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# A national examination of suicidal ideation, planning, and attempts among United States adults: Differences by military veteran status, 2008–2019

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ABSTRACT

There is a widening disparity in suicide deaths between United States (U.S.) military veterans and nonveterans. However, it is unclear if there are similar differences in suicidal ideation, planning, and attempts that often precipitate these deaths. A better understanding of trends in suicidal thoughts and behaviors could illuminate opportunities for prevention. We examined pooled cross-sectional data ($N = 479{,}801$ adults) from the 2008 to 2019 National Survey on Drug Use and Health. We examined differences in past-year suicidal ideation, suicide planning, and suicide attempts between U.S. veterans ($n = 26{,}508$) and nonveterans ($n = 453{,}293$). We conducted post hoc analyses to examine for differences in these relationships by race/ethnicity and sex. Lastly, we examined trends in these outcomes over time and tested for differences in trends by veteran status. Overall, veterans had significantly greater odds of past-year suicidal ideation (aOR = 1.33, 95% CI 1.20 to 1.47) and suicide planning (aOR = 1.52, 95% CI 1.30 to 1.78) compared to nonveterans. However, the association between veteran status and past-year suicide attempt was not statistically significant (aOR = 1.29, 95% CI 1.00 to 1.68). These relationships did not differ by race/ethnicity or sex ($ps > 0.05$). Among all adults, there were significant linear increases in past-year suicidal ideation, planning, and attempts ($ps < 0.001$). However, these trends did not differ between veterans and nonveterans ($ps > 0.05$). Veterans may be more likely to experience suicidal thoughts and behaviors than nonveteran adults. Upward trends in suicidal thoughts and behaviors among both veterans and nonveterans from 2008 to 2019 highlight opportunities for intervention.

## 1. Introduction

Approximately 7% of the adult United States (US) population are military veterans (Vespa, 2020), but veterans represented nearly 14% of the suicide deaths among US adults in 2020 (U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention, 2022). National data suggests that the suicide rate among veterans has been outpacing the suicide rate among nonveteran adults over the last two decades, resulting in a widening disparity in suicide mortality (U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention, 2022). Recent data suggest veteran suicide mortality decreased from 2018 to 2020 (U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention, 2022), but it is unclear if this trend will continue. Although veterans have a greater risk of suicide mortality than their nonveteran counterparts, it is less clear if veterans are more likely to experience suicidal ideation, planning, and attempts that often precipitate these deaths. For example, a meta-analysis of studies examining the association between suicidal ideation and suicide death suggests that people who experience suicidal thoughts have a 3.4-fold greater odds of suicide death compared to people who do not experience suicidal ideation (McHugh et al., 2019). Likewise, a systematic review of the antecedents of suicide death suggests that 39% of people who died by suicide had a known history of prior suicide attempts (Cavanagh et al., 2003). Moreover, suicidal thoughts and behaviors are important health outcomes from a quality of life perspective in and of themselves (Chen et al., 2011; Goldney et al., 2001; Jobes and Joiner, 2019). However, vital statistics and most healthcare records do not contain data on suicidal ideation, suicide planning, and non-fatal

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suicide attempts.

Nearly half of all veterans own firearms (Cleveland et al., 2017), and it has been speculated that increased access to such a lethal means of suicide may partly explain the disparity in suicide *mortality* (U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention, 2021). Indeed, firearms were involved in 71.0% of veteran suicide deaths and 50.3% of nonveteran suicide deaths in 2020, with veterans being 1.3 to 1.6 times more likely than civilians to use a firearm as a means of suicide (Kaplan et al., 2009). In addition to increased access to lethal means, it is also possible that veterans may be more likely to experience suicidal *thoughts* and *behaviors* than nonveterans, but more research is needed in this area. This is important because research suggests that, among people experiencing suicidal ideation, those who own firearms are more likely to engage in suicide planning compared to those who do not own firearms (Betz et al., 2011). Further, a recent systematic review of studies related to firearm suicide among veterans suggests that veterans are a culturally distinct group and that their unique experiences shape their attitudes about firearms and subsequent risk for suicide-related outcomes (Theis et al., 2021).

