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# Comparing Rates and Predictors of Suicide-Related Outcomes among Veterans and Service Members across VA and Civilian Health Care Systems

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December 13, 2023

# Disclaimer

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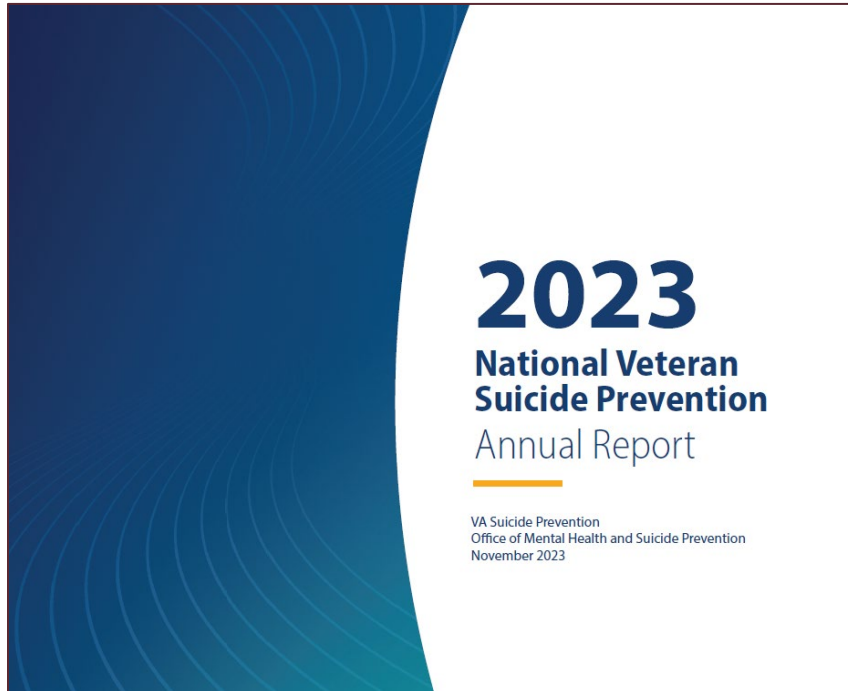
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# Key Findings – Suicide among Veterans (Vs)

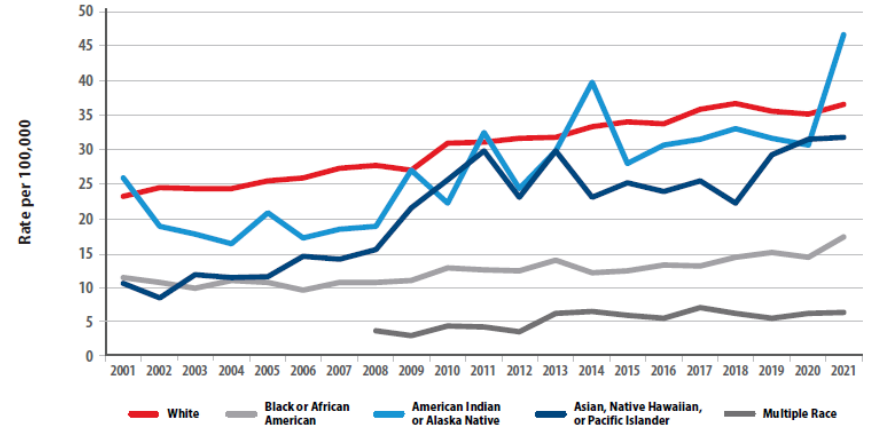
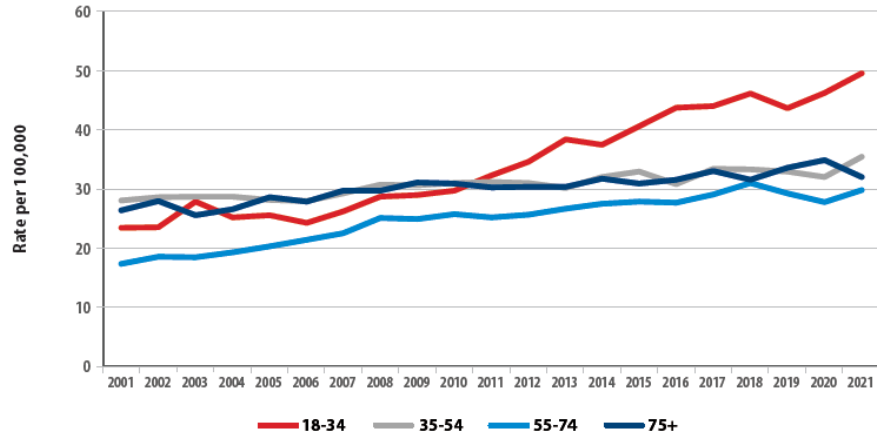


	First Leading Cause of Death	Second Leading Cause of Death	Rank of Suicide as a Leading Cause of Death
<b>All Veterans</b>			
All Ages	Heart Disease	Cancer	13th
18 to 34	Accident (Unintentional Injury)	<i>Suicide</i>	2nd
35 to 44	Accident (Unintentional Injury)	<i>Suicide</i>	2nd
45 to 54	COVID-19	Heart Disease	5th
55 to 64	Heart Disease	Cancer	9th
65 to 74	Cancer	Heart Disease	14th
75 to 84	Heart Disease	Cancer	17th
85 and older	Heart Disease	Cancer	17th
<b>Male Veterans</b>			
All Ages	Heart Disease	Cancer	13th
18 to 34	Accident (Unintentional Injury)	<i>Suicide</i>	2nd
35 to 44	Accident (Unintentional Injury)	<i>Suicide</i>	2nd
45 to 54	COVID-19	Heart Disease	5th
55 to 64	Heart Disease	Cancer	9th
65 to 74	Cancer	Heart Disease	14th
75 to 84	Heart Disease	Cancer	17th
85 and older	Heart Disease	Cancer	17th
<b>Female Veterans</b>			
All Ages	Cancer	Heart Disease	9th
18 to 34	Accident (Unintentional Injury)	<i>Suicide</i>	2nd
35 to 44	Accident (Unintentional Injury)	Cancer	4th
45 to 54	Cancer	COVID-19	6th

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# Key Findings – 2023 Suicide Prevention Annual Report



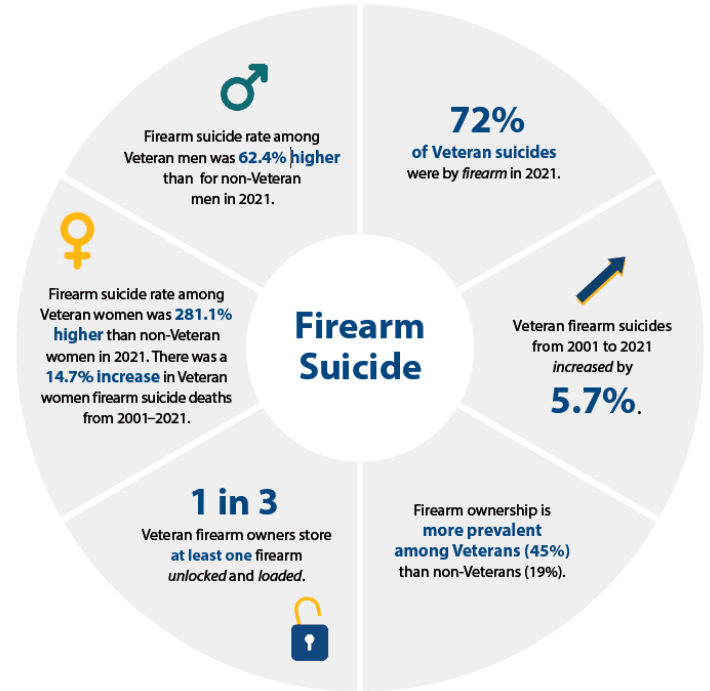
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# Lethal Means

- Firearms more commonly involved among V deaths (72%) than non-V deaths (52%)

