substantially increased risk for being in class 4 (AOR=5.2). These findings are consistent with previous studies. Swedo et al.[35] suggested that adolescents either planning or attempting suicide could be distinguished from not-at-risk adolescents because the former were more likely to smoke, drink, or use drugs. Kelder et al.[36] found a significant association between smoking and symptoms of poor emotional health in minority race/ethnicity middle school students. Hallfors et al.[23] reported that involvement in any smoking, drinking, or sexual activity was associated with significantly increased odds of depression, suicidal ideation, and suicide attempts as compared with abstention from these behaviors. Cigarette use might be a marker for other risk behaviors, which supports providing mental health services in conjunction with smoking-cessation programs.

Our study showed significant AORs of 2.1 and 2.3 for perceived overweight associated with class 2 and class 4. Other studies have shown that overweight adolescents were more likely to have higher rates of depressed mood and low self-esteem[37,38] and that negative body image or weight dissatisfaction were associated with depression, anxiety, and low self-esteem.[39] Using YRBS data, Whetstone et al.[7] showed that middle school students who perceived themselves to be overweight were more likely to report suicide ideation and attempts. They also found that girls were more likely than were boys to perceive themselves as overweight, to report more body dissatisfaction, and to be concerned about their weight. Overweight children often feel isolated or discriminated against in social situations.[37] Educators should note that students, especially those who are overweight, presenting with low self-esteem and depressed mood may be at increased risk for suicidal thoughts and behaviors and may benefit from clinical assessment.

In summary, classes 3 and 4 represented the student populations at greatest risk for actually attempting suicide and being treated for related injuries. Class 3 was particularly disconcerting because these students had a higher probability of attempting suicide, often resulting in serious injury, whereas they displayed a lower propensity for premeditation or prior depression. There were somewhat more male than female students in class 3. Class 4 was also at high risk of attempting suicide, but these students displayed depression and premeditation as well, although a smaller proportion reported attempts requiring medical attention. Female students were significantly more likely than were male students to be in class 4.

### Strengths and Limitations

The differences in our study compared with previous research included (1) using 1 latent class regression model as opposed to multiple logistic or linear regression models to characterize and quantify the Rhode Island public high school population at risk for suicide, (2) identifying 4 distinct patterns of suicide, and (3) determining population subgroups that have an elevated risk for 1, 2, or 3 classes of suicide. These subgroups are identifiable and potentially reachable with creative policies and interventions. Focusing initiatives on high-risk groups may be beneficial as well as cost- and resource-effective in reducing the burden of suicide among high school students.

The YRBS is an ongoing biennial survey that tracks the prevalence of health risk behaviors and depressed mood or suicide over time and among populations at risk. There are 5 limitations to the YRBS and this study. First, the data are cross-sectional, and, therefore, causality cannot be inferred. Longitudinal studies are needed to investigate these relationships appropriately. Second, the YRBS collects self-reported data, which are affected by recall bias. Students may under- or overreport behaviors, although the survey questions demonstrate good test–retest reliability.[12] The extent of under- or overreporting cannot be determined because there is no "gold standard" to validate these behaviors.[31] Third, the 2007 Rhode Island YRBS included only public high school students; findings may not apply to private high school students. Fourth, suicide is a human behavior that results from the confluence of many factors.[11] This study was not able to assess the contribution of several factors commonly associated with depressed mood and suicidal behavior, such as mental illness and family function. Fifth, if one considers the differences between males and females in suicide ideation and attempts,[3,11] running separate latent class regression models by gender might be useful. However, the 2007 Rhode Island YRBS sample size was too small for such an analysis. In future studies, we will combine multiple years of data to compare suicide patterns by gender.

## Conclusions

When research determines specific relationships in data, it is important to identify the best ways to intervene with at-risk populations. Parents and officials from education and other community-based organizations should work together to screen adolescents for depression and risk of suicide if they exhibit high-risk behaviors or certain patterns of behaviors. Health care professionals should also consider screening adolescents for risk behaviors as part of routine primary care. It is particularly important not to overlook suicide risk, because suicide is preventable. Collaborative programs to prevent smoking, marijuana use, and overweight have proven to be effective. The following Rhode Island programs should work together to prevent suicide: the SafeRI injury and violence prevention program can provide youths with meaningful after-school and evening activities such as sports, tutoring, and music, and educate teens about the harmful effects of bullying; the Initiative for Healthy Youth and the Watch Me Grow RI programs can train school professionals, parents, and students to recognize the warning signs for depression and suicide; and the Office of Special Health Care Needs can provide youths with opportunities for contact with helpful adults and for learning emotional problem solving. ■

## About the Authors

*At the time of the study, Yongwen Jiang, Donald Kent Perry, and Jana Earl Hesser were with Center for Health Data and Analysis, Rhode Island Department of Health, Providence. Yongwen Jiang and Jana Earl Hesser were also with Department of Community Health, School of Medicine, Brown University, Providence, RI.*

*Correspondence should be sent to Yongwen Jiang, Center for Health Data and Analysis, Rhode Island Department of Health, 3 Capitol Hill, Providence, RI 02908 (e-mail: yongwen.jiang@health.ri.gov). Reprints can be ordered at http://www.ajph.org by clicking the "Reprints/Eprints" link.*

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## Contributors

Y. Jiang prepared the database, conducted the literature review, collaborated on analytic decisions and data interpretation, performed the statistical analyses, prepared the data table and figure, and drafted the article. D.K. Perry manages the Rhode Island YRBS and oversees survey implementation; he collaborated on analytic decisions and data interpretation, and revised and edited the article. J.E. Hesser directly supervised the other authors, and assisted in the editing and revising of the article. All the authors helped to conceptualize ideas, interpret findings, review drafts, and approve the final version of the article.

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## Human Participant Protection

The YRBS was reviewed and approved by an institutional review board at the CDC. No protocol approval was needed for this study.

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