Although national suicide mortality data reveal unique risks among veterans (U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention, 2021), limited studies have been able to compare veteran and nonveteran populations directly. Several studies have examined the characteristics of U.S. veteran and civilian decedents (Horwitz et al., 2019; Wood et al., 2020), but few studies have collected data on the suicidal thoughts and behaviors among living participants. The Comparative Health Assessment Interview Study (Hoffmire et al., 2021), examined suicidal ideation and attempts among a large national sample of veterans and nonveterans. Results suggest that veterans have higher *lifetime* odds of suicidal ideation and attempts than nonveterans, but data collection was restricted to 2018, included only post-9/11 veterans, and the study was affected by a lower than optimal response rate among nonveterans (obtained via a separate panel) and could not control for confounding factors such as mental health history. Examining nationally representative data from a *single* data source with both current-era and older veterans could better illuminate the potential differences between veterans' and nonveterans' suicidal thoughts and behaviors and can provide insight into suicide-related secular trends at the population level.

The current study examines suicidal thoughts and behaviors trends among U.S. adults using data from a nationally representative sample of adults, including military veterans and nonveterans, surveyed between 2008 and 2019. We examine differences in past-year suicidal ideation, suicide planning, and suicide attempts by veteran status and characterize trends in these outcomes over time. We hypothesized that veterans would have greater odds of suicidal ideation, planning, and attempts than nonveterans. Our examination of trends over time was exploratory. Finally, given the known differences in suicidal behavior and suicide mortality risk among different racial and ethnic groups (Ivey-Stephenson et al., 2017; Lorenzo-Luaces and Phillips, 2014; Oquendo et al., 2001) and by sex (Miranda-Mendizabal et al., 2019; Oquendo et al., 2001), we conducted post hoc analyses to determine if any of the examined relationships differed by race/ethnicity or sex.

## 2. Material and methods

### 2.1. Data source

Pooled data from the 2008–2019 National Survey on Drug Use and Health were examined. Using a multi-stage, complex sampling design, the NSDUH is an ongoing cross-sectional survey assessing substance use, mental health, and behavioral health services among non-institutionalized people in the United States aged 12 years and older, excluding unhoused people not staying in shelters. Notably, the NSDUH excludes military service members currently on active duty, but those who have separated or retired from the military (i.e., veterans) are eligible for inclusion, a focus of the current study. Weighted response rates for the 2008–2019 waves of the NSDUH exceeded 64.9% each year. Additional details regarding NSDUH data collection methods have been published elsewhere (Substance Abuse and Mental Health Services Administration, 2020).

### 2.2. Participants

To obtain a subsample of adult veteran and nonveteran NSDUH participants ($N = 479{,}801$), we limited the data to those aged 18 years and older who responded to the survey question "Have you ever been in the United States Armed Forces?" Those who responded "No" were coded as nonveterans. Those who responded "Yes" and who *also* responded to the question, "Are you currently on active duty in the armed forces, in a reserves component, or now separated or retired from either reserves or active duty" with a response of "Now separated/retired from reserves/active duty" were coded as veterans. Participants currently serving as a military reserve component were excluded from our sample. Our final analytic sample was comprised of both nonveterans ($n = 453{,}293$) and veterans ($n = 26{,}508$) aged 18 years and older.

### 2.3. Measures

#### 2.3.1. Past-year suicidal ideation

We assessed past-year suicidal ideation among adults aged 18 years and older with the following NSDUH survey question: "At any time in the past 12 months, that is from (12 months prior to survey date) up to and including today, did you seriously think about trying to kill yourself?" Adult participants who endorsed a valid response of "Yes" or "No" to this question were included in all analyses.

#### 2.3.2. Past-year suicide planning

Among those who endorsed past-year suicidal ideation, the NSDUH presented them with the following question: "During the past 12 months, did you make any plans to kill yourself?" with response options of "Yes" or "No." Those who did not endorse past-year suicidal ideation were coded as "No" for past-year suicide planning.

#### 2.3.3. Past-year suicide attempts

Participants who endorsed past-year suicidal ideation were also asked the follow-up question in the NSDUH survey: "During the past 12 months, did you try to kill yourself?" with response options of "Yes" or "No." Participants who did not endorse past-year suicidal ideation were coded as "No" for past-year suicide attempts.

