

Evaluating Iatrogenic Risk of Youth Suicide Screening Programs

A Randomized Controlled Trial

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THE PRESIDENT'S NEW FREEDOM Commission¹ and the Children's Mental Health Screening and Prevention Act² recommend increased screening for suicidality and mental illness. The recent enactment of the Garrett Lee Smith Memorial Act³ further supports the development of youth suicide prevention and intervention programs. Despite the proliferation of screening programs in recent years (eg, Signs of Suicide,⁴ Teen-Screen⁵), the current debate about possible iatrogenic effects of other suicide preventive interventions,^{6,7} and the belief that prevention programs may "spur troubled youngsters to try suicide,"⁸ the potential harm of screening for suicide remains unstudied.^{9,10}

Screening strategies are based on the valid premise that suicidal adolescents are underidentified¹¹⁻¹⁵; have an active, often treatable, mental illness¹⁶⁻¹⁸; and exhibit identifiable risk factors.¹¹ Evidence for the clinical validity and reliability of school-based screening procedures has recently emerged. Use of the Suicidal Ideation Questionnaire (SIQ) in a midwestern US high school yielded a sensitivity

Context Universal screening for mental health problems and suicide risk is at the forefront of the national agenda for youth suicide prevention, yet no study has directly addressed the potential harm of suicide screening.

Objective To examine whether asking about suicidal ideation or behavior during a screening program creates distress or increases suicidal ideation among high school students generally or among high-risk students reporting depressive symptoms, substance use problems, or suicide attempts.

Design, Setting, and Participants A randomized controlled study conducted within the context of a 2-day screening strategy. Participants were 2342 students in 6 high schools in New York State in 2002-2004. Classes were randomized to an experimental group (n=1172), which received the first survey with suicide questions, or to a control group (n=1170), which did not receive suicide questions.

Main Outcome Measures Distress measured at the end of the first survey and at the beginning of the second survey 2 days after the first measured on the Profile of Mood States adolescent version (POMS-A) instrument. Suicidal ideation assessed in the second survey.

Results Experimental and control groups did not differ on distress levels immediately after the first survey (mean [SD] POMS-A score, 5.5 [9.7] in the experimental group and 5.1 [10.0] in the control group; $P=.66$) or 2 days later (mean [SD] POMS-A score, 4.3 [9.0] in the experimental group and 3.9 [9.4] in the control group; $P=.41$), nor did rates of depressive feelings differ (13.3% and 11.0%, respectively; $P=.19$). Students exposed to suicide questions were no more likely to report suicidal ideation after the survey than unexposed students (4.7% and 3.9%, respectively; $P=.49$). High-risk students (defined as those with depression symptoms, substance use problems, or any previous suicide attempt) in the experimental group were neither more suicidal nor distressed than high-risk youth in the control group; on the contrary, depressed students and previous suicide attempters in the experimental group appeared less distressed ($P=.01$) and suicidal ($P=.02$), respectively, than high-risk control students.

Conclusions No evidence of iatrogenic effects of suicide screening emerged. Screening in high schools is a safe component of youth suicide prevention efforts.

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ranging from 83% to 100%, with specificity from 49% to 70%.¹⁹ The Suicide Risk Screen's use among 581 students in 7 high schools had a sensitivity ranging from 87% to 100%, with specificity from 54% to 60%.²⁰ Among 2004 teenagers from 8 New York metropoli-

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Table 1. Overall Research Design

Timeline	Experimental Group	Control Group
Day 1 (survey 1)		
Baseline POMS-A1	✓	✓
Beck Depression Inventory	With suicide question	Without suicide question
Drug Use Screening Inventory	✓	✓
Suicidal Ideation Questionnaire	✓	
Suicide attempt history	✓	
Immediate POMS-A2	✓	✓
Day 3 (survey 2)*		
Persistent POMS-A3	✓	✓
Interim depression question†	✓	✓
Suicide questions		
Interim suicide item†	✓	✓
Suicidal Ideation Questionnaire	✓	✓
Suicide attempt history	✓	✓
Beck Depression Inventory suicide item	✓	✓

Abbreviation: POMS-A, Profile of Mood States adolescent version.

*Associated suicide risk factors assessed but not the focus of this article.

