

# Suicide Ideation and Attempts in a Pediatric Emergency Department Before and During COVID-19

Ryan M. Hill, PhD,<sup>a</sup> Katrina Rufino, PhD,<sup>b,c</sup> Sherin Kurian, MD,<sup>d</sup> Johanna Saxena, BS, BA,<sup>d</sup> Kirti Saxena, MD,<sup>d</sup> Laurel Williams, DO<sup>d</sup>

abstract

**OBJECTIVES:** Elevated rates of mental health concerns have been identified during the coronavirus disease 2019 (COVID-19) pandemic. In this study, we sought to evaluate whether youth reported a greater frequency of suicide-related behaviors during the 2020 COVID-19 pandemic as compared with 2019. We hypothesized that rates of suicide-related behaviors would be elevated between the months of March and July 2020 as compared with 2019, corresponding to the onset of the COVID-19 pandemic.

**METHODS:** Routine suicide-risk screening was completed with youth aged 11 to 21 in a pediatric emergency department. Electronic health records data for suicide-risk screens completed between January and July 2019 and January and July 2020 were evaluated. A total of 9092 completed screens were examined (mean age 14.72 years, 47.7% Hispanic and/or Latinx, 26.7% non-Hispanic white, 18.7% non-Hispanic Black).

**RESULTS:** Rates of positive suicide-risk screen results from January to July 2020 were compared with corresponding rates from January to July 2019. Results indicated a significantly higher rate of suicide ideation in March and July 2020 and higher rates of suicide attempts in February, March, April, and July 2020 as compared with the same months in 2019.

**CONCLUSIONS:** Rates of suicide ideation and attempts were higher during some months of 2020 as compared with 2019 but were not universally higher across this period. Months with significantly higher rates of suicide-related behaviors appear to correspond to times when COVID-19–related stressors and community responses were heightened, indicating that youth experienced elevated distress during these periods.

Departments of <sup>a</sup>Pediatrics and <sup>b</sup>Psychiatry, Baylor College of Medicine, Houston, Texas; <sup>c</sup>Department of Social Sciences, University of Houston–Downtown, Houston, Texas; and <sup>d</sup>The Menninger Clinic, Houston, Texas

Dr Hill conceptualized and conducted the analysis, drafted the initial manuscript, and revised the manuscript; Drs Kurian, K. Saxena, Rufino, and Williams and Ms J. Saxena reviewed and revised the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Address correspondence to Ryan M. Hill, PhD, Department of Pediatrics, Baylor College of Medicine, 6701 Fannin St, Suite B.19810, Houston, TX 77030. E-mail: [ryan.hill@bcm.edu](mailto:ryan.hill@bcm.edu)

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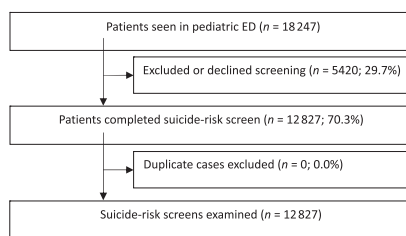
**WHAT'S KNOWN ON THIS SUBJECT:** Despite prominent attention to the potential mental health consequences of coronavirus disease 2019 (COVID-19)–related stressors, to date, few data have revealed increased rates of suicide-related behaviors among youth during the COVID-19 pandemic.

**WHAT THIS STUDY ADDS:** In this study, we identified increased rates of youth suicide ideation and suicide attempts during the COVID-19 pandemic in 2020 as compared with 2019. Increases in suicide ideation and suicide attempts appear to correspond to times of increased COVID-19–related concerns.

