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## School Year and Suicidal Behaviors Among Youth: Insight From a National Dataset

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### ABSTRACT

**Objective:** To compare suicidal behaviors that occur during the school year with those during school break and to examine demographic characteristics and comorbidities of the suicidal behaviors by time period.

**Methods:** This retrospective cross-sectional analysis of a nationwide US sample included 74,385 inpatients (aged 10–18 years) who were admitted to the hospital with primary *ICD-9* codes of suicidal ideation or suicide and self-inflicted injury including poisoning between January and December 2014. For this study, the sample was further subgrouped based on school year (September to May) and school break (June to August).

**Results:** Suicidal behaviors were higher during the school year (average of 6,761/month) compared to school break (average of 4,512/month). Prevalence of suicidal behaviors was highest in October for both hospitalization and primary diagnosis of mood disorder. Among the school year cohort, the rate of suicidal behaviors was higher in youth with mood disorders (91.6% vs 90%). During school break, the suicidal behavior rate was higher for youth with disruptive behavior disorders (34.6% vs 31.5%) and comorbid alcohol (7.9% vs 5.7%) and other substance use disorders (21.7% vs 18.4%).

**Conclusions:** Suicidal behaviors were higher (1.5 times) during the school year compared to school break. Given the finding that suicidal behaviors are higher among students with mood disorders during the school year, schools should implement universal depression and suicide screening. Youth with disruptive behavior disorders and substance use disorders are at higher risk for suicidal behaviors during school break, thus increased outreach and monitoring during extended breaks seems warranted for these high-risk youth during unstructured times.

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Suicide is the second leading cause of death among youth aged 10–18 years in the United States.<sup>1</sup> Multiple social and environmental factors increase the risk for suicidal behaviors among youth, including social isolation, substance abuse, bullying, difficulties in school, and school absenteeism and dropout.<sup>2–4</sup> Past reports found an increase in suicide attempts during the school year.<sup>4–6</sup> However, most of the previous studies about the temporal patterns of suicidal behaviors report about completed suicide<sup>4</sup> or analyze a single academic site<sup>6</sup> or selected number of children's hospitals.<sup>5</sup> No study has examined whether serious suicidal behaviors, which require inpatient hospitalization, are associated with school attendance in a national dataset. Furthermore, little is known about which youth are at higher risk for the apparent increase in suicidal behaviors during the school year. In this study, we aim to compare suicidal behaviors during the time of year when students are typically in school versus on break from school. We also examine demographic characteristics and comorbidities with suicidal behaviors that occur during these different time periods. Identification of youth who are at high risk for suicidal behaviors would allow for better allocation of scarce resources.

### METHODS

We conducted a retrospective cross-sectional analysis of the nationwide inpatient sample (NIS).<sup>7</sup> The health care cost and utilization project (HCUP) NIS acquires administrative data on inpatient discharges from about 4,400 nonfederal hospitals and 44 states in the United States, excluding rehabilitation and long-term care hospitals.<sup>8</sup>

We included 74,385 inpatients (aged 10–18 years) from the NIS (January–December 2014) with primary *ICD-9* codes of suicidal ideation (V62.84) or suicide and self-inflicted injury including poisoning (E950.XX–959.XX). Back-to-school dates in the United States vary considerably across states and regions; around 86% of schools start between mid-August and early September.<sup>9</sup> For this study, we further subgrouped based on school year (September to May) and school break (June to August). Given the variability in school start date and seasonal variability, we also looked specifically at suicidal behaviors in different seasons and when all youth (regardless of state or region) were in school (October [fall], January [winter], and May [spring]) and when all students were on summer break (July). Primary *ICD-9* diagnoses were identified for mood disorders, anxiety disorders, disruptive behavior disorders, alcohol, and other substance-related disorders.

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## Clinical Points

- The rate of suicide among youth has increased significantly over the past 2 decades.
- Suicidal behaviors were higher in youth during the school year compared to school break.
- Mood disorders were higher during the school year, while disruptive behavior disorders and substance use were higher during school break.