†Data available for 4 of the 6 schools.

tan-area high schools, Columbia Teen-Screen exhibited a sensitivity of approximately 88% and specificity of 76%.¹⁴ Moreover, many high-risk adolescents, defined as those with a major depressive disorder, frequent suicidal ideation, or any previous suicide attempt, were previously unidentified. Recently, the Columbia Suicide Screen, completed by 1729 9th- to 12th-graders, had a sensitivity and specificity of 75% and 83%, respectively.²¹ Systematic clinical evaluations using interviews such as the Suicidal Behavior Interview²² and the Diagnostic Schedule for Children¹⁴ have provided the suicidal status criteria in these studies. An evaluation of the Signs of Suicide school-based suicide prevention program, which incorporates an educational component and suicide screen, reported high satisfaction by school personnel²³ and a short-term decrease in students' suicide attempts, although neither help-seeking behavior nor suicidal ideation was affected.²⁴

Studies have identified potential strengths of school-based screening without assessing potential shortcomings. The US Preventive Services Task Force cited a similar deficit when reviewing suicide screening by primary care clinicians.⁹ A pervasive concern is whether asking a child or adolescent about suicidal thoughts and behavior may trig-

ger subsequent suicidal ideation and behavior. This article addresses this concern by examining whether asking about suicidal ideation and behavior during a screening program creates immediate or persistent distress or increases suicidal ideation among high school students generally or among high-risk students with depression symptoms, substance use problems, or previous suicide attempts, specifically.

METHODS

Research Design

A randomized experimental design was conducted during a 2-day screening strategy. Classes within each of 6 high schools were randomized to either an experimental or a control group. Each school had an approximately equal number of students in each group. The experimental group received a first screening survey with a set of questions assessing suicidal ideation and behavior; the control group received the same first survey but without suicide questions. A measure of transient distress was given at the beginning and end of the first survey and repeated at the beginning of a second survey administered 2 days after the first. Both groups received the same second survey with suicidal ideation or behavior questions (TABLE 1). During a subsequent safety review, a project child psychia-

trist, psychologist, or social worker interviewed adolescents reporting serious distress, serious suicidal ideation, or any suicide attempt to assess imminent suicide risk and the need for further evaluation and possible treatment. Referrals were arranged with parents by project social workers.

Sample

This study targeted adolescents who were aged 13 through 19 years, in grades 9 to 12, and attending 6 high schools in Nassau, Suffolk, and Westchester counties in New York State. Five schools were public coeducational schools and 1 was a parochial all-boys' school. These schools were identified from our earlier screening program.²⁵ To examine as sensitive an issue as iatrogenic risks of screening programs, we had to recruit schools in which we had previously gained school administrators' trust. However, students in the current study had not participated in our previous screening because they were not yet in high school.

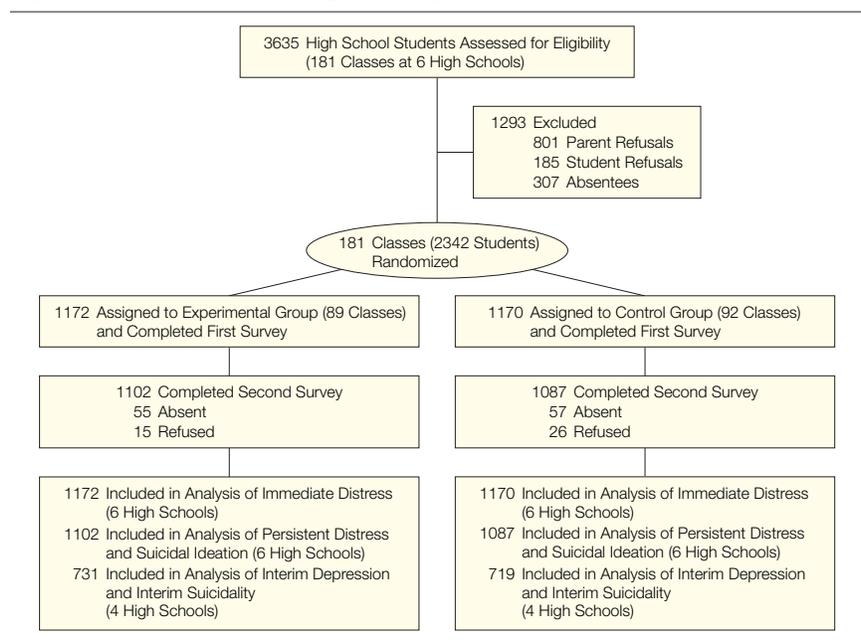
We assessed 2342 of 3635 students (64.4% participation rate) from the fall of 2002 through the spring of 2004. Reasons for nonparticipation included parental refusals (61.9%), student refusals (14.3%), and absences (23.7%). The experimental and control groups consisted of 1172 and 1170 students, respectively (FIGURE). The ethnic distribution of the participating sample was 80.3% white, 5.1% black, 7.3% Hispanic, 3.8% Asian, and 3.5% other. A total of 58.1% of the students were boys (the inclusion of an all-male parochial school explains the high percentage of boys). The mean (SD) age of participating students was 14.8 (1.2) years. There were no significant differences between experimental and control groups or between participants and nonparticipants in sex, age, and race/ethnicity. Participants reported race/ethnicity according to options defined by the investigator. For nonparticipants, demographic information was obtained from school records by school administrators. Race/ethnicity was assessed because it is among the demo-

graphic factors related to the epidemiology of suicidal behavior.