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Suicide is the second leading cause of death among children and adolescents aged 10 to 17 years in the United States, and suicide rates have increased in the age group over the past 20 years.<sup>1</sup> These statistics coincide with recent literature that revealed a 92% increase in annual emergency department (ED) visits for suicide ideation and attempts for children without a statistically significant increase in overall ED visits.<sup>2</sup> Additionally, youth suicide-related behaviors result in 4 to 5 ED visits per year for every 1000 youth aged 15 to 19 years,<sup>3</sup> costing an estimated \$15.5 billion annually.<sup>4</sup>

In multiple reports, elevated rates of mental health concerns have been identified during the coronavirus disease 2019 (COVID-19) pandemic.<sup>5-7</sup> In a recent study of US adults, >40% of respondents reported adverse mental health or increased substance use in June 2020.<sup>8</sup> Furthermore, research reveals that participants in shelter-in-place or lockdown because of COVID-19 experienced increasing rates of suicide ideation as months passed, whereas participants not under these COVID-19 restrictions did not.<sup>9</sup> Consequently, experts in the field have published resources to inform treating suicide using the Collaborative Assessment and Management of Suicidality,<sup>10</sup> and safety planning<sup>11</sup> during the COVID-19 pandemic. Among adolescents, greater levels of negative COVID-19 experiences were associated with increased depressive symptoms and anxiety.<sup>12</sup> However, although many have speculated about the impacts of the COVID-19 pandemic on youth and adults,<sup>13,14</sup> empirical data revealing elevated rates of mental health concerns during this period have been provided in few studies.<sup>15,16</sup> In fact, authors of recent studies have reported that the rates of death by suicide in children and adults have not changed since the onset of the pandemic.<sup>17,18</sup>



**FIGURE 1** Patients screened in the pediatric ED, January to July 2019 and January to July 2020.

The goal of the current study was to examine rates of suicide ideation and attempts reported during routine suicide-risk screening in a pediatric ED. We report changes in rates of positive suicide-risk screen results and compare rates of positive screen results from January to July 2020 with those from the same period in 2019. Potential demographic differences are evaluated to determine if specific demographic groups were disproportionately impacted by the COVID-19 pandemic with respect to suicide-related behaviors.

## METHODS

### Participants and Procedures

Data were drawn from the electronic health record of a large pediatric ED in a major metropolitan area in Texas. Youth aged 11 and older who presented to the ED within any of three connected pediatric hospitals for any presenting complaint were asked to complete the screening version of the Columbia-Suicide Severity Rating Scale (C-SSRS)<sup>19</sup> via an electronic tablet. Exclusion criteria included the following: patient or legal guardian refusal, unresponsive on arrival due to medical condition, or intellectual disability that precluded the ability to read and respond to the questions. All positive suicide-risk screen results were addressed via standard hospital protocols, including an assessment of suicide risk and appropriate safety steps to ameliorate suicide risk before

discharge. This research was approved by the appropriate institutional review board.

In the current study, we examine data from January to July 2019 and January to July 2020. A total of 18 247 youth aged 11 to 21 years were seen in the ED, of whom 12 827 completed the suicide-risk screen (Fig 1). Participants had a mean age of 14.52 years (SD = 2.22; with 88.8% aged 11–17 years). Respondents self-identified as follows: 59.0% female ( $n = 7570$ ) and 41.0% male ( $n = 5257$ ), 47.5% Hispanic and/or Latinx ( $n = 6091$ ), 26.8% non-Hispanic white ( $n = 3433$ ), 19.1% non-Hispanic Black or African American ( $n = 2455$ ), 2.6% non-Hispanic Asian ( $n = 338$ ), 0.1% American Indian or Alaskan native ( $n = 16$ ), 0.1% native Hawaiian or Pacific Islander ( $n = 12$ ), and 1.2% multiracial ( $n = 153$ ). Demographic data were unavailable for 2.6% of the respondents ( $n = 329$ ). Overall, 3.5% ( $n = 454$ ) of participants reported a chief complaint of suicidal thoughts or behaviors at the time of their visit.

### Measures

The 7-item screening version of the C-SSRS was used to screen for suicide risk.<sup>20</sup> The C-SSRS uses the Columbia Classification Algorithm of Suicide Assessment for categorizing suicide-related phenomena.<sup>21</sup> The C-SSRS has excellent documented reliability and predictive validity in both youth and adults.<sup>19-22</sup> Youth were asked to complete 2 items assessing passive and active suicide ideation in the previous month. If active suicide ideation was present, 3 additional items were presented, further assessing the severity of suicide ideation (method, intent, and plan). All youth also responded to a single item assessing lifetime suicide attempt history. If a positive suicide attempt history was noted, youth were also asked to identify whether any suicide attempt had occurred within the previous 3 months. All items are asked by using “yes” and

“no” response options. Screens were provided in both English and Spanish.