	Veterans		Non-Veteran U.S. Adults		Veteran Men		Non-Veteran Men		Veteran Women		Non-Veteran Women	
	2021	Change	2021	Change	2021	Change	2021	Change	2021	Change	2021	Change
<b>All Ages</b>												
Firearms	72.2%	+5.7%	52.2%	-0.5%	73.4%	+6.1%	57.2%	-0.8%	51.7%	+14.7%	34.6%	-0.9%
Poisoning	7.8%	-5.4%	12.4%	-6.0%	6.9%	-5.5%	7.7%	-4.7%	23.7%	-19.2%	28.8%	-9.2%
Suffocation	14.9%	+0.9%	26.8%	+6.1%	14.6%	+0.5%	26.9%	+4.5%	19.7%	+9.3%	26.8%	+11.1%
Other	5.2%	-1.2%	8.6%	+0.5%	5.2%	-1.1%	8.3%	+1.0%	4.9%	-4.9%	9.8%	-1.0%



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# TBI and Suicide

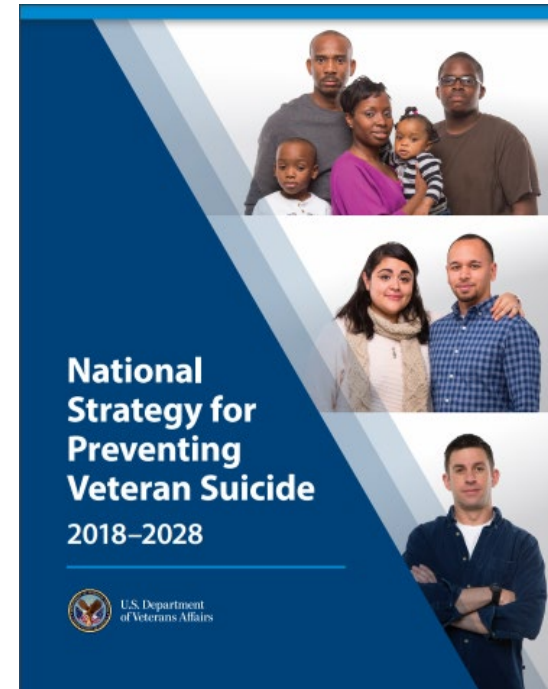
- Elevated risk for suicide, suicide attempt (SA) and suicidal ideation (SI) <sup>1</sup>
  - 2-4 times more likely to die by suicide than general population<sup>2-4</sup>
  - Lifetime rates of SA after TBI range from 8% to 26%<sup>5-7</sup>
  - Rates of SI after TBI range from 7% to 33% (with 25% in first year) <sup>8-10</sup>
- V/SMs with history of TBI
  - 1.5 – 2.2 times more likely to die by suicide than those w/o TBI<sup>11,12</sup>
  - Rates highest among post-9/11 Veterans with service-related m/s TBI<sup>13</sup>
  - PTSD leading mediating factor between TBI and suicide<sup>14</sup>

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# Strategy for Suicide Prevention

- Research on risk and protective factors across multiple sectors and settings
- Implementing treatment and support services
- Predictive analytics to identify V/SMs at higher risk



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# Rationale for Current Study

- Priorities can be address by TBI Model Systems National Databases
  - Polytrauma Rehabilitation Center (PRC) TBIMS Study
  - National Institute on Disability, Independent Living, & Rehabilitation Research



## TBIMS

**Traumatic Brain Injury  
Model System**

Since 1987

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# Specific Aims

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- Compare rates of SI and SA during first 2 years after TBI among V/SMs
  - Compare V/SMS across civilian and VA health care settings
  - Compare both to civilians
  - Identify characteristics that differ between groups
  - Examine associations between these characteristics and suicide risk

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# Sample Cohort

**Year 1 or 2 Follow-Up Due 07/01/2009 – 09/30/2021**

Year 1 Cohort N = 8,737  
Injuries: 09/01/2008 – 07/31/2020  
(77% with known Military History)

Year 2 Cohort N = 7,628  
Injuries: 10/01/2007 – 07/31/2020  
(66% with known Military History)

Year 1 Cohort  
**Suicide Attempts**  
N = 8,347

**6,590 NIDILRR Civilian**  
**963 NIDILRR V/SM**  
**794 PRC V/SM**

Year 1 Cohort  
**Suicidal Ideation**  
N = 3,987

**2,942 NIDILRR Civilian**  
**431 NIDILRR V/SM**  
**614 PRC V/SM**

Year 2 Cohort  
**Suicide Attempts**  
N = 7,237

**5,661 NIDILRR Civilian**  
**808 NIDILRR V/SM**  
**768 PRC V/SM**

Year 2 Cohort  
**Suicidal Ideation**  
N = 3,521

**2,583 NIDILRR Civilian**  
**324 NIDILRR V/SM**  
**614 PRC V/SM**

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# Main Outcomes and Participants Characteristics

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- Main outcomes
  - SA reported by participant or proxy at anytime in last year
  - SI reported by participant via Patient Health Questionnaire (PHQ-9) Item 9
- Participant Characteristics
  - Age, sex, minority status
  - Martial status, level of education, and employment status at follow-up
  - Pre-injury mental health treatment, psych hospitalization, or suicide attempt

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# Measures

- Injury, Recovery, and Rehabilitation Characteristics
  - Duration of posttraumatic amnesia
    - Russel Classification Scheme
    - Mild (< 1 day), Moderate (1-7 days), Severe (>7days)
  - Functional Independence Measure (Motor and Cog) at follow-up
  - Glasgow Outcome Scale – Extended (GOSE)
- Substance Use
  - Illicit or non-prescription drug use in past year
  - Alcohol use in last 30 days
    - CDC Classifications
    - Abstaining, light, moderate, or heavy use

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# Data Analyses

- Sample Characteristics
  - Described each cohort
  - Compared with *t*-tests, Wilcoxon-Rank sum tests, and chi-square
- Distribution of SA and SI across both time points
  - Estimated using frequency counts and percentages
  - Compared among groups using chi-square
- Unadjusted associations between group and SA and SI
  - Estimated with logistic regression
  - Unadjusted effect sizes as odds ratios (ORs) of SA/SI vs. no SA/SI
  - Bivariate relationships between characteristics and outcomes (chi-squares and logistic regression)
- Multiple regression models to assess SA and SI between groups
  - Controlled for characteristics that differed between groups or with bivariate relationship to outcome
  - Characteristic included across all models if significant for any cohort

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# Sample Characteristics and Group Differences

Characteristic	Year 1 Cohort w/ SA Data (N=8,347)				Year 2 Cohort w/ SI Data (N=3,987)			
	NIDILRR Civilian (N=6,590)	NIDILRR V/SM (N=963)	PRC V/SM (N=794)	p-value	NIDILRR Civilian (N=2,942)	NIDILRR V/SM (N=431)	PRC V/SM (N=614)	p-value
Age at Injury, Mean (SD)	42.5 (19.3)	60.1 (18.9)	36.7 (16.0)	<0.001 *	40.9 (18.5)	58.2 (18.5)	37.2 (16.5)	<0.001 *
Sex, % Male	69.9%	97.4%	94.0%	<0.001 *	70.0%	97.2%	93.2%	<0.001 *
Minority, % Yes	38.1%	23.6%	34.4%	<0.001 *	35.4%	23.0%	35.8%	<0.001 *
Education Level at FU, % > HS	49.6%	61.9%	61.6%	<0.001 *	51.9%	64.9%	64.2%	<0.001 *
Employment at FU, % Employed	27.8%	22.2%	23.4%	<0.001 *	32.1%	25.3%	27.4%	0.003 *
Marital Status at FU, % Married	31.2%	55.3%	38.4%	<0.001 *	32.2%	54.4%	38.7%	<0.001 *
Cause of Injury, % Violent	9.4%	6.3%	22.3%	<0.001 *	8.6%	6.5%	21.4%	<0.001 *
Pre-Injury Mental Health, % Yes	23.0%	18.5%	36.1%	<0.001 *	23.9%	16.4%	33.9%	<0.001 *
Pre-Injury Suicide Attempt, % Yes	5.2%	3.3%	8.7%	<0.001 *	5.3%	3.5%	8.4%	0.002 *
FIM Motor at FU, Median (IQR)	89 (81, 91)	88 (80, 91)	89 (81, 91)	<0.001 *	89 (85, 91)	89 (83, 91)	90 (86, 91)	<0.001 *
FIM Cognitive at FU, Median (IQR)	32 (29, 34)	33 (30, 34)	32 (28, 34)	0.029 *	33 (30, 34)	33 (31, 34)	33 (31, 34)	0.039 *