#### 2.3.4. Covariates

Given the demographic differences between nonveterans and veterans, generally, and the known differences in suicide-related outcomes among different demographic and clinical populations (Horwitz et al., 2019; Huang et al., 2017; Spicer and Miller, 2000), we also included the following variables in our models to control for their potentially confounding effects: biological sex (male vs. female), age category (18–25 years, 26–34 years, 35–49 years, 50–64 years, and ≥65 years), family income category (<$20,000, $20,000 – $49,999, $50,000 – $74,999, and ≥ $75,000), and lifetime major depressive episode (Yes/No). In addition, we used NSDUH-provided imputed variables to limit the amount of missing data. These variables are imputed using hot-deck imputation methods (Substance Abuse and Mental Health Services Administration, 2021), a common imputation approach in large-scale survey-based research in which each missing value is replaced with an observed plausible response from a similar or "donor" unit (Andridge and Little, 2010). Finally, in post hoc analyses, we also examined differences in the relationships between veteran status and suicidal thoughts and behaviors by race/ethnicity (Non-Hispanic White, Non-Hispanic Black/African American, Non-Hispanic Native

American/Alaska Native, Non-Hispanic Native Hawaiian/Other Pacific Islander, Non-Hispanic Asian, Non-Hispanic More than One Race, Hispanic) and biological sex (male, female).

### 2.4. Statistical analysis

Using logistic regression models, we separately examined the overall odds of past-year suicidal ideation, suicide planning, and suicide attempts by military veteran status (veteran vs. nonveteran). We conducted post hoc analyses to determine if these relationships differed by race/ethnicity or sex by adding separate interaction terms representing the cross-products of veteran status and race/ethnicity and veteran status and sex to each main effects model, separately. Following the National Center for Health Statistics Guidelines for Analysis of Trends (Ingram et al., 2018), we estimated whether there was a significant trend in past-year suicidal ideation, planning, and attempts by including the survey year as a focal predictor and then testing for linear contrasts. Lastly, we tested for differences in the trends of suicidal ideation, planning, and attempts between veterans and nonveterans by including an interaction term in the final models, representing the cross-product term of veteran status and survey year. All models included biological sex, age, family income, and lifetime major depression as covariates to control for their potential confounding effects on the relations between veteran status and suicidal ideation, planning, and attempts. The variance inflation factor (VIF) for the variables selected as predictors in our models suggests some modest correlations, but not multicollinearity (VIF = 1.27). All variables were entered into the models simultaneously. Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) are reported.

Additionally, we plotted the overall prevalence estimates of suicidal ideation, planning, and attempts, separately among U.S. adults from 2008 to 2019. We also calculated the age- and sex-stratified prevalence estimates of each outcome by veteran status for the overall study period. All analyses were conducted in Stata version 17.1 (College Station, TX) and incorporated NSDUH-provided sampling weights. A 2-sided $p <$ 0 0.05 was considered statistically significant.

## 3. Results

### 3.1. Descriptive results

The overall sample was demographically diverse, but veterans were more likely than nonveterans to be male (92.4% vs. 43.4%, respectively; $p < 0.001$), non-Hispanic White (79.9% vs. 64.2%, respectively; $p <$ 0.001), and over the age of 65 (46.2% vs. 15.8%, respectively; $p <$ 0.001). However, these are comparable to estimates of veteran demographics nationally (US Department of Veterans Affairs, 2021). Weighted distributions of the characteristics of our analytic sample are shown in Table 1 according to veteran status.

Among this large and nationally representative sample of U.S. adults, the pooled prevalence of past-year suicidal ideation was 4.1% (95% CI 3.99 to 4.14), and yearly prevalence estimates ranged from 3.8% to 4.9% (Fig. 1 Panel A). The pooled prevalence of past-year suicide planning across all waves in the total sample was 1.2% (95% CI 1.12 to 1.20), ranging from 1.0% to 1.4% in individual survey years (Fig. 1 Panel B). Among those endorsing past-year suicidal ideation, the prevalence of past-year suicide planning across all years was 28.6% (95% CI 27.79 to 29.49). In the total sample, the pooled prevalence of past-year suicide attempt was 0.5% (95% CI 0.50 to 0.55) but represented 13.0% (95% CI 12.40, 13.64) of those who endorsed past-year suicidal ideation and 37.2% (95% CI 35.60 to 38.92) of those who endorsed past-year suicide planning. Among the overall sample, individual survey year prevalence estimates of past-year suicide attempts ranged from 0.4% to 0.6% (Fig. 1 Panel C). Age- and sex-stratified prevalence estimates of each outcome by veteran status for the overall study period are presented in the Supplemental Table.