Individual patient identifiers are used to protect patient health information.<sup>7</sup> The use of administrative databases under the HCUP and publicly available deidentified NIS database does not require institutional review board approval.<sup>8</sup> We used  $\chi^2$  and *t* test to compare demographics, clinical diagnoses, and comorbid substance use disorder during school months versus school break. Next, we used the binomial logistic regression model to identify the predictors of suicidal behaviors during the school year (compared to school break as reference category). All the analyses were done using SPSS, and statistically significant *P* values was set at  $<.01$ .

## RESULTS

Suicidal behaviors were higher during the school year (average of 6,761/month, 223/day) compared to school break (average of 4,512/month, 147/day) (Table 1). This pattern

persisted when data were restricted to periods when all students were in school (October, January, and May, average of 208/day) versus when all students were on break (July, average of 136/day). Prevalence of suicidal behaviors was highest in October for both hospitalization (*n* = 7,515) and primary diagnosis of mood disorder (*n* = 6,800) (Figure 1).

Among the school year cohort, the rate of suicidal behaviors was higher in youth who were younger, females, Hispanics, those from high-income families, and those with mood disorders (91.6% vs 90%). Hospital care cost during inpatient stay was higher during the school year. During school break, the rate of suicidal behaviors was higher for White and African American youth, males, and those with disruptive behavior disorders (34.6% vs 31.5%) and comorbid alcohol (7.9% vs 5.7%) and other substance use disorders (21.7% vs 18.4%). There was no statistically significant difference between cohorts in terms of length of stay and anxiety disorder.

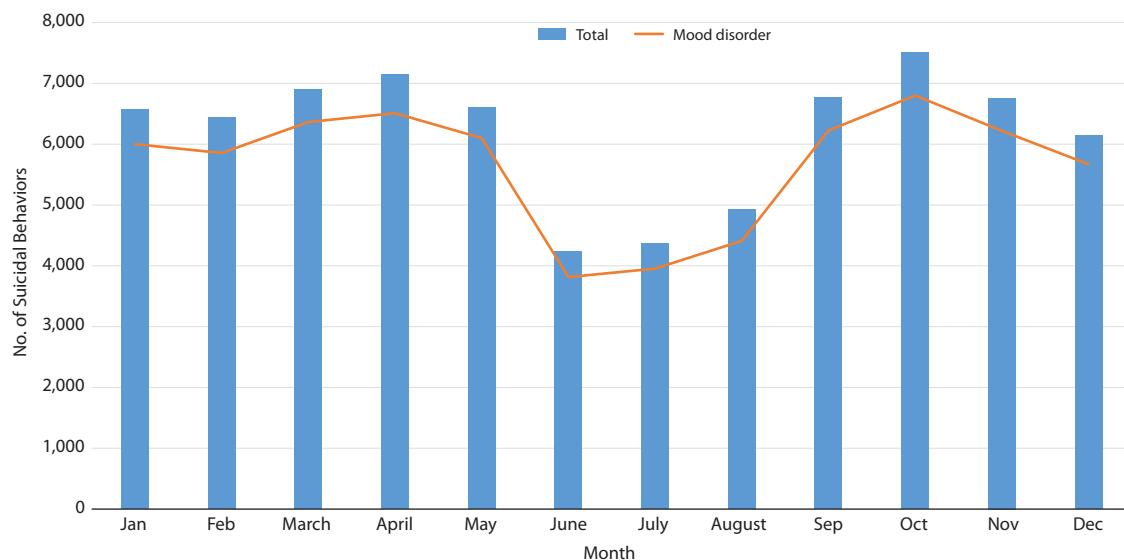
As per the logistic regression model, Hispanics were at higher odds of hospitalization for suicidal behaviors during the school year compared to Whites. Sex and geographic region did not have significant association to predict the risk for suicidal behaviors by school period. Also, the odds of hospitalization for suicidal behaviors during the school year increases with median household income and is a significant predictor as shown in Supplementary Table 1. Psychiatric diagnoses and comorbid substance use were not significant predictors for suicidal behaviors during the school year when compared to school break.