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# Sample Characteristics and Group Differences (continued)

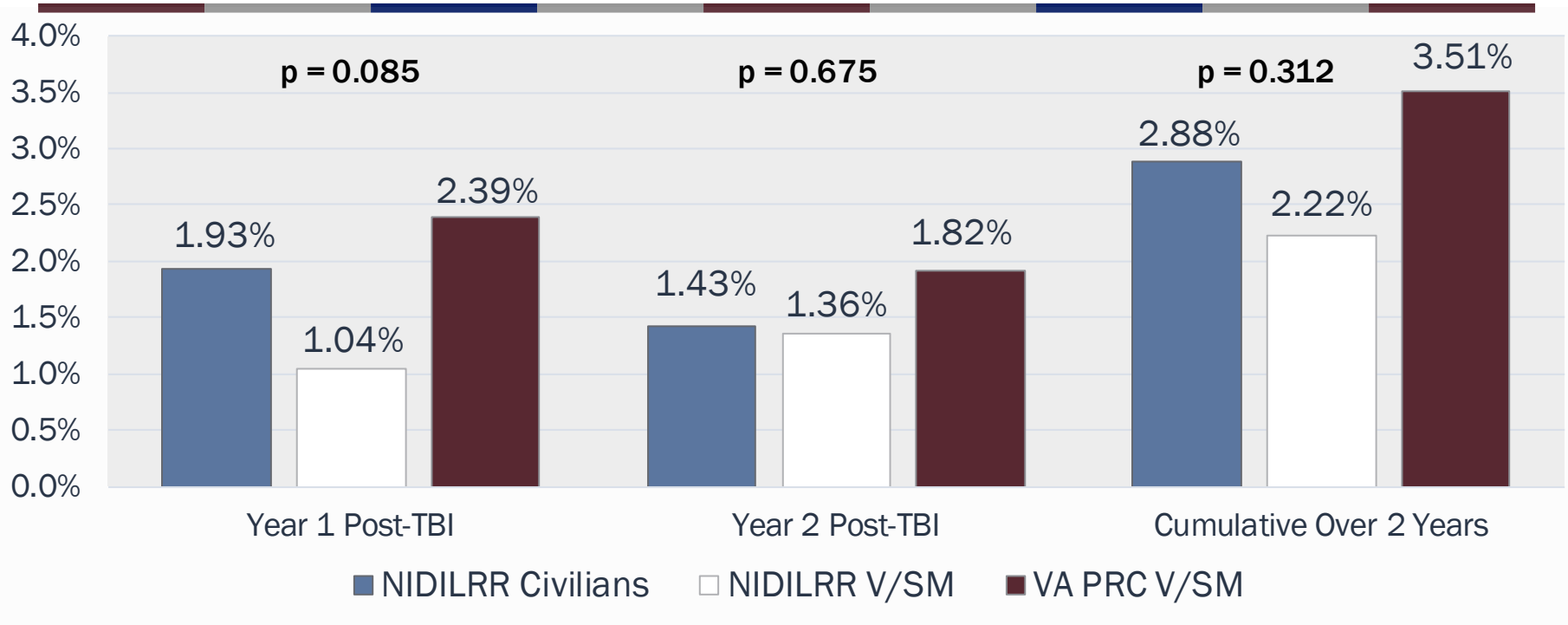
	Year 1 Cohort w/ SA Data (N=8,347)				Year 2 Cohort w/ SI Data (N=3,987)			
	NIDILRR Civilian (N=6,590)	NIDILRR V/SM (N=963)	PRC V/SM (N=794)	p-value	NIDILRR Civilian (N=2,942)	NIDILRR V/SM (N=431)	PRC V/SM (N=614)	p-value
PTA Russell Classification, %				<0.001 *				<0.001 *
Mild (0 Days)	8.4%	15.8%	22.3%	†	8.8%	17.9%	26.3%	†
Moderate (1-7 Days)	18.2%	19.0%	10.8%	†	20.2%	19.1%	12.4%	†
Severe (> 7 Days)	73.5%	65.2%	66.9%	†	71.0%	62.9%	61.2%	†
Drugs at FU, % Yes	12.6%	5.9%	7.5%	<0.001 *	14.0%	6.7%	8.6%	<0.001 *
Drinking Category at FU, %				0.208 <sup>ns</sup>				0.015 *
Abstaining	62.6%	63.1%	62.1%	~	58.0%	60.6%	54.3%	~
Light	19.7%	18.6%	19.8%	~	23.5%	18.8%	24.0%	†
Moderate	13.6%	15.6%	15.0%	~	14.5%	18.6%	17.9%	†
Heavy	4.1%	2.7%	3.2%	~	3.9%	2.1%	3.8%	†
GOSE at FU, %				<0.001 *				<0.001 *
Vegetative/Severe Disability	33.1%	32.4%	35.9%	~	23.4%	24.9%	24.7%	~
Moderate Disability	31.9%	27.9%	28.8%	†	37.4%	29.4%	44.8%	†
Good Recovery	35.0%	29.8%	25.3%	†	39.2%	45.7%	30.5%	†

\* statistically significant at  $\alpha = 0.05$  for continuous variables and global tests for categorical variables; <sup>ns</sup> not statistically significance at  $\alpha = 0.05$  for continuous variables and global tests for categorical variables; † cell chi-square values > 2 indicating observed percent is smaller/larger than expected percent reported in "Overall" row; ~ cell-chi-square values  $\leq 2$  indicating observed percent is similar to expected percent

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# Suicide Attempts in Last Year