**Table 1**
Weighted distributions of sample characteristics by veteran status.

| | Nonveteran ($n$ = 453,293) % (95% CI) | Veteran ($n$ = 26,508) % (95% CI) | $X^2$ test p-value |
|---|---|---|---|
| **Biological Sex** | | | |
| Male | 43.4% (43.2, 43.6) | 92.4% (91.9, 92.8) | |
| Female | | 7.6% (7.2, 8.1) | $p < 0.001$ |
| **Race/Ethnicity** | | | |
| Non-Hispanic White | 64.2% (64.0, 64.4) | 79.9% (79.2, 80.6) | |
| Non-Hispanic Black/African American | 11.8% (11.6, 11.9) | 10.6% (10.1, 11.2) | |
| Non-Hispanic Native American/Alaska Native | 0.5% (0.5, 0.6) | 0.5% (0.4, 0.6) | |
| Non-Hispanic Native Hawaiian/Other Pacific Islander | 0.4% (0.3, 0.4) | 0.2% (0.1, 0.3) | |
| Non-Hispanic Asian | 5.6% (5.5, 5.7) | 1.0% (0.8, 1.2) | |
| Non-Hispanic More than One Race | 1.4% (1.4, 1.5) | 1.8% (1.6, 2.0) | |
| Hispanic | 16.1% (15.9, 16.2) | 6.0% (5.6, 6.4) | $p < 0.001$ |
| **Age** | | | |
| 18–25 years | 15.7% (15.5, 15.8) | 1.5% (1.4, 1.6) | |
| 26–34 years | 16.9% (16.7, 17.0) | 6.1% (5.8, 6.4) | |
| 35–49 years | 26.8% (26.6, 27.0) | 16.6% (16.0, 17.1) | |
| 50–64 years | 24.9% (24.7, 25.1) | 29.7% (28.8, 30.5) | |
| 65 years or Older | 15.8% (15.5, 16.0) | 46.2% (45.3, 47.1) | $p < 0.001$ |
| **Family Income** | | | |
| <$20,000 | 18.1% (17.9, 18.2) | 11.0% (10.5, 11.5) | |
| $20,000-$49,000 | 30.9% (30.7, 31.1) | 33.2% (32.4, 34.0) | |
| $50,000-$74,999 | 16.4% (16.2, 16.6) | 19.1% (18.4, 19.8) | |
| >$75,000 | 34.7% (34.4, 34.9) | 36.7% (35.9, 37.6) | |
| **Lifetime Major Depressive Episode** | | | |
| No | 86.3% (86.1, 86.4) | 89.9% (89.4, 90.4) | |
| Yes | 13.7% (13.6, 13.9) | 10.1% (9.6, 10.6) | $p < 0.001$ |

Abbreviation: CI, confidence interval.

### 3.2. Suicidal ideation

Veterans had 1.33-fold greater odds of past-year suicidal ideation compared to nonveteran adults after controlling for the effects of biological sex, age, family income, and lifetime major depression (aOR = 1.33, 95% CI 1.20 to 1.47; $p < 0.001$; Table 2). This relationship did not differ by race/ethnicity or sex ($ps > 0.05$). Adjusted results from this model demonstrate that compared to 2008, the odds of suicidal ideation among US adults were higher in the years 2015 (aOR = 1.12, 95% CI 1.01 to 1.24; $p = 0.04$), 2016 (aOR = 1.14, 95% CI 1.02 to 1.27; $p =$ 0.02), 2017 (aOR = 1.22, 95% CI 1.10 to 1.36; $p < 0.001$), 2018 (aOR = 1.20, 95% CI 1.08 to 1.34; $p = 0.01$), and 2019 (aOR = 1.38 95% CI 1.24 to 1.53; $p < 0.001$). An examination of model contrasts revealed a significant linear trend in past-year suicidal ideation ($b = 0.08$, 95% CI 0.06 to 0.10; $p < 0.001$), suggesting the prevalence of past-year suicidal ideation among adults has increased over time. However, there was no statistically significant difference in this trend between veterans and nonveterans (aOR = 0.99, 95% CI 0.96 to 1.02; $p = 0.46$).