The attrition rate from the first to the second survey did not significantly differ between the experimental (6.0%) and control groups (7.1%) (odds ratio [OR], 0.83; 95% confidence interval [CI], 0.60-1.16; $P = .28$). Furthermore, attrition rates were not significantly related to sex (girls, 7.2%; boys, 6.0%) (OR, 1.01; 95% CI, 0.64-1.60; $P = .97$) or race/ethnicity (black, Hispanic, Asian and other groups, 5.4%; white, 6.8%) (OR, 1.01; 95% CI, 0.53-1.94; $P = .97$), nor was there an interaction between these demographics and randomization group on attrition (OR for sex \times randomization, 0.86; 95% CI, 0.44-1.68; $P = .65$; OR for ethnicity \times randomization, 1.2; 95% CI, 0.49-2.95; $P = .69$). Study dropouts were older (mean [SD], 15.5 [1.3] years) than those who participated both days (14.8 [1.2] years) (OR, 1.57; 95% CI, 1.28-1.91, $P < .001$), but there was no differential relationship of age by randomization group on attrition (OR for age \times randomization, 1.02; 95% CI, 0.79-1.32; $P = .88$). The relationship of attrition to clinical risk factors is discussed later.

Students were recruited with an "opt-out" procedure for parents and active written assent for youth. Two mailings with an information sheet describing survey content and procedures, a response form, and a stamped response envelope were sent to parents 6 and 4 weeks before survey administration, providing parents opportunities to refuse their children's participation. Student written assent was obtained immediately before the survey. Parents and students were informed that the research was designed "to develop good screening programs and test different methods of screening to minimize distress in high school students," and that "alternative formats of the survey will be used, but over the course of 2 class periods, on separate days, the same questions will be asked of all students." The schools' principals and guidance directors, cognizant of project aims, randomization procedures, and survey content, approved

Figure. Flow of Participants Through the Study



recruitment and consent procedures. The study procedures, consistent with the Family Educational Rights and Privacy Act and the Protection of Pupil Rights Amendment, were approved by the institutional review board of the New York State Psychiatric Institute/Columbia University Department of Psychiatry.

Outcome Measures

Profile of Mood States. The Profile of Mood States (POMS) is a self-administered adjective checklist measuring transient mood states.²⁶ Factor analyses of its 65 items, coded on a 5-point scale,²⁶⁻³⁰ yielded 6 factors: "tension-anxiety," "depression-dejection," "anger-hostility," "fatigue-inertia," "confusion-bewilderment," and 1 positive state, "vigor-activity." The POMS has demonstrated excellent internal consistency and has proven sensitive to short- and long-term change.³¹⁻³⁹ The present study used an abbreviated version of the POMS, previously developed and validated in a sample of nearly 2000 adolescents. Confirmatory factor analysis supported the factorial validity of a 24-item 6-factor model.³⁹ We used 3 of the 4 top loading items on

each factor. The POMS-A has demonstrated criterion and construct validity, and its "right now" time frame is sensitive to short-term mood changes.³⁹ The POMS-A measured at the end of the first survey and at the beginning of the second survey assessed immediate and persistent distress, respectively.

Suicidal Ideation Questionnaire. The SIQ-JR assesses suicidal thoughts and is designed for large-scale, school-based screenings of adolescents.⁴⁰ The 15-item SIQ-JR uses a 7-point Likert-type scale, ranging from 0 ("I never had this thought") to 6 ("This thought was in my mind almost every day"), assessing the frequency of specific suicidal thoughts during the past month. It assesses a wide range of thoughts related to death and dying, passive and active suicidal ideation, and suicidal intent. The SIQ-JR, designed for seventh- to ninth-graders, accommodated the ninth graders in our sample. Reliability of the SIQ-JR is high, ranging from 0.91 to 0.96⁴⁰⁻⁴² for internal consistency and from 0.87 to 0.93 for test-retest reliability (0.89 overall; 0.87 for adolescent girls and 0.93 for adolescent boys).⁴² The SIQ-JR has demonstrated criterion validity,^{22,40,42,43} construct validity in community^{41,42,44-47} and

clinical samples,^{43,48-51} and predictive validity.⁴¹

Interim Depression and Suicidal Ideation. During the second survey, 2 questions directly assessed participants' subjective experiences of depression and suicidal ideation after the first survey: "Since the first survey, have you felt depressed? . . . have you thought about killing yourself?" These were coded on a 5-point scale, ranging from 0 (not at all) to 5 (a lot). According to clinical judgment, "a little" suicidal ideation was included as a yes response for the dichotomized item, whereas "some-what," "quite a bit," and "a lot" defined yes for depression. These questions were added to the study after data collection began, and data are available for 4 schools.