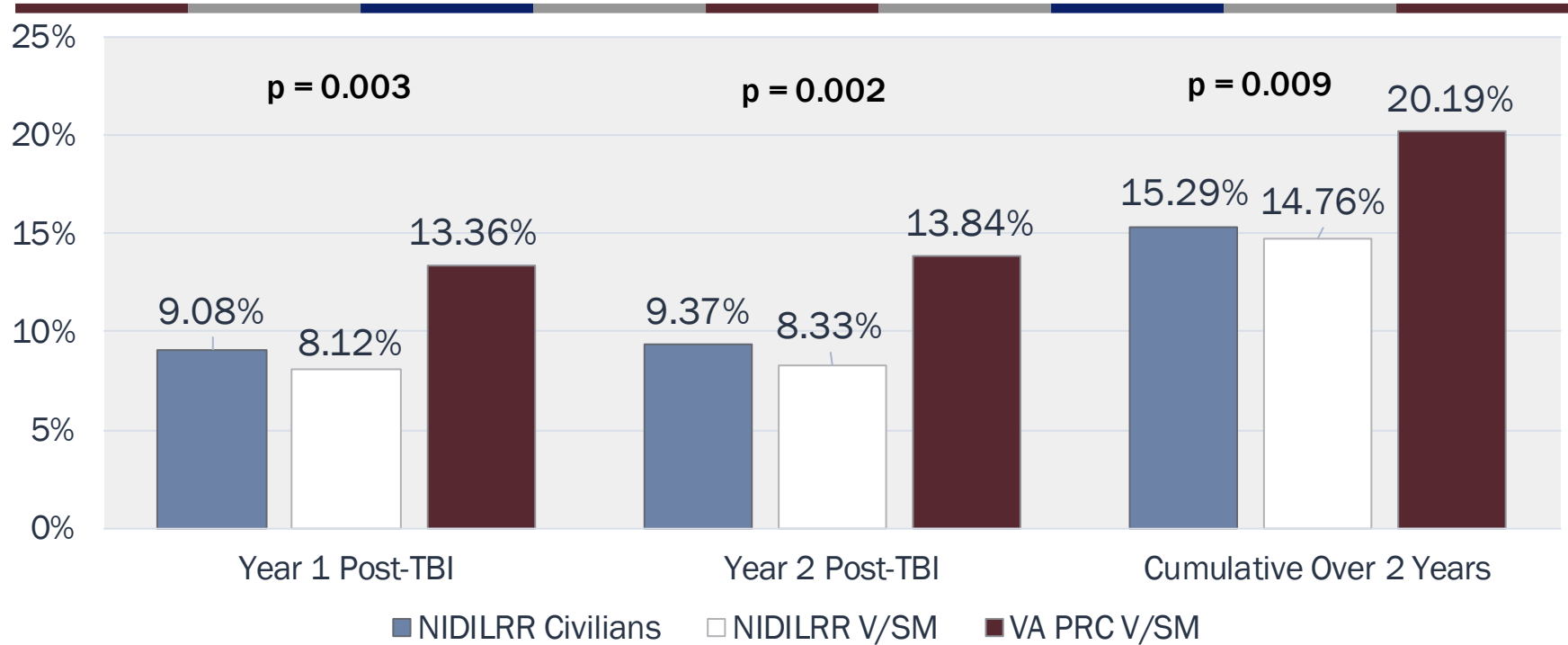


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# Suicidal Ideation at Follow-up



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# Bivariate Relations between Sample Characteristics and SA and SI Outcomes

	Suicide Attempts		Suicidal Ideation	
	Year 1	Year 2	Year 1	Year 2
Categorical Characteristics	Percent	Percent	Percent	Percent
<b>Overall (Expected Null Rate)</b>	<b>1.87</b>	<b>1.46</b>	<b>9.63</b>	<b>10.05</b>
Group	ns	ns	*	*
NIDILRR Civilian	1.93 ~	1.43 ~	9.08 ~	9.37 ~
NIDILRR V/SM	1.04 †	1.36 ~	8.12 ~	8.33 ~
<b>PRC V/SM</b>	2.39 ~	1.82 ~	<b>13.36 †</b>	<b>13.84 †</b>
Sex	ns	ns	ns	ns
Male	1.81 ~	1.33 ~	9.91 ~	10.24 ~
Female	2.05 ~	1.89 ~	8.75 ~	9.46 ~
Minority	*	*	ns	*
<b>Yes</b>	<b>2.36 †</b>	<b>1.91 †</b>	10.24 ~	<b>11.50 †</b>
No	1.60 †	1.22 ~	9.31 ~	9.27 ~
Education at FU	*	*	ns	ns
<b>HS or less</b>	<b>2.39 †</b>	<b>1.85 †</b>	10.48 ~	10.95 ~
> HS	1.38 †	1.11 †	8.96 ~	9.27 ~
Employment at FU	ns	*	*	*
Employed	1.80 ~	0.81 †	6.08 †	7.48 †
<b>Not Employed</b>	1.90 ~	<b>1.69 †</b>	<b>11.22 †</b>	<b>11.33 †</b>
Marital Status at FU	*	*	*	*
Married/Other	0.93 †	0.65 †	7.76 †	7.46 †
<b>Single/Divorced/Widowed</b>	<b>2.37 †</b>	<b>1.89 †</b>	<b>10.64 †</b>	<b>11.44 †</b>
Cause of Injury	ns	ns	ns	ns
Violent	2.69 †	1.56 ~	10.46 ~	10.54 ~
Not Violent	1.78 ~	1.46 ~	9.56 ~	10.00 ~



# Bivariate Relations between Sample Characteristics and SA and SI Outcomes

(continued)

	Suicide Attempts		Suicidal Ideation	
	Year 1	Year 2	Year 1	Year 2
<b>Continuous Characteristics</b>	<b>OR</b>	<b>OR</b>	<b>OR</b>	<b>OR</b>
Age at Injury, 1 year OR	0.962 *	0.972 *	0.991 *	0.988 *
FIM Motor at FU, 1 unit OR	1.003 <sup>ns</sup>	1.006 <sup>ns</sup>	0.973 *	0.974 *
FIM Cognitive at FU, 1 unit OR	0.973 *	0.970 <sup>ns</sup>	0.889 *	0.874 *
<b>Categorical Characteristics</b>	<b>Percent</b>	<b>Percent</b>	<b>Percent</b>	<b>Percent</b>
Overall (Expected Null Rate)	1.87	1.46	9.63	10.05
Pre-Injury Mental Health	*	*	*	*
Yes	3.40 †	2.52 †	16.39 †	15.53 †
No	1.41 †	1.15 †	7.42 †	8.23 †
Pre-Injury Suicide Attempt	*	*	*	*
Yes	10.02 †	4.23 †	26.24 †	25.68 †
No	1.40 †	1.31 †	8.55 †	9.16 †
PTA Russell Classifications	<sup>ns</sup>	<sup>ns</sup>	<sup>ns</sup>	<sup>ns</sup>
Mild TBI (0 days)	1.58 ~	1.00 ~	8.22 ~	9.64 ~
Moderate TBI (1-7 days)	1.49 ~	1.26 ~	8.24 ~	8.03 †
Severe TBI (> 7 days)	2.02 ~	1.56 ~	10.33 ~	10.83 ~
Drugs at FU	*	*	*	*
Yes	5.24 †	3.81 †	16.06 †	18.74 †
No	1.42 †	1.10 †	8.75 †	8.63. †
Drinking Category at FU	*	<sup>ns</sup>	<sup>ns</sup>	*
Abstaining	1.82 ~	1.44 ~	9.44 ~	10.12 ~
Light	1.63 ~	1.19 ~	9.66 ~	8.88 ~
Moderate	1.50 ~	1.30 ~	8.36 ~	9.43 ~
Heavy	4.47 †	2.68 †	15.07 †	16.85 †
GOSE at FU	*	*	*	*
Veg/Severe Disability	2.35 †	1.67 ~	14.33 †	16.22 †
Moderate Disability	2.22 ~	2.08 †	12.02 †	11.75 †
Good Recovery	1.15 †	0.50 †	4.17 †	5.09 †



# Unadjusted and Adjusted ORs for SA and SI

		Suicide Attempts		Suicidal Ideation	
		Year 1	Year 2	Year 1	Year 2
Unadjusted Effect	Comparison	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Group	NIDILRR V/SM vs NIDILRR Civilian	0.53 (0.28, 1.02)	0.95 (0.50, 1.79)	0.89 (0.61, 1.28)	0.88 (0.58, 1.33)
	PRC V/SM vs NIDILRR Civilian	1.25 (0.77, 2.03)	1.28 (0.72, 2.27)	1.54 ** (1.19, 2.01)	1.55 ** (1.19, 2.03)
	PRC V/SM vs NIDILRR V/SM	2.34* (1.08, 5.05)	1.35 (0.61, 2.98)	1.74 ** (1.15, 2.65)	1.77 ** (1.12, 2.79)
Adjusted Effect	Comparison	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Group	NIDILRR V/SM vs NIDILRR Civilian	1.36 (0.65, 2.83)	1.90 (0.89, 4.05)	1.25 (0.82, 1.91)	1.09 (0.67, 1.78)
	PRC V/SM vs NIDILRR Civilian	1.42 (0.77, 2.61)	0.72 (0.27, 1.89)	1.41 (0.99, 2.00)	1.37 (0.94, 1.98)
	PRC V/SM vs NIDILRR V/SM	1.04 (0.43, 2.54)	0.38 (0.12, 1.20)	1.13 (0.68, 1.86)	1.25 (0.71, 2.20)
	Comparison	OR	OR	OR	OR
Sex	Female vs Male	1.37	1.50	0.88	0.94
Minority	Minority vs Non-Minority	1.16	1.55	1.03	1.27
Education at FU	≤ HS vs > HS	1.56 **	1.14	1.02	0.98
Employment at FU	Not Employed vs Employed	0.68	1.71	1.18	0.85
Marital at FU	Not Married vs Married	1.12	1.20	1.25	1.08
Cause	Not Violent vs Violent	1.21	1.71	1.40	1.38
Pre-Injury Mental Health	Yes vs No	1.50	1.59	1.72 **	1.45 **
Pre-Injury Suicide Attempt	Yes vs No	4.20 **	2.10 **	2.41 **	2.65 **
Age at Injury	10 Year increase	0.73 **	0.75 **	0.95	0.91 **