**Table 1. Distribution of Suicidal Behaviors by School Break Versus School Year**

Variable	Total	School Break	School Year	<i>P</i> Value
Inpatients (total and subgroups), <i>n</i>	74,385	13,535	60,850	...
No. of suicidal behaviors/mo	6,199	4,512	6,761	...
Age, mean (SD), y	15.06 (2.05)	15.17 (2.09)	15.01 (2.05)	<.001
Length of stay, mean (SD), d	6.4 (7.5)	6.4 (7.92)	6.4 (7.41)	.953
Total charges, mean (SD), US\$	17,698 (18,680)	17,270 (16,260)	17,793 (19,174)	.003
Sex, <i>n</i> (%)				
Male	25,620 (34.4)	4,800 (35.5)	20,820 (34.2)	.006
Female	48,760 (65.6)	8,735 (64.5)	40,025 (65.8)	
Race, <i>n</i> (%)				
White	41,465 (64.8)	7,630 (64.9)	33,385 (64.7)	<.001
Black	9,360 (14.6)	1,915 (16.3)	7,445 (14.2)	
Hispanic	8,565 (13.4)	1,430 (12.2)	7,135 (13.6)	
Other	4,645 (7.3)	780 (6.6)	3,865 (7.4)	
Household income by percentile, median (%), US\$				
0–25th	18,500 (25.3)	3,630 (27.4)	14,870 (24.8)	<.001
26th–50th	19,680 (26.9)	3,720 (28.0)	15,960 (26.6)	
51st–75th	18,305 (25.0)	3,295 (24.8)	15,010 (25.0)	
76th–100th	16,725 (22.8)	2,625 (19.8)	14,100 (23.5)	
Region, <i>n</i> (%)				
Northeast	10,585 (14.2)	1,860 (13.7)	8,725 (14.3)	.005
Midwest	28,045 (37.7)	5,220 (38.6)	22,825 (37.5)	
South	26,955 (36.2)	4,945 (36.5)	22,010 (36.2)	
West	8,800 (11.8)	1,510 (11.2)	7,290 (12.0)	
Psychiatric diagnoses, <i>n</i> (%)				
Mood disorders	67,930 (91.3)	12,185 (90.0)	55,745 (91.6)	<.001
Anxiety disorders	33,280 (44.7)	5,945 (43.9)	27,335 (44.9)	.035
Disruptive behavior disorders	23,875 (32.1)	4,680 (34.6)	19,195 (31.5)	<.001
Comorbid substance use, <i>n</i> (%)				
Alcohol use disorders	4,515 (6.1)	1,070 (7.9)	3,445 (5.7)	<.001
Other substance use disorders	14,125 (19.0)	2,940 (21.7)	11,185 (18.4)	<.001

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Figure 1. Month-Wise Distribution of Suicidal Behaviors



## DISCUSSION

In this retrospective study, suicidal behaviors requiring medical attention were higher (1.5 times) during the school year compared to school break. There were also differential patterns for suicidal behaviors during the school year versus when on break. For example, mood disorders were higher during the school year compared to school break, while disruptive behavior disorders and substance use showed the opposite pattern.

It is unclear why suicidal behaviors are higher during the school year, but several hypotheses can be suggested based on known risk factors. When school is in session, bullying, sleep deprivation, and academic stress, which are known risk factors for suicide behaviors, are more common.<sup>2,4,10,11</sup> In addition to mood disorders, the association between adverse experiences and suicidal behaviors among adolescents has been well documented.<sup>12</sup>

Temporal fluctuations in suicidal behaviors may be due to a variety of factors besides school schedules. Similar to previous reports of seasonal pattern of suicidal behaviors among youth, with highest in fall and spring and lowest during summer months,<sup>5</sup> we found higher suicidal behaviors in October and April than in June and July in this study. Similarly, mood disorders were more frequent in October and April. It is possible that the apparently increased rates of mood disorders and suicidal behaviors during the early months of the school year (September to November) were related to stress due to returning to school. For example, students may be less likely to encounter in-person bullying when they are out of school, and the resumption of school may prompt greater stress that triggers suicidal behaviors or mood problems. Alternatively, increased mood disorders and suicidal behaviors at the end of the school year (March–May) could be associated with increased stress from increased high-stakes testing. These are speculative explanations that warrant further investigation.

