

# Age- and Sex-Specific Risk Factors for Youth Suicide: A Mixed Methods Review

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## ABSTRACT

**Background:** Suicide is the second-leading cause of death for individuals ages 10 through 34, and rates are rising. This study seeks to broaden the understanding of suicide in youths ages 10-17.

**Study Aims:** Use a mixed-methods approach to investigate the different characteristics leading to youth suicide by 2 distinct youth age subgroups (pre-high school and high school) and by sex.

**Methods:** A retrospective review and analysis of the Wisconsin Violent Death Reporting System data on Wisconsin resident suicides was conducted for 146 individuals ages 10 through 17 who died by suicide from 2012 through 2016.

**Results:** A total of 20 common characteristics were extrapolated from the narratives. Among the 10- to 13-year-old age group, 4 age-specific characteristics emerged: estrangement, exposure to suicide, school issues, and adversity. Six age-specific characteristics emerged among the 14- to 17-year-old age group: history of abuse ( $P < 0.01$ ), history of self-harm ( $P < 0.01$ ), and history of suicide attempt ( $P < 0.01$ ) were highly associated with female sex.

**Conclusions:** This study demonstrates that there are unique age and sex-specific characteristics for teenage suicide. This information can be leveraged to plan focused prevention strategies relevant to youth in 2 distinct age groups.

## BACKGROUND

Suicide is a significant public health issue for youth in the United States and is the second-leading cause of death for individuals ages 10 through 34.<sup>1</sup> Recent data suggest that suicide rates among youth are increasing, particularly for young women.<sup>2</sup> The traditionally wide gap between young male and young female suicide rates is narrowing, while suicide rates for both groups have been increas-

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ing since 2007, with young girls ages 10 through 14 experiencing a particularly sharp increase.<sup>2,3</sup> One reason for this increase is that young women are now relying on more lethal means (firearms versus hanging or poisoning), leading to a higher suicide fatality rate.<sup>4</sup> This trend signals a need to better understand the factors contributing to youth suicide.

One potential explanation for the increase in youth suicide rates is the elevated stress that contemporary youth experience, especially with a more pronounced focus on academic achievement.<sup>5</sup> The emergence of social media as a primary method of communication and socialization among youth has contributed to increased stress. Cyberbullying victimization has been associated with increased suicidal behavior in youth, particularly young females.<sup>6</sup> Youth are also at risk of traumatic bereavement

following the traumatic death of a peer in social media, which may increase risk of suicidal behavior in the bereaved.<sup>7</sup> The interplay of these factors and others contributes to the complex etiology of youth suicide.

Suicide risk differs among demographic groups.<sup>8</sup> Prior suicide attempts, mood and anxiety disorders, alcohol and drug use, and access to lethal means are common risk factors across races.<sup>9</sup> However, a race-specific risk factor for suicide among blacks is perceived racism and discrimination,<sup>10</sup> while historical trauma is a specific risk factor for suicide among American Indians/Alaska Natives.<sup>11</sup> Among whites, family conflict is a race-specific risk factor for suicide.<sup>9</sup> Suicide risk also differs by age group. Substance abuse is a more common risk factor for suicide among older adolescents versus younger adolescents,<sup>12</sup> while heavy episodic drinking is more strongly associated with suicide attempts in adoles-

**Table 1. Demographic Information**

Factor	n	%	P value
Age			<i>P</i> <0.001
10	0	0	
11	3	2.1	
12	5	3.4	
13	8	5.5	
14	18	12.3	
15	35	24.0	
16	37	25.3	
17	40	27.4	
Sex			<i>P</i> <0.001
Male	99	67.8	
Female	47	32.2	
Race			<i>P</i> <0.001
White, non-Hispanic	118	80.8	
Black, non-Hispanic	8	5.5	
American Indian/Alaska Native, non-Hispanic	2	1.4	
Asian/Pacific Islander, non-Hispanic	2	1.4	
2 or more races, non-Hispanic	5	3.4	
Ethnicity			<i>P</i> <0.001
Hispanic	11	7.5	
Non-Hispanic	135	92.5	
Mechanism of injury			<i>P</i> <0.001
Firearm	59	40.4	
Poisoning	6	4.1	
Hanging/suffocation/asphyxiation	77	52.7	
Other (includes fall, drowning, fire)	4	2.7	