## Data Analyses

Data were evaluated by using SPSS version 26 (IBM SPSS Statistics, IBM Corporation). Data were first cleaned to remove cases that did not meet inclusion criteria or those with missing data on the C-SSRS screen. A search for duplicate patients in any given month was conducted, and none were identified. Suicide-risk screens were then scored according to two algorithms: Recent suicide ideation was defined as a positive (“yes”) response to any of the items assessing past-month suicide ideation. Recent suicide attempt was defined as a positive (“yes”) response to item 7, which assessed suicide attempts in the previous 3 months. Descriptive statistics were calculated, followed by a series of  $\chi^2$  difference tests to examine the difference in rates of suicide ideation and attempts in the months pre- and post-COVID-19. Finally, binary logistic regressions were used to examine demographic differences associated with positive screen results. Because of the exploratory nature of the study, power analyses were not conducted.

## RESULTS

### Prevalence of Suicide-Related Behaviors, 2019–2020

Across the entire study period, 15.8% ( $n = 2033$ ) reported past-month suicide ideation, and 4.3% ( $n = 554$ ) reported a recent suicide attempt (past 3 months). Rates of screen results positive for recent suicide ideation and suicide attempts by month and year are reported in Table 1. The  $\chi^2$  difference tests identified significant differences in the rate of recent suicide ideation in March and July 2020 compared with those same months in 2019. The odds of recent suicide ideation were 1.60 times higher in March 2020 compared with March 2019 and

1.45 times higher in July 2020 compared with July 2019.

For recent suicide attempts,  $\chi^2$  difference tests identified significant differences in the rate of suicide attempts in February, March, April, and July 2020 compared with those same months in 2019. The odds of a recent suicide attempt were 1.58, 2.34, 1.75, and 1.77 times higher in February, March, April, and July 2020 compared with those same months in 2019, respectively. Figure 2 reveals rates of positive screen results by month and year.

### Demographic Characteristics Associated With Positive Screen Results

To evaluate whether specific demographic subgroups were disproportionately impacted, two logistic regression models were examined to evaluate the effects of sex and race and/or ethnicity on the likelihood of a positive suicide-risk screen result. Results are presented in Table 2. Data for March to July were evaluated in a single model, with any recent suicide ideation as the outcome. For sex, the first step of the model contained year and sex as predictors of the likelihood of recent suicide ideation. The overall model was statistically significant ( $\chi^2_2 = 155.22$ ;  $P < .001$ ; Nagelkerke  $R^2 = 0.029$ ). Both variables were statistically significant predictors, indicating that recent suicide ideation was more frequent in 2020 and among female participants. In the second step, the interaction term was added to the model. This second step was not a statistical improvement in the model ( $\chi^2_1 = 0.76$ ;  $P = .38$ ), and the interaction between year and sex was not statistically significant, indicating that neither sex reported a greater increase in the likelihood of recent suicide ideation from 2019 to 2020.

In the second model, race and ethnicity was evaluated, categorized as non-Hispanic white, non-Hispanic Black or African American, and

Hispanic and/or Latinx, with non-Hispanic white as the reference group. The first step of the model contained year and race and ethnicity as predictors of the likelihood of recent suicide ideation. The overall model was statistically significant ( $\chi^2_3 = 23.48$ ;  $P < .001$ ; Nagelkerke  $R^2 = 0.005$ ). Both variables were statistically significant predictors, indicating that recent suicide ideation was more frequent in 2020 and less frequent among Hispanic and/or Latinx youth (as compared with non-Hispanic white youth). In the second step, the interaction term was added to the model. This second step was not a statistical improvement in the model ( $\chi^2_2 = 1.40$ ;  $P = .50$ ), and the interaction between year and race and ethnicity was not statistically significant, indicating that no racial or ethnic group reported a greater increase in the likelihood of recent suicide ideation from 2019 to 2020. A similar pattern of results was found for both sex and race and ethnicity when recent suicide attempt was the outcome variable (Table 2).