Risk Status Measures

Depression Symptoms. The Beck Depression Inventory (BDI)⁵² assessed cognitive, behavioral, affective, and somatic components of depression. Loss of libido was not assessed. The BDI's use in more than 200 studies includes those with adolescent samples.⁵³⁻⁵⁵ Each response ranged from 0 ("symptom not present") to 3 ("symptom is severe"). Deleting the suicidal ideation question from the control group's first survey necessitated omitting this item from both groups' total scores, lowering the maximum total score to 57; therefore, we used a cutoff point of 15 rather than 16, recommended to detect possible depression in normal populations.⁵²

Substance Use Problems. The Drug Use Screening Inventory (DUSI),⁵⁶⁻⁵⁸ designed to screen for alcohol or drug use and problems among teenagers, has demonstrated good reliability and discriminant validity and sensitivity and has published normative cutoff scores.⁵⁷⁻⁶³ A total score combined all 15 items from the substance use scale (assessing the degree of involvement and severity of consequences from alcohol and drug use), 3 alcohol or drug items on the school performance adjustment scale, and 1 additional aggression item assessing the clinically predictive problem of breaking things or getting into fights while un-

der the influence of alcohol or drugs.¹⁸ A cutoff point of at least 5 dichotomized total scores according to the recommended cutoff points, roughly corresponding to 10% of the sample.⁶⁰

Suicide Attempt History. Seven questions asking about lifetime and recent suicide attempts were derived from the depression module of the Diagnostic Interview Schedule for Children⁶⁴ and an earlier suicide screen.²¹ These items have demonstrated good construct validity.^{21,65} The assessment of an attempt included questions about occurrences, injuries sustained, medical care sought, and hospitalization.⁶⁶ Any attempt (regardless of timing, injury, or medical attention) categorized a student as "high risk." For purposes of parallel measurement, attempt history was derived from the second-day survey for the experimental and control groups. Agreement on attempt history between the first- and second-day surveys for the experimental group was high ($\kappa=0.79$; SE, 0.05).

Analytic Strategy

The primary sampling unit was school and the secondary sampling unit was student within school. Thus, we first examined the extent of within-school clustering to determine whether this clustering variable warranted inclusion in the analyses. The sample clusters (school) had little impact on the outcomes (POMS, SIQ-JR) or risk modifiers (depression symptoms, substance use problems, suicide attempt history), as indicated by the intraclass coefficients, which were all close to zero. Therefore, the use of mixed-effects linear models to account for the clustering variable of school was unnecessary. School was included as a covariate in all analyses.

The primary tests of the a priori hypotheses about immediate distress, persistent distress, and suicidal ideation involved comparisons of the experimental and control groups on the outcome measures. Multivariable linear regression models were estimated to determine the significance of randomization status (ie, experimental or control group) on im-

mediate distress (POMS-A2, end of first survey), persistent distress (POMS-A3, beginning of second survey), or suicidality (SIQ-JR). The total POMS-A1 score (beginning of first survey) was used as a covariate in the analyses of POMS-A2 and POMS-A3 by design because an expected high correlation between the pre-POMS and post-POMS scores (A1-A2 $r=0.87$, $P<.001$; A1-A3 $r=0.76$, $P<.001$) yields a substantial increase in statistical power to test the primary hypotheses. Another series of models included each risk modifier separately (depression symptoms, substance use problems, suicide attempt history), the risk \times randomization group interaction term, and randomization group to test whether some students were more susceptible to distress or suicidality from the suicide questions.

Logistic regression models were estimated to examine the main and interactive effects on interim depression and suicide. Significance levels were set at 5%. For continuous variables, there was ample statistical power ($\geq 95\%$) to detect small main effects ($\geq 15\%$) and small interaction effects ($\geq 25\%$). For dichotomous variables, there was adequate power ($\geq 80\%$) to detect a small OR (≥ 1.4) for a main effect and an interaction OR of 2 for a rare risk factor (approximately 5% prevalence) and an outcome in excess of 10% prevalence.

Applying the Consolidated Standards of Reporting Trials⁶⁷ statement principles, there was no post hoc adjustment for baseline differences between the randomized conditions because such adjustment is likely to bias the estimated treatment effect.⁶⁸ The DUSI score was the only baseline variable to differ between the experimental and control groups (mean [SD], 1.2 [2.4] and 1.0 [2.1], respectively, $P<.001$, which reflects a minimal effect size [0.1]). The statistical analyses were conducted using SPSS statistical software, version 12 (SPSS Inc, Chicago, Ill).

RESULTS

Attrition

Attrition rates (TABLE 2) were not significantly related to randomization

Table 2. Attrition Rates as a Function of Randomization Group and Risk Status

Risk Status	No./Total (%)		Experimental vs Control*		With vs Without Risk†		Interaction‡	
	Experimental Group	Control Group	OR (95% CI)	P Value	OR (95% CI)	P Value	OR (95% CI)	P Value
Depression	14/156 (9.0)	8/127 (6.3)	0.75 (0.52-1.08)	.12	0.84 (0.39-1.81)	.66	1.76 (0.66-4.72)	.26
No depression	55/1013 (5.4)	75/1035 (7.2)						
Substance use problems	16/109 (14.7)	7/68 (10.3)	0.73 (0.51-1.05)	.09	1.49 (0.65-3.44)	.35	1.94 (0.69-5.43)	.21
No substance use problems	54/1063 (5.1)	76/1102 (6.9)						
Suicide attempt history	3/56 (5.4)	0	0.67 (0.20-2.25)	.52				
No suicide attempt history	65/1111 (5.9)	0						
Total	70/1172 (6.0)	83/1087 (7.1)	0.83 (0.60-1.16)	.28				

Abbreviations: CI, confidence interval; OR, odds ratio.