**Table 2. Mechanism of Injury and Sex of Suicide Decedents**

Mechanism	% Male Decedents	% Female Decedents	P value
Firearm	56.6%	6.4%	<i>P</i> <0.001
Hanging/strangulation/suffocation	40.4%	78.7%	<i>P</i> <0.001
Poisoning	1%	10.6%	<i>P</i> <0.001
Other	2%	4.3%	<i>P</i> <0.001

**Table 3. Common Risk Factors by Sex**

Common Risk Factor	% Male Suicide Decedents	% Female Suicide Decedents	P value
Attention-deficit/hyperactivity disorder	8.1%	8.5%	<i>P</i> =0.93
Asperger's syndrome	2.0%	0%	<i>P</i> =0.33
Argument with a parent	30.3%	29.8%	<i>P</i> =0.95
Anger	6.1%	0%	<i>P</i> =0.09
Bullying victim	12.1%	12.8%	<i>P</i> =0.91
Death of loved one	6.1%	12.8%	<i>P</i> =0.17
Depression/depressed mood	50.1%	61.7%	<i>P</i> =0.21
History of abuse*	2.0%	17.2%	<i>P</i> =0.001
Homicidal ideation	3.0%	0%	<i>P</i> =0.23
Loss of privileges/items	22.2%	14.9%	<i>P</i> =0.30
Parental alcohol/substance abuse	1.0%	4.3%	<i>P</i> =0.20
Psychiatric hospitalization history	10.1%	21.3%	<i>P</i> =0.07
Recent breakup	14.1%	8.5%	<i>P</i> =0.33
School problems/discipline	24.2%	34.0%	<i>P</i> =0.22
Self-harm history*	11.1%	34.0%	<i>P</i> =0.001
Suicidal ideation expressed	42.4%	53.2%	<i>P</i> =0.22
Suicide attempt history*	8.1%	36.2%	<i>P</i> <0.001
Suicide note	37.4%	42.6%	<i>P</i> =0.55
Suspended/kicked out of school	5.1%	6.4%	<i>P</i> =0.74
Using marijuana	13.1%	10.6%	<i>P</i> =0.67

\**P*<0.01

cents ages 13 and younger versus older adolescents.<sup>13</sup> Suicide risk is higher among sexual minority youth than among their heterosexual counterparts. Transgender youth and emerging adults with gender dysphoria demonstrate higher risk for suicide attempt and self-harm than nontransgender youth.<sup>14</sup>

The National Violent Death Reporting System (NVDRS) is a national system that includes robust data about suicide.<sup>15</sup> The Wisconsin Violent Death Reporting System (WVDRS) is a state-based system that collects information from coroners and medical examiners, law enforcement, toxicology records, and other sources including state crime labs, on all homicides, suicides, unintentional firearm deaths, violent deaths of undetermined intent, and legal intervention deaths.<sup>16</sup> Much of the suicide data are quantitative in nature; however, qualitative data relating to the contexts that precede suicide deaths are available in narrative form in the NVDRS and have been underutilized. Qualitative narratives include additional information gathered as part of the death investigation. This qualitative data provides information on the interplay of the multilevel risk factors available through surveillance data.<sup>17</sup>

There is a dearth of qualitative literature in the field of youth suicide. One US study conducted a mixed methods analysis to examine the frequency with which certain antecedents (eg, problems with parents, bullying) occur among youth suicide decedents and the contexts in which these antecedents occurred.<sup>17</sup> Another qualitative study, conducted in Japan, examined “group suicides” and found that the most frequently expressed factor associated with these suicides was unbearable psychological pain.<sup>18</sup> However, the Japanese study did not focus exclusively on youth.