## DISCUSSION

In this study, we evaluated whether rates of youth suicide-related behaviors have been elevated during the COVID-19 pandemic by examining rates of positive results on suicide-risk screens administered as routine screening in a pediatric ED. Comparison of the rate of suicide screen results positive for recent suicide ideation revealed significantly increased rates of ideation in March and July 2020 as compared with screening rates in March and July 2019. Similarly, screen results positive for recent suicide attempts were higher in February, March, April, and July 2020 than in those same months in 2019. Of note, the number of ED visits was substantially reduced during the COVID-19 pandemic. Consequently, direct comparison of rates across years should be made with caution.

**TABLE 1** Percentage of Screen Results Positive for Any Suicide-Related Behaviors and Recent Suicide Attempts

| Month                          | 2019, % ( <i>n</i> ) | 2020, % ( <i>n</i> ) | $\chi^2$ (df) | <i>P</i> | Odds Ratio |
|--------------------------------|----------------------|----------------------|---------------|----------|------------|
| <b>Recent suicide ideation</b> |                      |                      |               |          |            |
| January                        | 16.0 (92)            | 14.6 (143)           | 0.569 (1)     | .45      | 0.90       |
| February                       | 15.7 (188)           | 15.4 (152)           | 0.031 (1)     | .86      | 0.98       |
| March                          | 14.3 (189)           | 21.1 (167)           | 16.069 (1)    | <.001    | 1.60       |
| April                          | 16.3 (213)           | 16.5 (82)            | 0.012 (1)     | .91      | 1.02       |
| May                            | 16.1 (200)           | 17.3 (106)           | 0.412 (1)     | .52      | 1.09       |
| June                           | 14.8 (146)           | 18.2 (131)           | 3.579 (1)     | .06      | 1.28       |
| July                           | 11.9 (106)           | 16.3 (118)           | 6.734 (1)     | .009     | 1.45       |
| <b>Recent suicide attempts</b> |                      |                      |               |          |            |
| January                        | 4.0 (22)             | 3.7 (36)             | 0.024 (1)     | .72      | 0.91       |
| February                       | 3.3 (40)             | 5.2 (51)             | 4.540 (1)     | 0.3      | 1.58       |
| March                          | 3.3 (43)             | 7.3 (58)             | 17.910 (1)    | <.001    | 2.34       |
| April                          | 3.3 (43)             | 5.6 (28)             | 5.227 (1)     | .02      | 1.75       |
| May                            | 4.0 (50)             | 4.7 (29)             | 0.506 (1)     | .48      | 1.18       |
| June                           | 3.7 (37)             | 5.3 (38)             | 2.331 (1)     | .13      | 1.43       |
| July                           | 3.7 (33)             | 6.4 (46)             | 6.144 (1)     | .01      | 1.77       |

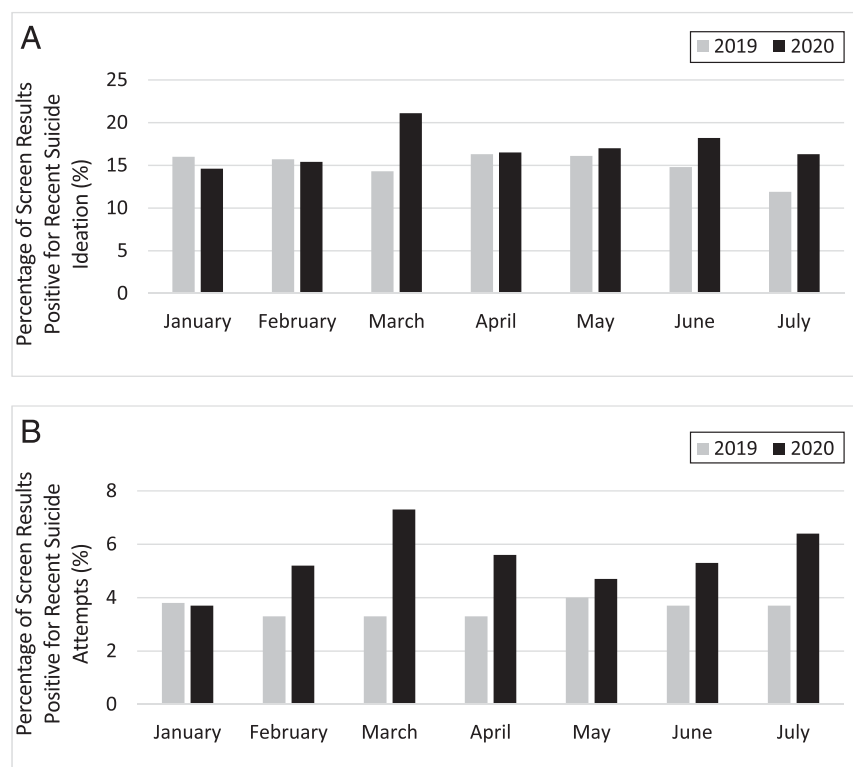
df, degree of freedom.