*Experimental group is coded 1 and control group is coded 0. Attrition is coded 1 and no attrition is coded 0.

†With risk is coded 1 and without risk is coded 0.

‡The interaction is the ratio of the adjusted OR of attrition by risk for the experimental group to the adjusted OR of attrition by risk for the controls. In other words, the interaction examines whether attrition rates for high-risk groups depend on randomization group (experimental or control).

group ($P=.28$), depression symptoms ($P=.66$), substance use problems ($P=.35$), or suicide attempt history ($P=.52$), nor were there any significant interactions between risk status and randomization group. Baseline scores on the POMS, SIQ-JR, BDI, and DUSI were not associated with attrition, nor did they interact with randomization group. The lack of differential attrition provides evidence that our subsequent analyses and interpretations are not vulnerable to this potential threat to the study's internal validity and suggests that the experimental group's high-risk students were no more distressed than those in the control group.

Impact on Distress

Experimental and control groups did not significantly differ in distress levels immediately after the first survey (POMS-A2) or 2 days later (POMS-A3) (TABLE 3), nor were there any differences on the 6 POMS-A subscales. Rates of depressive feelings in the 2-day period between the surveys were not significantly different between the experimental (13.3%) and control (11.0%) groups ($P=.19$).

Impact on Suicidal Ideation

The experimental group reported no more suicidality after the survey than the control group (Table 3). Neither SIQ-JR scores in the second survey nor rates of interim suicidal thoughts be-

Table 3. Distress and Suicidal Ideation by Randomization Group

	Experimental (n = 1172 Day 1, n = 1102 Day 2)	Control (n = 1170 Day 1, n = 1087 Day 2)	Experimental vs Control	
			β or OR (95% CI)	P Value
Distress*				
Baseline (POMS-A1), mean (SD)	6.9 (10.0)	6.4 (9.7)	0.47 (−0.32 to 1.26)†	.25
Immediate (POMS-A2), mean (SD)	5.5 (9.7)	5.1 (10.0)	0.09 (−0.32 to 0.50)‡	.66
Persistent (POMS-A3), mean (SD)	4.3 (9.0)	3.9 (9.4)	0.21 (−0.29 to 0.72)‡	.41
Interim depression (yes), %§	13.3	11.0	1.24 (0.90-1.70)	.19
Suicidal ideation				
SIQ-JR, mean (SD)¶	6.5 (11.5)	6.6 (10.5)	−0.82 (−1.00 to 0.84)†	.86
Interim suicidality (yes), %§	4.7	3.9	1.20 (0.72-2.00)	.49

Abbreviations: CI, confidence interval; OR, odds ratio; POMS-A, Profile of Mood States adolescent version; SIQ-JR, Suicidal Ideation Questionnaire.

*Baseline, immediate, and persistent distress were assessed by the POMS-A measured at the beginning of the first survey, end of the first survey, and at the beginning of the second survey, respectively. POMS score ranges from −12 to 60 (higher scores indicating more distress).

†Unstandardized linear regression coefficient adjusted for school.

‡Unstandardized linear regression coefficient adjusted for school and POMS-A1.

§Interim depression and suicidality data available for 4 of 6 schools (n = 731 experimental students; n = 719 control students).

||Odds ratio adjusted for school.

¶The SIQ-JR is a 15-item questionnaire using a 7-point scale (higher scores indicating more suicidal ideation).

tween the first and second surveys were significantly higher among the experimental group (4.7%) than among the control group (3.9%; $P=.49$).

Differential Impact on High-Risk Students

Depression Symptoms. Students with depression symptoms above the cutoff score of 15 on the BDI reported more distress and suicidal ideation than students below the cutoff score in both experimental and control groups (TABLE 4). However, being exposed to suicide questions in the first survey did

not exacerbate distress or suicidal ideation among depressed students. On the contrary, the direction of the significant depression by randomization group interactions on POMS-A2 ($\beta=-1.58$; 95% CI=−2.78 to −0.38; $P=.01$) and POMS-A3 ($\beta=-2.00$; 95% CI=−3.52 to −0.48; $P=.01$) indicated that among depressed youth, the experimental group had slightly lower distress scores than the control group.

Substance Use Problems. Students with substance use problems had significantly higher rates of interim depression symptoms ($P=.047$) and in-

terim suicidal ideation ($P < .001$) and scored higher on the SIQ-JR ($P < .001$) than those without these problems; however, none of the interactions reached statistical significance (TABLE 5).