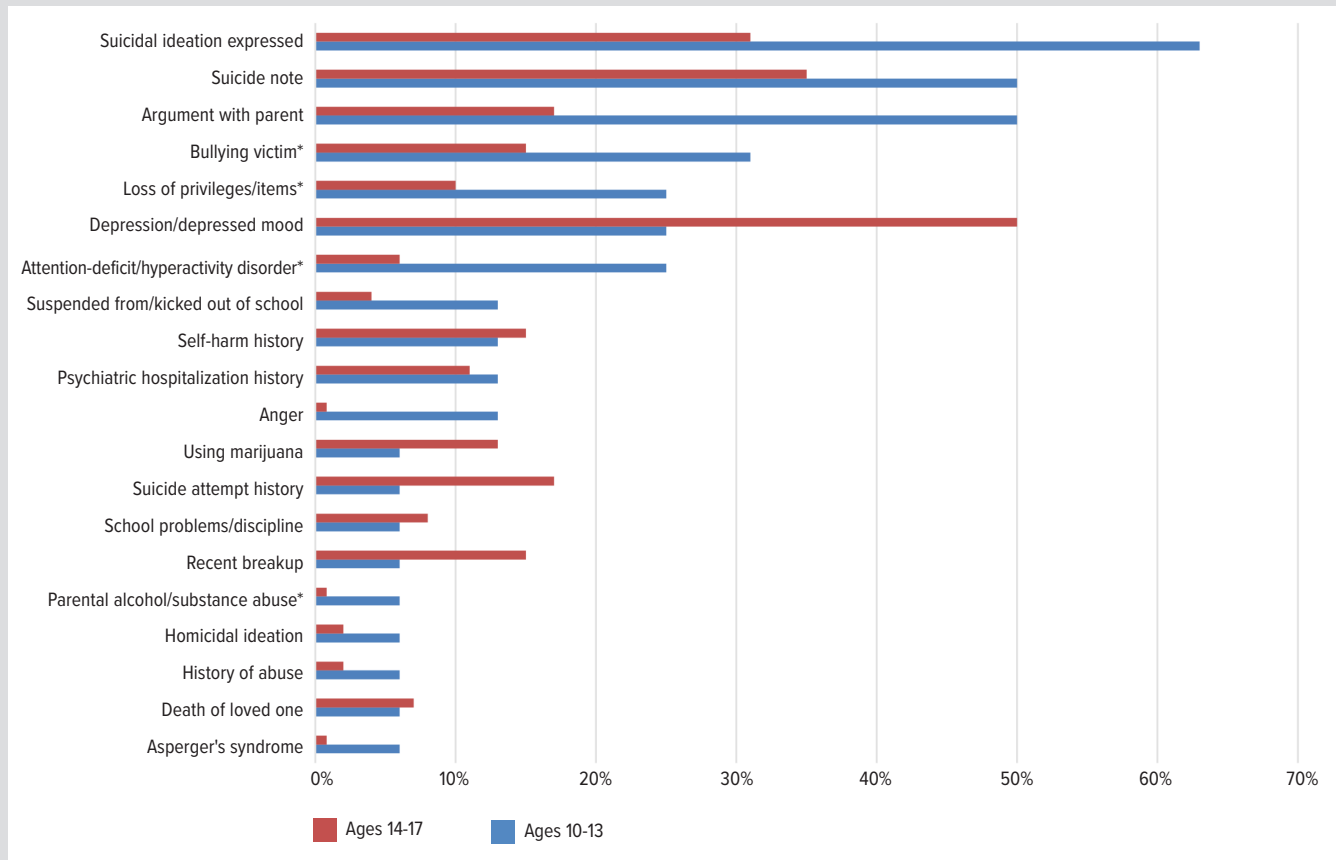
This study seeks to broaden the understanding of youth suicide using a mixed-methods approach. The analysis examined shared characteristics among suicide decedents ages 10 to 17 and then compared characteristics between sex and youth age subgroups 10 to 13 years and 14 to 17 years of age.