\* Indicates statistical significance at α = 0.05,

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\*\* Indicates statistically significant after Bonferroni adjustment



# Unadjusted and Adjusted ORs for SA and SI (continued)

		Suicide Attempts		Suicidal Ideation	
		Year 1	Year 2	Year 1	Year 2
		OR	OR	OR	OR
FIM Motor at FU	5 Unit Increase	1.09 **	1.09	0.94 **	0.91 **
FIM Cognitive at FU	5 Unit Increase	0.84	0.88	0.69 **	0.57 **
PTA	Mild vs Moderate	1.56	1.11	1.06	1.23
	Mild vs. Severe	1.58	1.11	0.94	0.94
	Moderate vs. Severe	1.01	1.00	0.89	0.76
Drugs at FU	Yes vs No	2.19 **	2.30 **	1.56 **	2.11 **
Drinking Category at FU	Light vs Abstaining	0.91	0.82	1.28	1.04
	Moderate vs Abstaining	0.74	0.89	1.26	1.10
	Heavy vs Abstaining	2.11 *	1.65	1.31	2.25 **
	Moderate vs Light	0.81	1.09	0.98	1.06
	Heavy vs Light	2.31 *	2.01	1.02	2.16 **
	Heavy vs Moderate	2.87 **	1.85	1.04	2.04 *
GOSE at FU	V/SD vs GR	2.31 **	2.83 **	2.23 *	1.53
	MD vs GR	1.88 **	3.05 **	2.68 *	1.68 **
	V/SD vs MD	1.23	0.93	0.83	0.91

\* Indicates statistical significance at  $\alpha = 0.05$ ,

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\*\* Indicates statistically significant after Bonferroni adjustment



# Summary of Findings

- Compared rates and predictors of SA/SI over 2 years post-TBI
  - V/SMs in PRC system endorsed higher rates of SI across both years
  - Significant differences in demographics, injury-related, mental/behavioral health, and functional outcomes
  - After controlling for these, no differences in SA/SI among groups over time
- Characteristics that consistently predicted SA and SI over time
  - Mental health history, drug use, younger age, lower cognitive FIMs, and greater level of overall disability
  - V/SMs with TBI in PRC system have distinct risk profiles and are fundamentally different from those served in civilian IRFs

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# Veterans Comprehensive Prevention, Access to Care, and Treatment (COMPACT) Act of 2022

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- New benefit for all Veterans (except with dishonorable discharge)
  - Specific (covers the cost of care related to episodes of acute suicidal crisis including medications)
  - Time-limited (30 days inpatient or residential, or 90 days outpatient)
  - This period can be extended 30 days if needed (first time by provider, next time by COS)
  - Additional acute suicidal crises are also covered as new and separate episodes

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# Death by Suicide In Post-9/11 Era Veterans: Associations of TBI and Population Patterns

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Mary Jo Pugh, Ph.D.



# Disclosures and Acknowledgments

- This study was funded by VA Rehabilitation Research and Development Service I01 RX003443 and the Long-term Impact of Military Relevant Brain Injury Consortium (W81XWH1920067 and W81XWH-13-2-0095). Dr. Pugh was also supported by VA Health Services Research and Development Service Research Career Scientist Award, 11K6HX003762 RCS 17-297.
- Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the U.S. Government, or the U.S. Department of Veterans Affairs, or the Department of Defense, and no official endorsement should be inferred.

# Background

- The “Healthy Soldier Effect” has eroded in Post-9/11 Era Veterans
  - TBI
  - PTSD
  - Depression
  - Anxiety
  - Chronic Disease
  - Suicidal Ideation/Attempt
  - All Cause Mortality
  - Death by Suicide

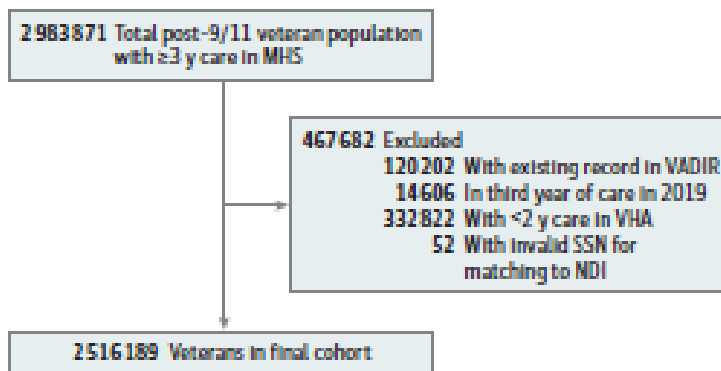


# Our Goal

- Examine trends in mortality (emphasis on death by suicide and related issues) in Post-9/11 Era Veterans comparing those with TBI to those without TBI and the general population
  - By age group
  - Over time

# Cohort Development

Figure 1. Study Flow Diagram



MHS indicates Military Health System; NDI, National Death Index; SSN, Social Security number; VADIR, Veterans Affairs/Department of Defense Identity Repository; and VHA, Veterans Health Administration.

# Measures

- Mortality and Cause of Death (ICD 9/10 Codes)
- Age
- Sex
- Race/Ethnicity
- TBI status (including severity)
- Deployed/Not Deployed



Original Investigation | Public Health

## Association of Traumatic Brain Injury With Mortality Among Military Veterans Serving After September 11, 2001

Jeffrey T. Howard, PhD; Ian J. Stewart, MD; Megan Amuan, MPH; Jud C. Janak, PhD; Mary Jo Pugh, PhD

# AGE ADJUSTED MORTALITY

Veterans by TBI Status vs. General Population

Howard JT, Stewart IJ, Amuan M, Janak JC, Pugh MJ. Association of Traumatic Brain Injury With Mortality Among Military Veterans Serving After September 11, 2001. JAMA Netw Open. 2022 Feb 1;5(2):e2148150.

# Descriptive Statistics of Post-9/11 Veteran Population by Traumatic Brain Injury Severity and Total US Population, 2002 to 2018