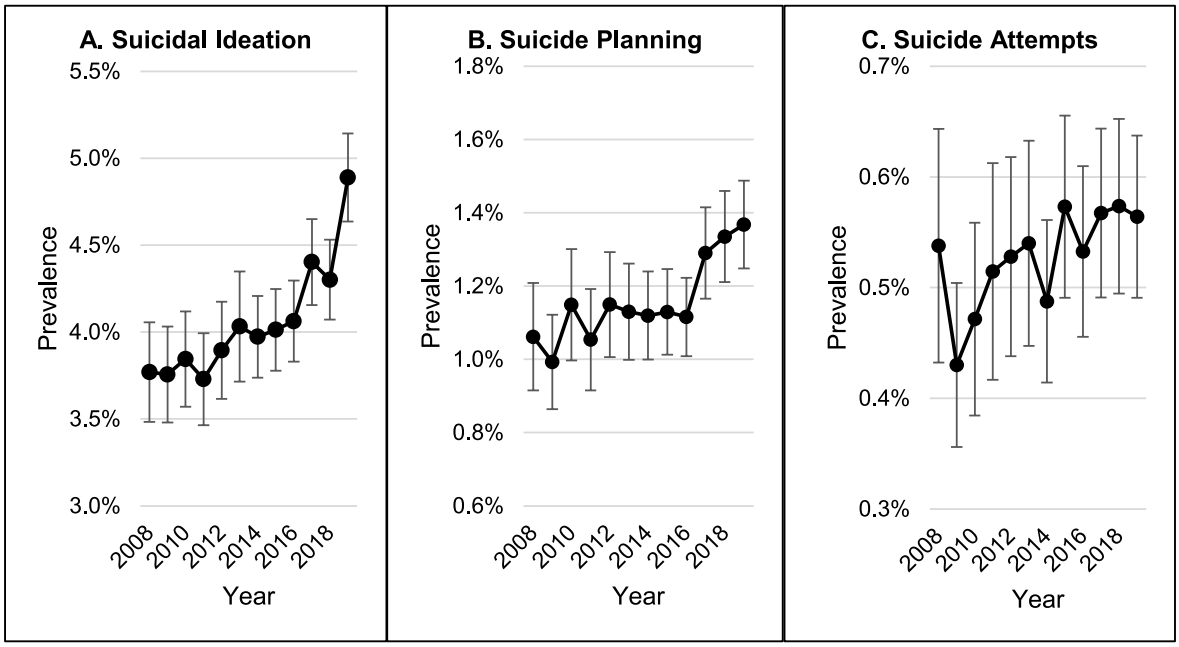


**Fig. 1.** Weighted trends in past-year suicidal ideation, planning, and attempts among U.S. Adults, 2008–2019.

**Table 2**
Odds of past-year suicidal ideation among U.S. Adults by military veteran Status, 2008–2019.

| | Suicidal Ideation aOR (95% CI) |
|---|---|
| **Military Veteran Status** | |
| Nonveteran | Referent |
| Veteran | **1.33 (1.20, 1.47)***** |
| **Year** | |
| 2008 | Referent |
| 2009 | 1.01 (0.90, 1.14) |
| 2010 | 1.06 (0.94, 1.20) |
| 2011 | 1.02 (0.90, 1.14) |
| 2012 | 1.05 (0.94, 1.19) |
| 2013 | 1.11 (0.98, 1.26) |
| 2014 | 1.10 (0.99, 1.23) |
| 2015 | **1.12 (1.01, 1.24)*** |
| 2016 | **1.14 (1.02, 1.27)*** |
| 2017 | **1.22 (1.09, 1.36)***** |
| 2018 | **1.20 (1.08, 1.34)**** |
| 2019 | **1.38 (1.24, 1.53)***** |
| **Biological Sex** | |
| Male | Referent |
| Female | **0.85 (0.81, 0.89)***** |
| **Age** | |
| 18–25 years | Referent |
| 26–34 years | **0.57 (0.54, 0.60)***** |
| 35–49 years | **0.49 (0.47, 0.52)***** |
| 50–64 years | **0.38 (0.36, 0.41)***** |
| 65 years or Older | **0.26 (0.24, 0.29)***** |
| **Family Income** | |
| <$20,000 | Referent |
| $20,000-$49,000 | **0.77 (0.73, 0.81)***** |
| $50,000-$74,999 | **0.62 (0.57, 0.66)***** |
| >$75,000 | **0.52 (0.49, 0.55)***** |
| **Lifetime Major Depressive Episode** | |
| No | Referent |
| Yes | **10.98 (10.51, 11.47)***** |

Note. Boldface indicates statistical significance ($p < 0.05$). *p < 0.05, **$p <$ 0.01, ***$p < 0.001$.
Abbreviations: aOR, adjusted odds ratio; CI, confidence interval.
Hosmer-Lemeshow goodness-of-fit test statistic: 1.51; p = 0.20.