## METHODS

This is a mixed-methods analysis of coroner, medical examiner, and law enforcement narratives in the WVDRS. A retrospective review and quantitative analysis of WVDRS data on Wisconsin resident suicides was conducted for individuals ages 10 through 17 who died by suicide between the years 2012 and 2016. Nonresident suicides were excluded from the dataset because the current study aims to describe contextual factors that precede suicide deaths among Wisconsin youth specifically. Murder-suicides were also excluded from the dataset, as there is ambiguity over whether murder-suicide is a subset of homicide or of suicide or a form of lethal violence distinct from both homicide and suicide.<sup>19</sup> Decedent demographic characteristics were analyzed using descriptive statistics. The study population was grouped into 2 distinct age categories: pre-high school (10-13 years) and high school (14-17 years).

A qualitative analysis was conducted on coroner, medical examiner, and law enforcement narratives in the WVDRS utilizing a

**Figure 1. Common Risk Factors by Age Group**



\* $P < 0.05$

grounded theory approach. This approach provides a systematic framework for analysis involving open coding, axial coding, and development of data-grounded themes.<sup>20</sup> First, each narrative was read and coded independently. Characteristics present in both age subgroups were tabulated. Remaining age subgroup-specific characteristics were analyzed by developing a coding paradigm, which asked the questions, “What conditions give rise to the codes in this category?” and “In what context do these conditions occur?” Axial categories generated based on this paradigm were then combined into themes, which are broader than the initial and axial codes. This process was followed for the age-specific characteristics in each subgroup and then for the common characteristics.

A quantitative analysis of the common characteristic codes was conducted to identify associations between factors or whether certain common characteristics were associated with age or sex. Each common characteristic was dichotomized to indicate its presence or absence in the narrative of each suicide decedent. Frequencies were tallied for each age-specific characteristic and common characteristics as they appeared in the dataset. Data were analyzed using chi-square analysis, and all analyses were conducted as 2-tailed tests with  $P$  values  $< 0.05$  considered statistically significant. All statistical analyses were conducted using Stata version 13.1 (StataCorp, College Station, Texas).

This study was determined exempt by the Medical College of Wisconsin Institutional Review Board.