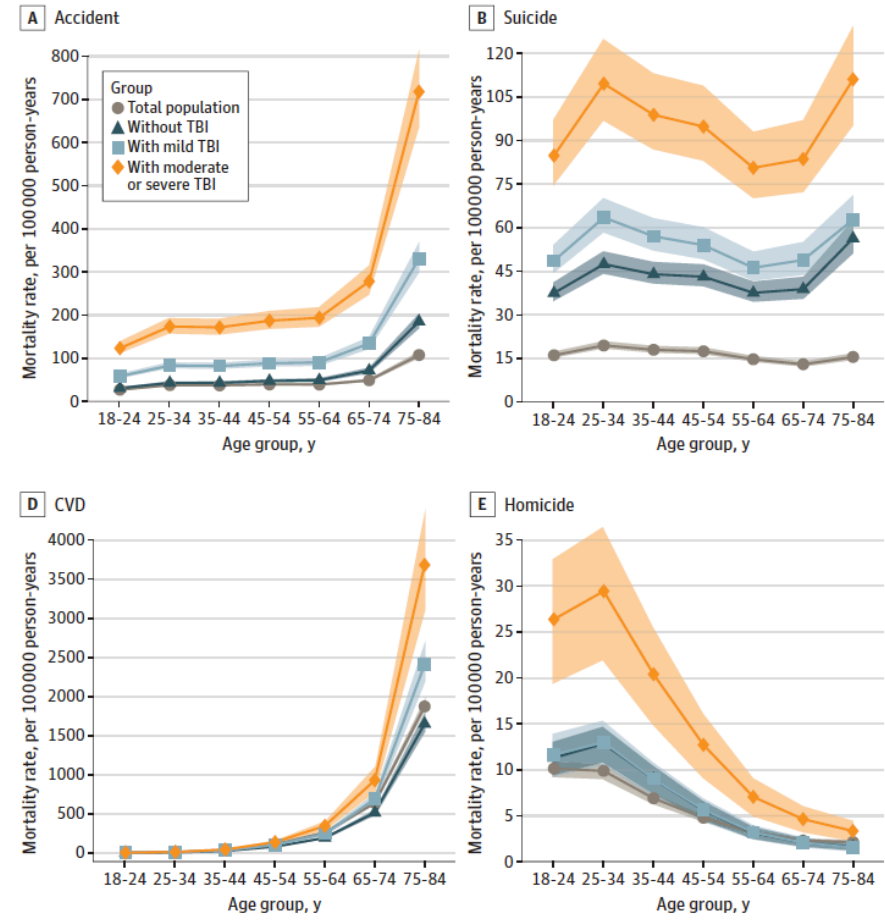
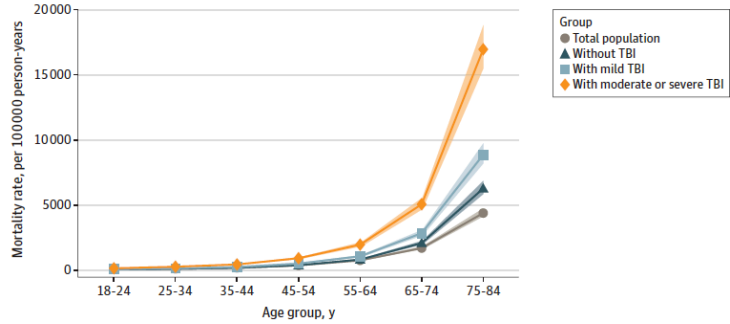
Variables	No. (%)				Total US population
	Veteran population				
	Total	No TBI	Mild TBI	Moderate to severe TBI	
No.	2 516 189	1 999 729 (79.5)	441 083 (17.5)	75 377 (3.0)	229 104 796 <sup>a</sup>
Person-years	16 071 373	12 460 025	3 100 813	510 535	3 894 781 528
Age, y					
18-24	601 841 (23.9)	481 061 (24.1)	103 245 (23.4)	17 535 (23.3)	30 241 833 (13.2)
25-34	1 159 053 (46.1)	899 860 (45.0)	221 823 (50.3)	37 370 (49.6)	41 697 073 (18.2)
35-44	440 253 (17.5)	350 730 (17.5)	76 138 (17.3)	13 385 (17.8)	41 926 178 (18.3)
45-54	234 028 (9.3)	197 119 (9.9)	31 518 (7.1)	5391 (7.2)	43 071 702 (18.8)
55-64	68 175 (2.7)	59 642 (3.0)	7159 (1.6)	1374 (1.8)	35 740 348 (15.6)
65-74	12 782 (0.5)	11 267 (0.6)	1194 (0.3)	321 (0.4)	22 910 480 (10.0)
75-84	58 (0)	50 (0)	6 (0)	2 (0)	13 517 183 (5.9)
Sex					
Male	2 167 736 (86.2)	1 696 396 (84.8)	401 894 (91.1)	69 446 (92.1)	112 261 350 (49.0)
Female	348 453 (13.8)	303 333 (15.2)	39 189 (8.9)	5931 (7.9)	116 843 446 (51.0)
Race and ethnicity					
American Indian/Alaska Native	45 324 (1.8)	34 898 (1.7)	8926 (2.0)	1500 (2.0)	1 832 838 (0.8)
Asian/Pacific Islander	160 178 (6.4)	119 702 (6.0)	34 209 (7.8)	6267 (8.3)	12 371 659 (5.4)
Hispanic	259 737 (10.3)	205 892 (10.3)	46 496 (10.5)	7349 (9.7)	32 761 986 (14.3)
Non-Hispanic Black	387 926 (15.4)	315 533 (15.8)	62 803 (14.2)	9590 (12.7)	27 950 785 (12.2)
Non-Hispanic White	1 619 834 (64.4)	1 284 606 (64.2)	285 100 (64.6)	50 128 (66.5)	154 187 528 (67.3)
Unknown <sup>b</sup>	43 190 (1.7)	39 098 (2.0)	3549 (0.8)	543 (0.7)	0
Deployment status					
Deployed	1 869 256 (74.6)	1 419 808 (71.0)	384 624 (87.2)	64 824 (86.0)	NA
Not deployed	646 933 (25.4)	579 921 (29.0)	56 459 (12.8)	10 553 (14.0)	NA



# TBI and Mortality

## Age Adjusted Per 100,000 person Years

Figure 2. Multivariable Adjusted, Age-Specific All-Cause Mortality Rates per 100 000 Person-Years by Population Subgroups



Shaded areas indicate

**RESEARCH LETTER**

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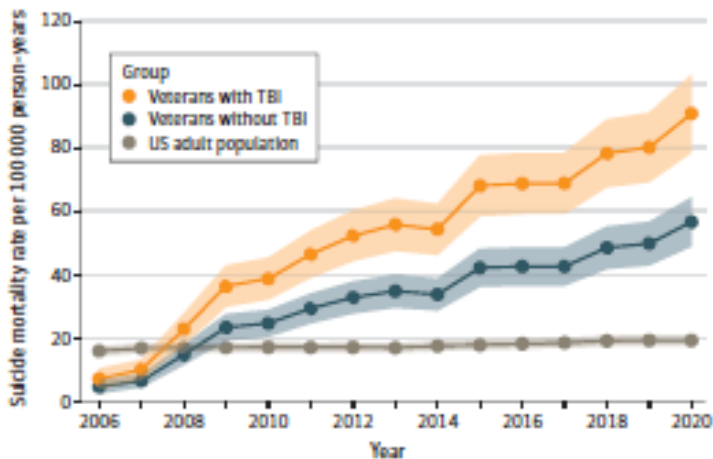
**Trends in Suicide Rates Among Post-9/11 US Military Veterans With and Without Traumatic Brain Injury From 2006-2020**

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Howard JT, Stewart IJ, Amuan ME, Janak JC, Howard KJ, Pugh MJ. Trends in Suicide Rates Among Post-9/11 US Military Veterans With and Without Traumatic Brain Injury From 2006-2020. JAMA Neurol. 2023 Oct 1;80(10):1117-1119.

# Adjusted Suicide Mortality Rates per 100,000 Person Years: 2006-2020

Figure. Adjusted Suicide Mortality Rates per 100 000 Person-Years  
From 2006-2020



Average annual percentage change was 14.8% (95% CI, 10.5-19.2;  $P < .001$ ) for veterans with traumatic brain injuries (TBIs), 14.4% (95% CI, 10.2-18.7;  $P < .001$ ) for veterans without TBI, and 1.2% (95% CI, 0.9-1.4;  $P < .001$ ) for the US adult population.