For youth with disruptive behavior disorders including attention-deficit/hyperactivity disorder (ADHD), school may provide a structured environment that reduces high-risk behaviors while also increasing use of ADHD medication and behavioral health services at school. Given the high prevalence of drug holidays for central nervous system stimulants during the school break<sup>13</sup> and unstructured days, youth with disruptive disorders may be more likely to have impulsive acts at the time of conflict or stress. There are reports of high risk of substance use disorders and legal troubles including juvenile arrests among high school dropouts, which independently increase the risk for suicidal behavior.<sup>3,14,15</sup>

This study has several limitations given the nature of the database used and that it only included a sample of suicide attempts that required inpatient hospitalization. Information about specific academic stressors and bullying and details regarding other clinical variables including medication use is not available. Other limitations include variability in school year schedules across school districts in the United States, information about type of schooling (attending in person, in cyber, or home schooled), and ambiguity about accidental versus intentional overdose. Additionally, this was a cross-sectional retrospective study, which lacks data on causal relationship.

Suicide among youth is a public health concern, and the rate of suicide for youth has increased significantly over the last 2 decades.<sup>1</sup> The recent pandemic has had a significant impact on child mental health, exemplified by the increase in mental health-related emergency visits for suicide attempts.<sup>16,17</sup> There is a clear need to identify risk factors associated with worsening suicidal behaviors in youth. This is the first large sample study, to our knowledge, to use objective indices to examine the pattern of suicidal behaviors between school attendance and school break. There are at least 2 actionable implications of this study. First, given

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the finding that suicidal behaviors are higher with mood disorders during the school year, schools should implement universal depression and suicide screening.<sup>18</sup> School-based mental health services should prioritize management of depression. Second, as youth with disruptive behavior disorders and substance use disorders are at higher risk for suicidal behaviors during school break, increased outreach and monitoring during extended breaks seem warranted for these high-risk youth during unstructured times. There is a need for a large prospective study to evaluate the various school stressors and impact on mental health and suicidal behaviors.

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**Supplementary material:** See accompanying pages.

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Supplementary material follows this article.



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## **Supplementary Material**

**Article Title:** School Year and Suicidal Behaviors Among Youth: Insight From a National Dataset

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### **List of Supplementary Material for the article**

1. [Supplementary Table 1](#)

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**Supplementary Table 1.** Predictors of Suicidal Behaviors During the School Year (compared to school break)

Variables	Odds Ratio	95% Confidence Interval		P Value
		Lower	Upper	
<b>Age</b>	0.97	0.959	0.977	<.001
<b>Sex</b>				
Male	Reference			
Females	1.02	0.983	1.062	.270
<b>Race</b>				
White	Reference			
Black	0.94	0.890	0.987	.014
Hispanic	1.13	1.063	1.192	<.001
Other	1.16	1.079	1.246	<.001
<b>Median household income in percentile</b>				
0-25 <sup>th</sup>	Reference			
26 <sup>th</sup> -50 <sup>th</sup>	1.10	1.049	1.157	<.001
51 <sup>st</sup> -75 <sup>th</sup>	1.13	1.069	1.183	<.001
76 <sup>th</sup> -100 <sup>th</sup>	1.20	1.136	1.266	<.001
<b>Region</b>				
Northeast	Reference			
Midwest	1.00	0.948	1.058	.959
South	1.04	0.985	1.098	.162
West	0.97	0.909	1.045	.468
<b>Psychiatric diagnoses</b>				
Mood disorders	1.07	1.006	1.143	.033
Anxiety disorders	0.97	0.936	1.006	.107
Disruptive behaviour disorders	0.93	0.895	0.970	.001
<b>Comorbid substance use</b>				
Alcohol use disorders	0.75	0.695	0.813	<.001
Other substance use disorders	0.98	0.931	1.029	.410