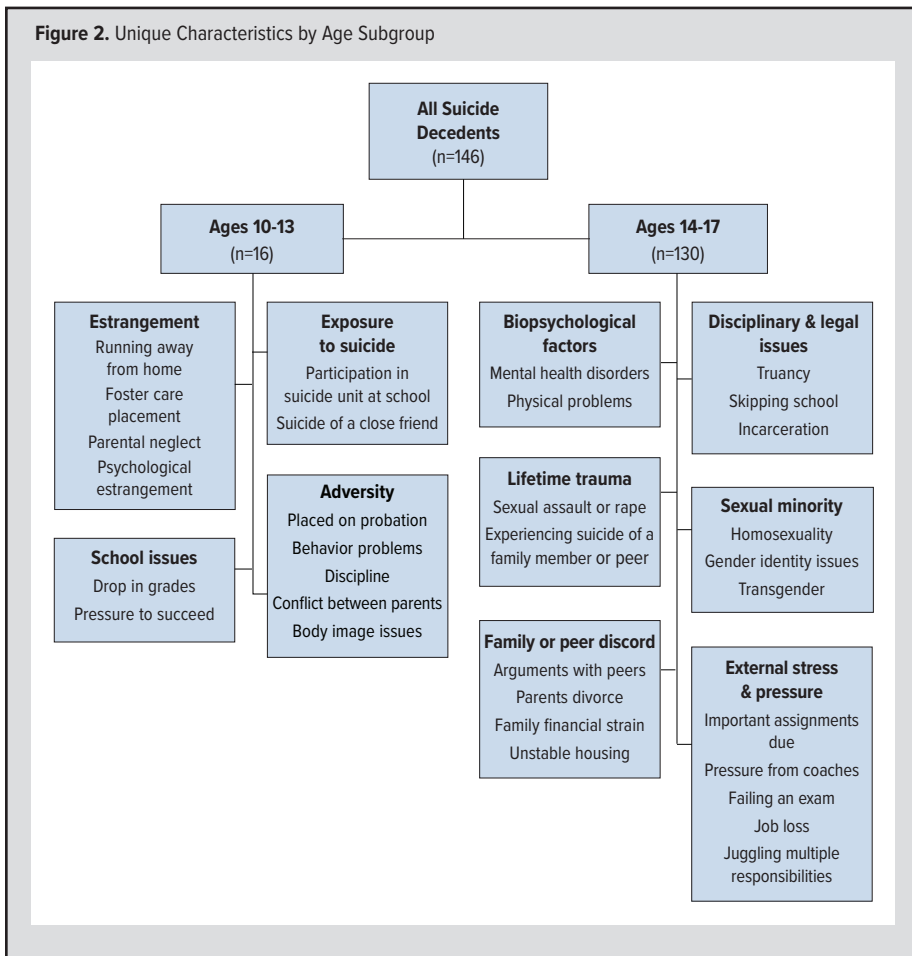
## RESULTS

Demographic and other descriptive information are included in Table 1. Between 2012 and 2016, 146 suicide deaths occurred among Wisconsin residents ages 10 through 17, with 16 deaths occurring in the pre-high school age group and 130 in the high school age group. The majority ( $n=99$ , 67.8%) were male, and 118 (80.8%) were white, non-Hispanic. In comparison, the total Wisconsin population for this group during this time was 51% male and 84% white.<sup>21</sup> Most decedents ( $n=77$ ; 52.7%) died via hanging/strangulation/suffocation, 59 (40.4%) died using a firearm, and 6 (4.1%) died from poisoning. Because youth are not permitted by law to own a firearm in Wisconsin,<sup>22</sup> it is important to know the ownership of the firearm. In almost half of the firearm suicide cases ( $n=27$ ; 45.8%), the firearm was owned by a parent. However, firearm ownership information is unknown in 30.5% ( $n=18$ ) of cases. As shown in Table 2, males were significantly more likely to use a firearm, while females were more likely to die by hanging/strangling/suffocation.

### Common Characteristics

A total of 20 common characteristics were extrapolated from the

**Figure 2.** Unique Characteristics by Age Subgroup



narratives. Figure 1 displays the distribution of each characteristic by age group. Common characteristics are not mutually exclusive, meaning that each decedent may have exhibited more than one of the factors listed. Attention-deficit/hyperactivity disorder (ADHD), being a victim of bullying, a loss of privileges or items, and parental alcohol or substance abuse are significantly associated with suicide in the 10- to 13-year age group versus the older age group. Table 3 displays the analysis results comparing the same common characteristics by sex. Females were significantly more likely than males to have history of abuse ( $P < 0.01$ ), history of self-harm ( $P < 0.01$ ), and history of suicide attempt ( $P < 0.01$ ).

### Qualitative Narrative Analysis

Figure 2 displays the age-specific characteristics that emerged in the qualitative analysis. Among the 10- to 13-year-old age group, 4 age-specific themes emerged: estrangement, exposure to suicide, school issues, and adversity. Six age-specific themes emerged among the 14- to 17-year-old age group: biopsychological factors, disciplinary and legal issues, lifetime trauma, sexual minority, family or peer discord, and external stress and pressure.

Each characteristic mentioned in the coroner/medical examiner narratives was included, regardless of when it occurred in a decedent's life. While it is widely assumed that impulsivity plays a major role in suicides, some studies on the role of impulsivity have failed

to support this assumption.<sup>23</sup> Therefore, restricting the inclusion of characteristics to those occurring immediately prior to the suicide event would likely result in missing information.