History of Suicide Attempt. Students with previous suicide attempts reported significantly more distress and

suicidal ideation (TABLE 6). The significant interactions on the SIQ-JR ($\beta = -5.33$; 95% CI = -9.40 to -1.26 ; $P = .01$) and interim suicidality (OR = 0.17 ; 95% CI = $0.04-0.72$; $P = .02$) indicated that among previous suicide attempters, the experimental group had less suicidal ideation than the control group.

COMMENT

This article described 2342 adolescents from 6 high schools in New York State participating in a school-based suicide screening program. Half the students were randomized to receive questions about suicidal ideation and behavior in the first screening survey. The other half did not receive these

Table 4. Distress and Suicidal Ideation by Randomization Group and Depression Symptoms

	Experimental		Control		Main Effect of Depression Symptoms		Interaction of Depression × Randomization Group	
	Symptoms (n = 156 Day 1, n = 142 Day 2)	No Symptoms (n = 1013 Day 1, n = 958 Day 2)	Symptoms (n = 127 Day 1, n = 119 Day 2)	No Symptoms (n = 1035 Day 1, n = 960 Day 2)	β or OR (95% CI)	P Value	β or OR (95% CI)	P Value
Distress								
Baseline (POMS-A1), mean (SD)*	21.2 (10.2)	4.6 (7.8)	21.9 (10.9)	4.5 (7.6)	17.10 (15.62-18.58)†	<.001	-0.57 (-2.58 to 1.43)†	.58
Immediate (POMS-A2), mean (SD)	20.0 (10.6)	3.2 (7.2)	22.1 (13.0)	3.0 (7.1)	5.52 (4.55-6.50)‡	<.001	-1.58 (-2.78 to -0.38)‡	.01
Persistent (POMS-A3), mean (SD)	16.5 (10.8)	2.5 (7.0)	18.7 (12.3)	2.0 (7.1)	5.77 (4.54-7.00)‡	<.001	-2.00 (-3.52 to -0.48)‡	.01
Interim depression (yes), %§	48.4	8.0	49.4	5.8	15.02 (8.64-26.13)	<.001	0.75 (0.36-1.58)	.45
Suicidal ideation								
SIQ-JR, mean (SD)¶	21.6 (17.8)	4.2 (7.7)	23.3 (20.4)	4.5 (5.9)	18.54 (16.79-20.30)†	<.001	1.30 (-3.69 to 1.09)†	.29
Interim suicidality (yes), %§	18.9	2.5	23.8	1.4	21.08 (9.08-48.97)	<.001	0.45 (0.15-1.39)	.17

Abbreviations: CI, confidence interval; OR, odds ratio; POMS-A, Profile of Mood States adolescent version; SIQ-JR, Suicidal Ideation Questionnaire.
 *Baseline, immediate, and persistent distress were assessed by the POMS-A measured at the beginning of the first survey, end of the first survey, and at the beginning of the second survey, respectively. POMS score ranges from -12 to 60 (higher scores indicating more distress).
 †Unstandardized linear regression coefficient adjusted for school.
 ‡Unstandardized linear regression coefficient adjusted for school and POMS-A1.
 §Interim depression and suicidality data available for 4 of 6 schools (n = 95 and n=635 for experimental group with and without depression, respectively; n = 81 and n=634 for control group with and without depression, respectively).
 ||Odds ratio adjusted for school.
 ¶The SIQ-JR is a 15-item questionnaire using a 7-point scale (higher scores indicating more suicidal ideation).

Table 5. Distress and Suicidal Ideation by Randomization Group and Substance Use Problems

	Experimental		Control		Main Effect of Substance Use Problems		Interaction of Substance Use Problems × Randomization Group	
	Problems (n = 109 Day 1, n = 93 Day 2)	No Problems (n = 1063 Day 1, n = 1009 Day 2)	Problems (n = 68 Day 1, n = 61 Day 2)	No Problems (n = 1102 Day 1, n = 1026 Day 2)	β or OR (95% CI)	P Value	β or OR (95% CI)	P Value
Distress								
Baseline (POMS-A1), mean (SD)*	15.2 (11.4)	6.0 (9.4)	14.8 (11.6)	5.9 (9.3)	8.47 (6.14-10.81)†	<.001	0.35 (-2.64 to 3.33)†	.82
Immediate (POMS-A2), mean (SD)	13.0 (11.7)	4.7 (9.1)	13.0 (12.7)	4.6 (9.6)	0.68 (-0.55 to 1.90)†	.28	-0.33 (-1.88 to 1.22)†	.67
Persistent (POMS-A3), mean (SD)	11.6 (11.8)	3.6 (8.4)	10.7 (11.6)	3.5 (9.1)	0.89 (-0.69 to 2.47)‡	.27	0.15 (-1.85 to 2.16)‡	.88
Interim depression (yes), %§	33.3	11.5	22.5	10.3	2.24 (1.01 to 4.98)§	.047	1.54 (0.57 to 4.12)	.40
Suicidal ideation								
SIQ-JR, mean (SD)¶	16.6 (17.6)	5.6 (10.3)	13.9 (17.5)	6.2 (9.8)	7.34 (4.54 to 10.14)†	<.001	3.22 (-0.39 to 6.83)†	.08
Interim suicidality (yes), %§	8.3	4.3	17.5	3.1	6.62 (2.55 to 17.9)	<.001	0.29 (0.08 to 1.14)	.08