Rates of positive suicide-risk screen results were not uniformly higher after the outbreak of the COVID-19 pandemic in the United States in March 2020, as indicated by the lack of statistically significant differences in rates of positive screen results, particularly in May and June. There

appears to have been an early increase in suicide-related behaviors between February and April 2020. This time frame corresponds to the onset of the pandemic in the United States, including initial stay-at-home orders and social distancing efforts that went into effect in March as well

as early outbreaks in some parts of the United States. However, in May 2020, the state of Texas began to lift COVID-19 restrictions, which may have also reduced fears and concerns regarding COVID-19, allowed youth to resume interrupted schedules, and increased social contacts and reduced social isolation. In June, Texas saw a resurgence of COVID-19 cases,<sup>23</sup> which triggered the reintroduction of COVID-19 restrictions across a number of public sectors in early July as well as renewed efforts to increase social distancing. The data indicate that at this same time, rates of screen results positive for suicide-related behaviors also increased. Thus, a possible explanation of the data is that the variability in the statistical results appears to follow the historical context of COVID-19 cases, particularly regarding the general level of community fear or isolation due to school cancellations and social distancing efforts in the region where data collection occurred.

The results of this study should be considered in the context of the study limitations. Critically, we are unable to make concrete causal influences because historical factors other than the COVID-19 pandemic occurred between 2019 and 2020.