**Table 3**
Odds of past-year suicide planning among U.S. Adults by military veteran Status, 2008–2019.

| | Suicide Planning aOR (95% CI) |
|---|---|
| **Military Veteran Status** | |
| Nonveteran | Referent |
| Veteran | **1.52 (1.30, 1.78)***** |
| **Year** | |
| 2008 | Referent |
| 2009 | 0.98 (0.80, 1.20) |
| 2010 | 1.16 (0.94, 1.43) |
| 2011 | 1.05 (0.85, 1.29) |
| 2012 | 1.12 (0.92, 1.37) |
| 2013 | 1.14 (0.94, 1.38) |
| 2014 | 1.13 (0.94, 1.36) |
| 2015 | 1.15 (0.95, 1.38) |
| 2016 | 1.14 (0.95, 1.36) |
| 2017 | **1.29 (1.08, 1.54)**** |
| 2018 | **1.36 (1.14, 1.62)**** |
| 2019 | **1.37 (1.15, 1.63)***** |
| **Biological Sex** | |
| Male | Referent |
| Female | **0.88 (0.81, 0.95)**** |
| **Age** | |
| 18–25 years | Referent |
| 26–34 years | **0.53 (0.49, 0.58)***** |
| 35–49 years | **0.51 (0.47, 0.56)***** |
| 50–64 years | **0.37 (0.32, 0.41)***** |
| 65 years or Older | **0.21 (0.17, 0.26)***** |
| **Family Income** | |
| <$20,000 | Referent |
| $20,000-$49,000 | **0.66 (0.61, 0.72)***** |
| $50,000-$74,999 | **0.51 (0.47, 0.56)***** |
| >$75,000 | **0.39 (0.35, 0.43)***** |
| **Lifetime Major Depressive Episode** | |
| No | Referent |
| Yes | **13.36 (12.37, 14.43)***** |

Note. Boldface indicates statistical significance ($p < 0.05$). **$p < 0.01$, ***$p$ $< 0.001$.
Abbreviations: aOR, adjusted odds ratio; CI, confidence interval.
Hosmer-Lemeshow goodness-of-fit test statistic: 1.85; p = 0.12.

**Table 4**
Odds of past-year suicide attempt among U.S. Adults by military veteran Status, 2008–2019.

| | Suicide Attempt aOR (95% CI) |
|---|---|
| **Military Veteran Status** | |
| Nonveteran | Referent |
| Veteran | 1.29 (1.00, 1.68) |
| **Year** | |
| 2008 | Referent |
| 2009 | 0.87 (0.66, 1.14) |
| 2010 | 0.96 (0.72, 1.28) |
| 2011 | 1.04 (0.78, 1.39) |
| 2012 | 1.06 (0.81, 1.40) |
| 2013 | 1.10 (0.84, 1.45) |
| 2014 | 0.99 (0.77, 1.29) |
| 2015 | 1.19 (0.93, 1.53) |
| 2016 | 1.12 (0.87, 1.44) |
| 2017 | 1.16 (0.91, 1.48) |
| 2018 | 1.20 (0.94, 1.54) |
| 2019 | 1.16 (0.91, 1.47) |
| **Biological Sex** | |
| Male | Referent |
| Female | 1.02 (0.92, 1.13) |
| **Age** | |
| 18–25 years | Referent |
| 26–34 years | **0.43 (0.38, 0.49)***** |
| 35–49 years | **0.39 (0.35, 0.45)***** |
| 50–64 years | **0.27 (0.22, 0.33)***** |
| 65 years or Older | **0.17 (0.12, 0.24)***** |
| **Family Income** | |
| <$20,000 | Referent |
| $20,000-$49,000 | **0.66 (0.58, 0.75)***** |
| $50,000-$74,999 | **0.42 (0.35, 0.51)***** |
| >$75,000 | **0.31 (0.27, 0.36)***** |
| **Lifetime Major Depressive Episode** | |
| No | Referent |
| Yes | **8.59 (7.73, 9.54)***** |

Boldface indicates statistical significance ($p < 0.05$). ***$p < 0.001$.
Abbreviations: aOR, adjusted odds ratio; CI, confidence interval.
Hosmer-Lemeshow goodness-of-fit test statistic: 1.17; p = 0.32.