Abbreviations: CI, confidence interval; OR, odds ratio; POMS-A, Profile of Mood States adolescent version; SIQ-JR, Suicidal Ideation Questionnaire.
 *Baseline, immediate, and persistent distress were assessed by the POMS-A measured at the beginning of the first survey, end of the first survey, and at the beginning of the second survey, respectively. POMS score ranges from -12 to 60 (higher scores indicating more distress).
 †Unstandardized linear regression coefficient adjusted for school and randomization group.
 ‡Unstandardized linear regression coefficient adjusted for school, POMS-A1, and randomization group.
 §Interim depression and suicidality available for 4 of 6 schools (n = 60; 671 for experimental group with and without substance problems, respectively; n = 40; 679 for control group with and without substance problems, respectively).
 ||Odds ratio adjusted for school and randomization group.
 ¶The SIQ-JR is a 15-item questionnaire using a 7-point scale (higher scores indicating more suicidal ideation).

questions until a second screening survey 2 days later. There was no evidence of an iatrogenic effect of asking about suicide. Neither distress nor suicidality increased among the entire population of surveyed students or high-risk students who were asked about suicidal ideation or behavior. On the contrary, the findings suggested that asking about suicidal ideation or behavior may have been beneficial for students with depression symptoms or previous suicide attempts.

The lack of detrimental effects in the present study contrasts with findings reported for some suicide-prevention programs,^{13,69} such as suicide awareness curricula programs of the 1980s. These usually included didactic presentations on suicide statistics, "warning signs" of suicide, and mental health resources. Often a videotape depicted a suicidal youngster or the consequences of failing to help a suicidal peer.⁷⁰ Although several studies reported modest increases in knowledge of symptoms,^{69,71-73} helpful attitudes,^{69,74,75} and help-seeking behavior,⁷⁴ others reported either no benefits^{13,76} or detrimental effects.^{13,69} Detrimental effects included a decrease in desirable at-

titudes,⁷⁷ a reduction in the likelihood of recommending mental health evaluations to a suicidal friend,⁷² more hopelessness and maladaptive coping responses among boys after exposure to the curriculum,⁶⁹ and negative reactions among students most at risk for suicide (ie, those with a history of suicidal behavior).¹³ Adolescent suicide attempters said they would not recommend suicide-curriculum programs to other students, reporting that talking about suicide in the classroom "makes some kids more likely to try to kill themselves."¹³ Our findings show that detrimental effects should not be inappropriately applied to all school-based suicide-prevention strategies, such as screening programs.

Our findings also show that extensive research supporting an imitative effect of suicide reports in the media^{11,78-80} does not apply to screening survey questions. Furthermore, the evidence that previous suicidal behavior may enhance the imitative effect of media reports^{81,82} cannot be extrapolated to suicide-screening surveys.

The present study has several advantages for addressing the impact of

screening programs. First, the randomized experimental design involved the direct manipulation of the suicide question exposure. Second, an ecologically valid setting (high schools) was used, rather than a laboratory setting, enabling generalization to the actual settings of suicide-screening programs. Third, several outcome indicators exhibited consistent results. Fourth, the large sample yielded ample statistical power to detect interactions between the experimental condition and depression symptoms, substance use problems, and a suicide attempt history.

The study also has important limitations. First, we used suburban schools with predominantly white populations of limited socioeconomic diversity so that the results cannot be generalized to urban, more ethnically or socioeconomically diverse settings. The schools were recruited from an earlier "postvention" screening project, involving schools with a student who had recently completed suicide and demographically matched comparison schools without such students. Three postvention and 3 comparison schools participated in the present study. In the

Table 6. Distress and Suicidal Ideation by Randomization Group (Experimental or Control) and Suicide Attempt History