# Multivariable Negative Binomial Regression Models of Suicide Mortality Rates: 2006-2020

Table. Results of Multivariable Negative Binomial Regression Models of Suicide Mortality Rates from 2006-2020

Variable	Veteran cohort			Total US adult population		
	No. at-risk, person-years	MRR (95% CI)	P value	No. at-risk, person-years	MRR (95% CI)	P value
Person-years	19 608 706	NA	NA	3 053 028 440	NA	NA
No. of suicide deaths	8262	NA	NA	562 411	NA	NA
<b>Year</b>						
2006 (Reference)	364 409	NA	NA	181 793 257	NA	NA
2007	616 509	1.40 (0.82-2.50)	.23	186 438 575	1.06 (0.96-1.18)	.26
2008	801 077	3.20 (1.98-5.45)	<.001	186 207 075	1.07 (0.97-1.19)	.18
2009	958 834	5.07 (3.19-8.53)	<.001	190 963 583	1.09 (0.98-1.21)	.11
2010	1 102 419	5.35 (3.38-8.97)	<.001	193 315 599	1.10 (0.99-1.22)	.07
2011	1 231 097	6.33 (4.02-10.59)	<.001	197 124 128	1.11 (1.00-1.23)	.05
2012	1 344 633	7.03 (4.48-11.68)	<.001	202 428 644	1.13 (1.02-1.25)	.02
2013	1 438 512	7.41 (4.73-12.30)	<.001	204 120 327	1.12 (1.01-1.23)	.03
2014	1 521 265	7.14 (4.56-11.94)	<.001	206 532 317	1.16 (1.05-1.28)	.004
2015	1 597 595	8.87 (5.67-14.66)	<.001	209 300 879	1.19 (1.08-1.32)	<.001
2016	1 657 575	8.91 (5.70-14.82)	<.001	214 019 833	1.23 (1.11-1.36)	<.001
2017	1 709 974	8.88 (5.68-14.73)	<.001	218 627 485	1.26 (1.14-1.39)	<.001
2018	1 749 882	10.10 (6.45-16.69)	<.001	221 403 762	1.32 (1.19-1.45)	<.001
2019	1 760 166	10.30 (6.60-17.12)	<.001	221 915 412	1.33 (1.20-1.46)	<.001
2020	1 754 759	11.70 (7.48-19.39)	<.001	218 837 564	1.31 (1.18-1.45)	<.001
<b>Age, y</b>						
18-24 (Reference)	4 100 163	NA	NA	411 064 409	NA	NA
25-34	9 146 972	1.33 (1.22-1.46)	<.001	567 098 256	1.03 (0.97-1.08)	.35
35-44	3 726 530	1.36 (1.23-1.51)	<.001	536 349 401	1.01 (0.96-1.07)	.66
45-54	1 885 434	1.13 (1.00-1.27)	.04	565 603 316	1.06 (1.00-1.13)	.03
55-64	619 646	0.76 (0.64-0.91)	.003	492 847 635	0.98 (0.92-1.04)	.47
≥65	129 961	0.42 (0.27-0.62)	<.001	480 065 423	0.90 (0.84-0.97)	.004

# Multivariable Negative Binomial Regression Models of Suicide Mortality Rates: 2006-2020 (continued)

Variable	Veteran cohort			Total US adult population		
	No. at-risk, person-years	MRR (95% CI)	P value	No. at-risk, person-years	MRR (95% CI)	P value
<b>Sex</b>						
Female (Reference)	2 725 789	NA	NA	1 405 623 809	NA	NA
Male	16882917	2.22 (2.02-2.46)	<.001	1 647 404 631	3.27 (3.15-3.40)	<.001
<b>Race and ethnicity</b>						
American Indian/Alaska Native	354 516	0.95 (0.80-1.13)	.58	3 962 823	2.15 (1.97-2.34)	<.001
Asian/Pacific Islander	875 687	1.07 (0.96-1.20)	.23	84 147 194	0.49 (0.46-0.52)	<.001
Black non-Hispanic	3 054 549	0.65 (0.60-0.71)	<.001	270 774 365	0.44 (0.42-0.46)	<.001
Hispanic	2 101 895	0.63 (0.57-0.70)	<.001	362 293 068	0.45 (0.43-0.47)	<.001
White non-Hispanic (Reference)	12 968 618	NA	NA	2 331 850 990	NA	NA
Unknown	253 441	0.98 (0.79-1.19)	.82	NA	NA	NA
<b>Deployment history status</b>						
Deployed	14 463 270	0.80 (0.75-0.85)	<.001	NA	NA	NA
Not deployed (Reference)	5 145 436	NA	NA	NA	NA	NA
<b>TBI exposure</b>						
TBI	4 682 062	1.56 (1.46-1.67)	<.001	NA	NA	NA
No TBI (Reference)	14 926 644	NA	NA	NA	NA	NA

Abbreviations: MRR, mortality rate ratio; NA, not applicable; TBI, traumatic brain injury.

# Conclusions

- In Post-9/11 era Veterans
  - Death by suicide was higher in all age groups of Post-911 Veterans, compared to general civilian population, with a dose response effect (higher suicide mortality with more severe TBI)
  - Effects by age were not consistent with VA population data
    - Bimodal distribution—especially in those with TBI
    - BUT trend analyses indicated that mortality rate ratios were highest among those 25-45 compared to 18-24
  - The Healthy Soldier effect regarding death by suicide was observed through 2007
  - Death by suicide increased significantly over time with no evidence of reduction through 2020—with significantly higher mortality for those with TBI after 2008
  - Mortality Rate Ratio was significantly lower for those who were deployed suggesting a “Healthy Deployer” effect

# Implications

- Focus on all Post-9/11 Veterans—not just those who deployed
- Suicide occurs at all ages
- Care in VA may have protective effects for Native Americans
- Prevention measures have had limited effect in lowering rates of suicide—is this due to even higher rates of higher suicidality over time? Need for broader implementation of prevention measures? Other thoughts?

## TBI and Suicide Risk: Accumulation of Risk Over Time and Strategies for Prevention: Ralph G. DePalma Memorial TBI Clinical Strategies



**Funding/Support:** This study was funded by the National Institute of Mental Health and Office of the Director at NIH (grant No. R01MH120122). Funding to support cohort development was from the National Center for Complementary and Integrative Health (NCCIH; grant No. R01 AT008404) and the National Institute on Drug Abuse (NIDA; grant No. R01 DA030150). Major Ryan C. Costantino, PharmD, served as the Department of Defense data sponsor for this work.

### Original Investigation | Psychiatry Associations of Military-Related Traumatic Brain Injury With New-Onset Mental Health Conditions and Suicide Risk

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#### Abstract

**IMPORTANCE:** Research to identify the direct and indirect associations of military-related traumatic brain injury (TBI) with suicide has been complicated by a range of data-related challenges.

**OBJECTIVE:** To identify differences in rates of new-onset mental health conditions (ie, anxiety, mood, posttraumatic stress, adjustment, alcohol use, and substance use disorders) among soldiers with and without a history of military-related TBI and to explore the direct and indirect (through new-onset mental health disorders) associations of TBI with suicide.

**DESIGN, SETTING, AND PARTICIPANTS:** This retrospective cohort study used data from the Substance Use and Psychological Injury Combat Study (SUPIC) database. Demographic, military, and health data from the Department of Defense within SUPIC were compiled and linked with National Death Index records to identify deaths by suicide. Participants included US Army soldiers who returned from an Afghanistan or Iraq deployment. Data were analyzed from September to December 2022.

**EXPOSURES:** Military-related TBI.

**MAIN RESULTS AND MEASURES:** The outcome of interest was suicide. Secondary outcomes were incidence of new-onset mental health conditions. Mediation analyses consisted of accelerated false-time (AFT) models in conjunction with the product-of-coefficients method. The new-onset mental health diagnosis categories and the 2 or more categories variable were each considered separately as potential mediators; therefore, a total of 14 models plus the overall AFT model estimating the total effect associated with TBI in suicide risk were fit.

**RESULTS:** The study included 860 892 soldiers (220 539 soldiers [25.7%] aged 18–24 at end of index deployment, 766 454 [89.0%] male), with 108 705 soldiers (12.6%) with at least 1 documented TBI on their military health record. Larger increases in mental health diagnoses were observed for all conditions from initial to after documented TBI, compared with the matched data for those without a history of TBI, with increases observed for mood (67.7% vs 37.5%) and substance use (100% vs 14.5%). Time-to-suicide direct effect estimates for soldiers with a history of TBI were similar across mediators. For example, considering new-onset adjustment disorders, time-to-suicide was 16.7% faster (acceleration factor, 0.833; 95% CI, 0.756–0.942) than for soldiers without a history of TBI. Indirect effect estimates of associations with TBI were substantial and varied across mediators. The largest indirect effect estimate was observed through the association with new-onset substance use disorder, with a time to suicide 63.8% faster (acceleration factor, 0.372; 95% CI, 0.322–0.435) for soldiers with a history of TBI.