### 3.3. Suicide planning

Across the entire sample of U.S. adults, veterans had significantly greater odds of past-year suicide planning than nonveterans, even after accounting for differences in demographic and clinical characteristics between these populations (aOR = 1.52, 95% CI 1.30, 1.78; $p < 0.001$; Table 3). This relationship did not differ by race/ethnicity or sex ($ps > 0.05$). Adjusted results from this model demonstrate that compared to 2008, the odds of suicide planning among US adults were higher in the years 2017 (aOR = 1.29, 95% CI 1.08 to 1.54; $p = 0.01$), 2018 (aOR = 1.36 95% CI 1.14 to 1.62; $p = 0.01$), and 2019 (aOR = 1.37, 95% CI 1.15 to 1.63; $p < 0.001$). Results from model contrasts show a significant linear trend in past-year suicide planning ($b = 0.09$, 95% CI 0.06 to 0.13; $p < 0.001$), suggesting the prevalence of past-year suicide planning among adults has increased over time. There was no significant difference in this trend between veterans and nonveterans (aOR = 0.97, 95% CI 0.93 to 1.02; $p = 0.25$).

### 3.4. Suicide attempts

Among the 479,801 adults included in the current study, the association between past-year suicide attempts and veteran status was not statistically significant (aOR = 1.29, 95% CI 1.00 to 1.68; $p = 0.05$; Table 4). This relationship did not differ by race/ethnicity or sex ($ps > 0.05$). Adjusted results from this model did not reveal any significant differences in the odds of a past-year suicide attempt on a per-year basis compared to 2008 ($ps > 0.05$). However, model contrasts suggest that, overall, there was a significant increase in past-year suicide attempts from 2008 to 2019 ($b = 0.08$, 95% CI 0.03 to 0.13, 0.15; $p = 0.01$). There was no statistically significant difference in this trend between veterans and nonveterans (aOR = 0.94, 95% CI 0.88 to 1.00; $p = 0.07$).

## 4. Discussion

The current study suggests that each year, approximately one in 25 U.S. adults experiences suicidal ideation and that the prevalence of suicidal ideation has been increasing in recent years. Although current data suggest that veteran suicide mortality decreased in 2019 (U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention, 2021), our results suggest that suicidal ideation and behaviors have continued to increase for veterans and nonveterans. Our findings demonstrate that compared to nonveteran adults, U.S. military veterans have a 1.33-fold greater odds of past-year suicidal ideation and 1.52-fold greater odds of past-year suicide planning, consistent with the findings of Hoffmire and colleagues (Hoffmire et al., 2021). The association between veteran status and suicide attempts was not statistically significant. Still, it was consistent in magnitude and direction with our findings for ideation and planning, suggesting that we may have been underpowered to detect a difference in the odds of suicide attempts by veteran status. An alternative explanation for the trends observed in the current study might also be partially attributable to increased suicide awareness efforts, which have been shown to increase suicidal cognition (Arendt et al., 2016).

Despite known differences in the risk of suicidal behaviors and suicide death among different racial and ethnic groups and between male and female adults (Ivey-Stephenson et al., 2017; Lorenzo-Luaces and Phillips, 2014; Miranda-Mendizabal et al., 2019; Oquendo et al., 2001), none of our focal analyses differed by race/ethnicity or sex, suggesting that veterans may be more likely to experience suicidal thoughts and behaviors than nonveterans, regardless of race/ethnicity or sex. This increased risk for suicidal ideation and planning is not accounted for when examining suicide *mortality* and cannot simply be attributed to greater access to lethal means (U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention, 2021). Results suggest that veteran status is associated with suicidal ideation, highlighting the need for more upstream suicide prevention efforts among veteran populations.

Findings from the current study, which demonstrate significant increases in past-year suicidal ideation, suicide planning, and suicide attempts among U.S. adults in recent years, mirror an increase in suicide deaths in the U.S. over the same period (Hedegaard et al., 2018; Stone et al., 2018). Ideation-to-action theories (Klonsky et al., 2018) suggest that pain, hopelessness, and related experiences motivate suicidal desire, whereas the capability for suicide is the primary catalyst for suicide attempts. Although increased firearm ownership (Cleveland et al., 2017) and the use of a firearm as a means of suicide (Kaplan et al., 2009) have been implicated in the disparate suicide mortality rate among veterans compared to civilians (U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention, 2022), the current study adds crucial contextual information to the literature. Our results suggest that veterans may *also* be more likely to experience suicidal thoughts and behaviors than nonveterans. In the context of a recently increasing prevalence of suicidal ideation, planning, and attempts among U.S. adults more broadly, as well as prevalent firearm ownership among veterans (Cleveland et al., 2017) and the association between firearm ownership and suicide planning (Betz et al., 2011), enhanced attention to firearm suicide prevention among veterans is warranted. Lethal means safety counseling, safety planning, gun locks, and firearms-focused legislation are recommended to improve the safety of military-connected populations (Ammerman and Reger, 2020; Anestis et al., 2021; Green et al., 2018; Holliday et al., 2019; Hoyt et al., 2021).