### DISCUSSION

These findings support the notion that suicide is a complex phenomenon, and each suicide death is preceded by several interrelated factors. This analysis was unique in that it qualitatively examined the context of a decedent's life prior to the suicide and the conditions that gave rise to that context. As a result, it may be assumed that some of these factors occurred immediately prior to a suicide death, while other factors had been occurring in decedents' lives for some time. This study also distinguishes characteristics to elucidate pathways to prevention that are age specific. Suicide prevention strategies typically lump "youth" together into a large age group, sometimes ages 10 through 24, or 10 through 17. While there are certainly characteristics that are common across younger and older youth, this study demonstrates that a "one-size-

fits-all" approach may not be effective for all ages within the umbrella "youth" age group. Strategies focused on strengthening the parent-child relationship may prevent suicide among younger adolescents, while suicide prevention strategies focused on reducing school-related pressure or peer discord may be salient for high school-age adolescents.

The results of this study expand the understanding of common and unique age and sex characteristics present in teen suicide. Multiple interwoven factors were identified, including factors that are widely considered to be risk factors for suicide across the population, such as history of suicidal ideation,<sup>24</sup> history of suicide attempt (particularly in females in this study population),<sup>25</sup> and depression.<sup>26</sup> ADHD has recently emerged as a recognized risk factor for suicide among youth, as it increases suicide risk through its psychological comorbidities.<sup>27</sup> The results of this study suggest that among all ages in this study population, ADHD is associated with anger, self-harm, and the recent experience of the breakup of a relationship. Future studies should explore whether ADHD may be an underlying factor that causes anger and self-harm and if the added stress of a precipitating event, such as a breakup, can lead to suicide in this younger population.

Losing privileges or items is another characteristic for suicide across the age groups; however, it more significantly affects the younger group. Major life loss events, such as the death of a fam-

ily member or a breakup, are associated with suicidal thoughts and behaviors among youth.<sup>28</sup> The results suggest that seemingly minor life losses also may be a factor but are likely compounded by other factors. For the younger group, loss of privileges and items included being “grounded,” losing access to a video gaming system, and loss of phone privileges. There were a few cases of loss of phone privileges in the 14- to 17-year-old age subgroup that resulted in a loss of connection to one’s friends. These seemingly “minor” losses often occurred in the hours and days prior to the suicide death that, when combined with other characteristics, became fatal.

Qualitative analysis revealed several age-specific characteristics for both age groups. Based on the narratives, there is some overlap of characteristics between subgroups. However, the context in which these characteristics occur may differ. Among the younger subgroup, estrangement was specific to relationships with parents and included factors like running away from home, being placed in foster care, parental neglect, and psychological estrangement. Exposure to suicide was reported as involving participation in a suicide educational unit at school, as well as experiencing the suicide of a close friend. School issues involved a drop in academic grades and pressure to succeed in school. Adversity included issues like being placed on probation, behavior problems, discipline in the school or home environment, conflict between parents, and body image issues.

Among the 14- to 17-year-old age group, biopsychological factors included mental health disorders such as depression, anxiety, and bipolar disorder and physical problems such as concussion, traumatic brain injury, and acne. Disciplinary and legal issues included factors involving school or law enforcement, such as skipping school and incarceration. Lifetime trauma included issues such as being a victim of sexual assault or rape or experiencing the suicide of a family member or peer. Homosexuality, bisexuality, being transgender, and having gender identity issues fell under the sexual minority theme. Family or peer discord included divorce of parents, family financial strain, unstable housing, and arguments with parents, peers, siblings, or a partner. Finally, external stress and pressure involved situations such as important assignments coming due at school, coaches putting pressure on a child, failing an exam, job loss, and stress from juggling multiple responsibilities.