**FIGURE 2** A and B, Rates of screen results positive for suicide ideation (A) and attempt (B), January to July.

**TABLE 2** Demographic Characteristics Associated With Positive Screen Results

| Predictor                        | Recent Suicide Ideation                  |      |       |          | Recent Suicide Attempt                  |      |       |          |
|----------------------------------|--|------|-------|----------|---|------|-------|----------|
|                                  | B  | SE   | P     | $\chi^2$ | B                                       | SE   | P     | $\chi^2$ |
| <b>Model 1</b>                   |  |      |       |          |   |      |       |          |
| Block 1                          | $\chi^2 = 155.22, P < .001, R^2 = 0.029$ |      |       |          | $\chi^2 = 77.79, P < .001, R^2 = 0.028$ |      |       |          |
| Year                             | -0.22                                    | 0.06 | <.001 | —        | -0.51                                   | 0.10 | <.001 | —        |
| Sex (female)                     | 0.72                                     | 0.06 | <.001 | —        | 0.80                                    | 0.12 | <.001 | —        |
| Block 2                          | $\chi^2 = 0.76, P = .38, R^2 = 0.029$    |      |       |          | $\chi^2 = 0.73, P = .39, R^2 = 0.028$   |      |       |          |
| Year                             | -0.14                                    | 0.11 | .21   | —        | -0.36                                   | 0.21 | .08   | —        |
| Sex (female)                     | 0.79                                     | 0.10 | <.001 | —        | 0.91                                    | 0.18 | <.001 | —        |
| Sex (female) × year              | -0.11                                    | 0.14 | .38   | —        | -0.20                                   | 0.24 | .39   | —        |
| <b>Model 2</b>                   |  |      |       |          |   |      |       |          |
| Block 1                          | $\chi^2 = 23.48, P < .001, R^2 = 0.005$  |      |       |          | $\chi^2 = 43.46, P < .001, R^2 = 0.017$ |      |       |          |
| Year                             | -0.24                                    | 0.06 | <.001 | —        | -0.57                                   | 0.11 | <.001 | —        |
| African American or Black        | -0.01                                    | 0.08 | .93   | —        | 0.09                                    | 0.14 | .55   | —        |
| Hispanic                         | -0.17                                    | 0.07 | .01   | —        | -0.38                                   | 0.13 | .002  | —        |
| Block 2                          | $\chi^2 = 1.40, P = .50, R^2 = 0.005$    |      |       |          | $\chi^2 = 1.54, P = .46, R^2 = 0.018$   |      |       |          |
| Year                             | -0.18                                    | 0.11 | .10   | —        | -0.74                                   | 0.19 | <.001 | —        |
| African American or Black        | 0.11                                     | 0.13 | .42   | —        | 0.02                                    | 0.20 | .94   | —        |
| Hispanic                         | -0.15                                    | 0.11 | .17   | —        | -0.54                                   | 0.18 | .002  | —        |
| African American or Black × year | -0.19                                    | 0.17 | .26   | —        | 0.14                                    | 0.29 | .62   | —        |
| Hispanic × year                  | -0.04                                    | 0.14 | .80   | —        | 0.31                                    | 0.25 | .22   | —        |

For race and/or ethnicity, the comparator is non-Hispanic white youth; for sex, the comparator is male sex. B, regression coefficient; —, not applicable.

Consequently, although the pattern of the data indicates a possible association between rates of positive suicide-risk screen results and COVID-19–related social and cultural changes, we were not able to evaluate the potential impacts of other historical sociopolitical events. Additionally, hospital pediatric ED patient volumes were reduced during the COVID-19 pandemic, which may have introduced bias into the sample, which we were unable to discern. Furthermore, data indicate that 40% of adolescents who are suicidal visit an ED in the year before their deaths,<sup>24</sup> indicating that patients in the ED constitute a high-risk population. Thus, the rates of suicide ideation and suicide attempts reported here may not be reflective of the true rates within the population. In addition, given the reduced rate of ED visits during the pandemic, it is possible that only patients with the most severe cases came to the ED, resulting in elevated rates of suicide ideation and attempt due to the increased overall severity of cases. Data are also drawn from a single hospital system and a single screening methodology, and so results may not generalize to other regions

or screening programs. In particular, because results appeared to follow localized patterns of COVID-19 response, additional research is needed to determine if these results replicate in other regions, where localized COVID-19 response patterns differed.

Additional research is also needed to evaluate unique risk and protective factors that may be associated with suicide risk in the context of a global pandemic.<sup>25</sup> In the current study, we were not able to evaluate individual effects of pandemic-related fears or stresses, social distancing and other preventive measures (eg, cancelling in-person classes, distance learning, isolation from peers), and stay-at-home or mask orders on suicide-related behaviors. In future efforts, researchers should aim to evaluate which aspects of the pandemic and pandemic responses have the greatest impact on youth suicide-related behaviors to identify potential avenues for countering the increased suicide risk.<sup>26</sup>

**CONCLUSIONS**

Rates of positive suicide-risk screen results for youth seeking care in

a pediatric ED during the 2020 COVID-19 pandemic were statistically elevated compared with the same period in the previous year. These data indicate that the effects of the pandemic, broadly defined, may be associated with increased rates of suicide ideation among youth aged 11 to 21. Future researchers should evaluate how various social, emotion, behavioral, and cultural factors may be associated with increased rates of suicide-related behavior during a global pandemic.

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**ABBREVIATIONS**

- COVID-19: coronavirus disease 2019
- C-SSRS: Columbia-Suicide Severity Rating Scale
- ED: emergency department

**POTENTIAL CONFLICT OF INTEREST:** The authors have indicated they have no potential conflicts of interest to disclose.

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