Prior research has identified several suicide risk factors among military-connected populations which may serve as potential intervention targets, including insomnia (Bishop et al., 2019; Vargas et al., 2020)

depression (Bishop et al., 2019; Pietrzak et al., 2010), anxiety (Shepardson et al., 2019), anger (Wilks et al., 2019), posttraumatic stress (Jakupcak et al., 2009; Pietrzak et al., 2010), lack of access to mental health services (Hester, 2017), traumatic brain injury (Wilks et al., 2019) and other physical health problems (Bruce, 2010; Wood et al., 2020), problems with alcohol (Pietrzak et al., 2010), and poor social support (Blais et al., 2021; Pietrzak et al., 2010; Wilks et al., 2019). Further, emerging research suggests combat exposure may *not* be the primary driver of suicide-related behaviors and outcomes among military-connected populations, highlighting the importance of *universal* suicide risk screening and management practices (e.g., increased provider training, integration of multiple screening tools into electronic health records systems) in addition to firearm-focused interventions (Faucett, 2021). Additional research is needed to identify the most effective intervention targets for preventing suicidal thoughts and behaviors among veterans.

Approximately half of people who died by suicide had a healthcare visit in the 4 weeks preceding death (Ahmedani et al., 2014) and are more likely to have recently seen a primary care physician than a psychiatrist (Ng et al., 2017), suggesting thabib_udvaomhsp_2022t there are significant opportunities for suicide prevention in primary care and other medical settings. Although the Department of Veterans Affairs (V.A.) has made robust efforts to reduce suicide mortality (e.g., Blue Ribbon Work Group on Suicide Prevention) and suicide mortality among veterans has recently declined (U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention, 2022bib_udvaomhsp_2022), our results suggest that there has not been a similar downturn in suicidal ideation and planning among veterans. This is important given that these are important health outcomes in and of themselves (Chen et al., 2011; Goldney et al., 2001; Jobes and Joiner, 2019). Given the current research findings, addressing upstream factors that affect the likelihood of suicidal ideation, as well as universal suicide screening practices, enhanced firearm safety practices and policies, and the promotion of suicide prevention as a core component of health care services are all needed to reduce suicidal thoughts and behaviors and suicide mortality to enhance veterans' quality of life (Chen et al., 2011; Faucett, 2021; Goldney et al., 2001; Jobes and Joiner, 2019; U.S. Department of Veterans Affairs).

### 4.1. Limitations

These findings should be considered within the context of its limitations. First, as with all secondary data analyses or large-scale survey-based research, the selection of our dependent and independent variables was limited to those collected in the 2008–2019 waves of the NSDUH and are subject to missingness (and assumed to be missing at random). However, the use of NSDUH-provided imputed variables maximizes the inferences we are able to make with this dataset. Second, an additional limitation of the NSDUH is that the sample excludes people who are incarcerated and unhoused people who are not staying in shelters. Given the known relationships between incarceration, housing status, veteran status, and suicide risk, our findings may not represent certain veterans' heightened risks. Another limitation of this study is that NSDUH respondents who did not endorse past-year suicidal thoughts were not presented with the past-year suicide planning and attempts questions. Research has shown that suicide attempts are common among those who deny suicidal ideation and single-item classifications may further bias these measurements (Bryan et al., 2022; Millner et al., 2015; Wastler et al., 2022). Our sample of veterans was also less diverse in terms of race/ethnicity and sex than national estimates (Department of Defense, 2021), which may affect generalizability. Lastly, all data were self-reported, so there is a possibility of social desirability bias and reduced self-disclosure of suicidality due to stigma among some groups (Calear and Batterham, 2019; Husky et al., 2016), including veterans (Ammerman et al., 2022).

## 5. Conclusions

Findings from this national examination of U.S. adults suggest that there have been significant population-level increases in suicidality among both veterans and nonveterans from 2008 to 2019 and that overall, veterans may be at greater risk for suicidal thoughts and planning than their nonveteran counterparts. There is an urgent need to understand better the motivations and behaviors associated with suicide in this at-risk population.

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## Author statement

**Rachel A. Hoopsick:** Conceptualization, Formal analysis, Writing - Original Draft, Visualization.

**R. Andrew Yockey:** Formal analysis, Data Curation, Writing - Review & Editing.

## Declaration of competing interest

No conflicts of interest to disclose.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychires.2023.07.009.

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