The role of parental relationships has importance among the 10- to 13-year-old subgroup. However, the role of discord with peers, in addition to discord with parents and family members, was present among the 14- to 17-year-old subgroup. Lack of family and peer support have been demonstrated to be risk factors for suicide in adolescents.<sup>29</sup> This study shows that losing a parental relationship—through neglect, estrangement, or by running away—particularly affects 10- to 13-year-old suicide victims. Interestingly, peer relationships are not referenced in the suicide narratives for this younger subgroup. However, these findings support previous studies that psychosocial adversity is a risk factor for suicide among younger adolescents (eg, pre-high school age

individuals),<sup>30</sup> which may enhance the effect of exposure to suicide among the younger subgroup.

Several age-specific characteristics emerged among the older age subgroup, including biopsychological issues. No specific mental health diagnoses, other than depression, ADHD, and Asperger’s syndrome, were mentioned in the younger subgroup. By contrast, several diagnoses, including bipolar disorder, obsessive compulsive disorder, anxiety, adjustment disorder, and defiance disorder, are present in older youth. This is not to suggest that these disorders are not present among the younger subgroup. However, their presence in the conditions that lead to suicide deaths is pronounced among the older youth, suggesting an increased influence of these factors on suicide among the 14- to 17-year-old decedents, or perhaps a lack of diagnosis of these conditions among younger decedents.

Stress and lifetime trauma were also age-specific characteristics among 14- to 17-year-old decedents. Life stress is a component of many suicide theories,<sup>31</sup> and studies point to job loss, divorce, and financial issues as major sources of stress among older suicide decedents. This study demonstrates the impact of family and school stress among teenage suicide decedents, even if that stress (such as family financial strain) is also shared with family members. Discipline and school issues may compound this stress. Additionally, this study illustrates the impact of lifetime trauma on suicide among high school-age youth.

In terms of differences by sex, a statistically significant proportion of female suicide decedents in this study experienced abuse at some point in their lives. Sexual abuse has been shown to be a mode of childhood trauma that contributes to suicidal behavior;<sup>32</sup> this study supports these findings, particularly as they reflect the experience of young females. This finding is important in understanding the impact of sexual assault and rape on young females and in planning suicide prevention among those who experience this trauma.

This study also supports literature pointing to the impact of sexual minority stress on suicide in youth. However, in the present study, sexual minority stress was reported only in the 14- to 17-year-old age group. This may not be due to a lack of understanding of sexuality among the younger age subgroup, as some studies have pointed to age 10 as the mean age of first sexual attraction.<sup>33</sup> Rather, since coroner, medical examiner, law enforcement reports rely on family reporting, the lack of mention of sexual orientation in the younger subgroup may be due to a lack of knowledge by others of the decedent’s sexual orientation.

This study is limited to decedents who were Wisconsin residents, which may limit generalizability to other states. However, the themes generated through these analyses are conditions experienced by youth across the country. Also, the small sample size of the younger subgroup (n = 16) is limiting; however, this reflects all the suicides occurring among Wisconsin residents in this age group for the 5-year study period. The information included in the coroner, medical examiner, and law enforcement narratives is limited to the information provided by family members or loved ones. Therefore, important information related to the suicide

death may not be represented for a variety of reasons (eg, stigma, lack of knowledge of preceding factors). As this study did not include a control group, the ability to identify whether the characteristics found represent actual risk factors for suicide is limited. Finally, the race information in the NVDRS is limited in that it is based on coroner/medical examiner ascertainment. In cases in which race may not be known or immediately ascertainable, the information could be incorrect. However, this is the best information currently available.

## CONCLUSION

Suicide is a complex public health issue that is preventable. The rising rate of suicides among young people highlights the importance of developing and implementing evidence-based prevention strategies. These strategies should be as tailored to specific age groups as possible to maximize their efficacy among diverse groups of young people. This study demonstrates that there are age-based nuances in suicide risk, even within the “youth” age group. This information can be leveraged to plan prevention strategies based on more granular age groupings, which may mean that strategies are more relevant to youth. Future studies in other states may attempt to replicate this study to uncover additional age- and sex-specific characteristics specific to their state and those that are shared across state lines.

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