	Experimental		Control		Main Effect of Suicide Attempt History		Interaction of Suicide Attempt History × Randomization Group	
	Attempt (n = 53 Day 2)*	No Attempt (n = 1037 Day 2)*	Attempt (n = 42 Day 2)*	No Attempt (n = 1042 Day 2)*	β or OR (95% CI)	P Value	β or OR (95% CI)	P Value
Distress								
Baseline (POMS-A1), mean (SD)†	18.7 (11.5)	6.0 (9.3)	16.1 (11.5)	6.0 (9.5)	9.9 (7.02 to 12.82)‡	<.001	2.5 (-1.36 to 6.42)‡	.20
Immediate (POMS-A2), mean (SD)	17.9 (12.1)	4.6 (8.9)	15.5 (13.2)	4.6 (9.6)	2.22 (0.70 to 3.73)§	.004	0.10 (-1.91 to 2.11)§	.92
Persistent (POMS-A3), mean (SD)	14.7 (12.1)	3.7 (8.4)	14.2 (14.5)	3.5 (8.9)	3.62 (1.76 to 5.49)§	<.001	-1.60 (-4.06 to 0.86)§	.20
Interim depression (yes), %	50	10.8	32.3	10.0	4.31 (1.92 to 9.70)¶	<.001	2.07 (0.72 to 5.92)¶	.18
Suicidal ideation								
SIQ-JR, mean (SD)#	25.5 (21.2)	5.4 (9.5)	31.0 (20.9)	5.6 (8.5)	25.20 (22.16 to 28.23)‡	<.001	-5.33 (-9.40 to -1.26)‡	.01
Interim suicidality (yes), %	10	4.2	29.0	2.8	16.11 (6.35 to 40.83)¶	<.001	0.17 (0.04 to 0.72)¶	.02

Abbreviations: CI, confidence interval; OR, odds ratio; POMS, Profile of Mood States; SIQ-JR, Suicidal Ideation Questionnaire.

*Attempt history was derived from second-day survey (see the "Methods" section).

†Baseline, immediate, and persistent distress was assessed by the POMS-A measured at the beginning of the first survey, end of the first survey, and at the beginning of the second survey, respectively. POMS score ranges from -12 to 60 (higher scores indicating more distress).

‡Unstandardized linear regression coefficient adjusted for school and randomization group.

§Unstandardized linear regression coefficient adjusted for school, POMS-A1 and randomization group.

||Interim depression and suicidality available for 4 of 6 schools (n = 40; 688 for experimental group with and without attempt history, respectively; n = 31; 687 for control group with and without attempt history, respectively).

¶Odds ratio adjusted for school and randomization group.

#The SIQ-JR is a 15-item questionnaire using a 7-point scale (higher scores indicating more suicidal ideation).

greater New York metropolitan area, most adolescents who complete suicide are white; consequently, our project was composed of a largely white population. Design considerations also dictated our implementation of the postvention project in the suburban counties surrounding New York City, rather than in New York City (which has a more ethnically diverse population) because lengthy delays in the adjudication of suicides in the New York City Medical Examiner's office precluded the timely implementation of the postvention protocol.

Second, our recruitment from an earlier postvention study might suggest that postvention influenced the results, thus limiting generalizability. However, the average interval since the index suicide was 72 months, ranging from 64 to 84 months, making the influence of the suicide less likely. Moreover, there were no significant interactions between postvention status and randomization group on distress or suicidal ideation, indicating that past postvention did not affect outcome.

Third, our participation rate was low, common to other suicide-screening protocols.²¹ Despite no significant differences between participants and non-participants in demographic factors (eg, sex, grade level, ethnicity), the same cannot be said about clinical factors (eg, risk status, BDI and SIQ-JR scores).

Fourth, by design the experimental group was asked about suicidal ideation or behavior in the first and second surveys, whereas the control group was asked these questions once, raising the possibility that attenuation^{83,84} masked an iatrogenic effect. However, standardized differences between means from 2 administrations of the SIQ-JR, using data on its test-retest reliability,⁴² indicate minimal attenuation (effect size = -0.03). In the present study, there was a significant decrease in the SIQ-JR from the first survey (mean [SD] = 7.7 [11.1]) to the second survey (mean [SD] = 6.5 [11.5]; $t = -5.05$; $P < .001$). If attenuation had masked an iatrogenic effect, this large a decrease (effect size = -0.11) would

not have been expected. A masked iatrogenic effect would have been more consistent with no decrease in scores. A comparison of the first administration of the SIQ-JR in the control group (second survey SIQ-JR) and the experimental group's first survey SIQ-JR cannot inform this issue because the survey content preceding these assessments was not comparable.

Our findings can allay concerns about the potential harm of high school-based suicide screening. Universal screening for mental health problems and suicide risk should continue to be at the forefront of the national agenda for youth suicide prevention. Moreover, our findings should assure health professionals that they should not refrain from asking their patients about suicidality for fear of its inducement.

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Study concept and design: Gould, Kleinman.

Acquisition of data: Gould, Marrocco, Thomas, Mostkoff, Cote.

Analysis and interpretation of data: Gould, Marrocco, Kleinman, Davies.

Drafting of the manuscript: Gould.

Critical revision of the manuscript for important intellectual content: Gould, Marrocco, Kleinman, Thomas, Mostkoff, Cote, Davies.

Statistical analysis: Gould, Kleinman, Davies.

Obtained funding: Gould.

Administrative, technical, or material support: Marrocco, Thomas, Mostkoff, Cote.

Study supervision: Gould.

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