#### Key Points

**Question:** Is military-related traumatic brain injury (TBI) associated with increased incidence of new-onset mental health conditions and suicide risk?

**Findings:** In this cohort study including 860 892 soldiers, individuals with a history of military-related TBI had significantly higher rates of new-onset mental health conditions than those without TBI. Increased risk for suicide was associated indirectly (through new-onset mental health diagnoses) and directly with history of TBI.

**Meaning:** These findings suggest that conceptualizing exposures (physical, psychological) as events that accumulate over an individual's lifetime and increase risk for negative outcomes (eg, suicide) may assist in identifying mechanisms underlying frequently co-occurring conditions, as well as evidence-based interventions.

✦ **Invited Commentary**

✦ **Supplemental content**

Author affiliations and article information are listed at the end of this article.





# Cumulative Disadvantage

The idea of cumulative disadvantage was introduced by Merton (1968) who identified disparities between career trajectories of scientists who received early advantages versus those who did not. Merton later noted that “differences in individual capabilities aside . . . processes of accumulative advantage and disadvantage accentuate inequalities in science and learning: inequalities in peer recognition, inequalities of access to resources, and inequalities of scientific productivity” (Merton, 1988, p. 616).



Analyzing life course trajectories of older adults, O’Rand (1996) suggested that “patterns of inequality” transpired over time secondary to the interaction between institutional mechanisms and individual difference. She suggested this interplay resulted in increasing heterogeneity and inequality between aging cohorts.

The theory has also been used to explain how an accumulation of disadvantaged genetic and/or environmental factors can result in a cascade of physical and psychiatric risk.

Rehabilitation Psychology  
2009, Vol. 34, No. 3, 239–246

In the public domain  
DOI: 10.1037/a0010901

### Assessment and Diagnosis of Mild Traumatic Brain Injury, Posttraumatic Stress Disorder, and Other Polytrauma Conditions: Burden of Adversity Hypothesis

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*Objective/Method:* Military personnel returning from Iraq and Afghanistan have been exposed to physical and emotional traumas. Challenges related to assessment and intervention for those with posttraumatic stress disorder (PTSD) and/or history of mild traumatic brain injury (TBI) with sequelae are discussed, with an emphasis on complicating factors if conditions are co-occurring. Existing literature regarding cumulative disadvantage is offered as a means of increasing understanding regarding the complex symptom patterns reported by those with a history of mild TBI with enduring symptoms and PTSD. *Implications:* The importance of early screening for both conditions is highlighted. In addition, the authors suggest that current best practices include treating symptoms regardless of etiology to decrease military personnel and veteran burden of adversity.

*Keywords:* Operation Enduring Freedom, Operation Iraqi Freedom, traumatic brain injury, posttraumatic stress disorder, war, polytrauma

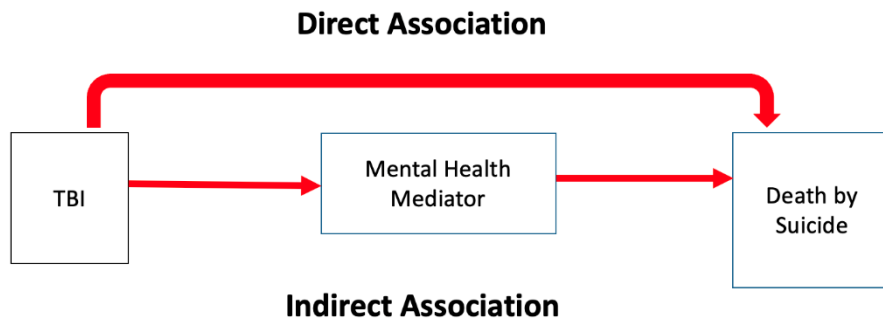


## Background

- Most previous work has focused on highlighting the unique association between TBI and suicide, without consideration of whether mental health conditions were confounders, mediators, or both
  - **Those with TBI are at risk for developing new onset mental health conditions, complicating analyses examining risk for death by suicide**
- To address these gaps, analyses aimed at identifying relationships between TBI, mental health conditions, and suicide should be conducted with large longitudinal datasets, allowing for identification of:
  - Pre-existing mental health conditions; an index TBI event; post-TBI new onset mental health conditions; and death by suicide using the gold standard National Death Index data

## Study Objectives

- Identify differences in rates of new onset mental health conditions (anxiety, mood, posttraumatic stress, adjustment, alcohol use, and substance use disorders) among those with and without a history of military related TBI
- Explore the direct and indirect (through new onset mental health disorders) effects of TBI on suicide





## Methods and Outcome Measure

- Retrospective cohort study using linked data from the Substance Use and Psychological Injury Combat Study (SUPIC) from Department of Defense data and National Death Index records (n=860,930)
- The exposed group was soldiers with a history of TBI (n = 108,785)
- Soldiers without a history of TBI were matched to a soldier with TBI:
  - Fiscal year of return from deployment and years of MHS data available prior to index deployment
  - individuals without a history of TBI (n = 752,107) were assigned a match date based on the number of days between the TBI diagnosis date and the return from index deployment date for the matched individual with a history of TBI
  - 38 soldiers without a history of TBI were removed because they could not be matched, resulting in a final analytic cohort of 860,892
- Death by suicide was observed from the end of the first deployment ending in the study period (i.e., index) through 2018
  - ICD-10 codes X60-X84 and Y87.0 as the underlying cause of death



## Additional Study Measures

- **History of TBI** was determined based on RM MIRECC TBI code set plus precise DOD-unique codes from the DoD's TBI surveillance efforts
  - Index TBI = the first documented qualifying TBI diagnosis within all available MHS encounter data, including data available prior to the end of the index deployment
- **Mental health diagnosis** categories based on ICD-9 and ICD-10
  - anxiety, mood, adjustment, alcohol use, substance use (excluding alcohol and tobacco), and posttraumatic stress disorders
  - Pre-TBI diagnosis = Any 1 qualifying mental health diagnosis that was documented on the day of, or before, the qualifying TBI date
  - New onset diagnosis = Any 1 qualifying mental health diagnosis that was documented after the qualifying TBI date
- **Demographic and military characteristics** were summarized by gender; race/ethnicity; rank (Junior Enlisted, Senior Enlisted/Warrant Officers (SE/WO); Officers); and component (AD, NG, RC)



## Analytic Methods

- Calculated the n (%) of soldiers with pre-, post, and new onset post-TBI (match date) mental health diagnoses
- Mediation analyses consisted of Accelerated Failure Time (AFT) models in conjunction with the product of coefficients method
  - AFT model distributions for survival time (Weibull, exponential, lognormal, logistic, log-logistic, and Gaussian) were compared using Akaike Information Criteria within the model that included history of TBI, demographic and military characteristics, and FY return
- To examine the need to control for pre-MH conditions, we ran base log-logistic AFT models with the addition of each mental health diagnosis category, for a total of 6 test models
  - All models resulted in a < 10% change (range 2.2%-9.1%) and as such, pre-existing mental health conditions were not considered confounders in the models that followed
- Each of the six new onset MH categories was considered separately as a potential mediator, and therefore a total of 12 models plus the overall AFT model estimating the total effect of TBI on suicide risk were fit

## Results

- 108,785 soldiers (12.6%) had a history of TBI
- Most of the cohort was:
  - aged 18-29 (62.4%)
  - male (89%)
  - White, non-Hispanic (62.7%), followed by Black non-Hispanic (16.7%) and Hispanic (10.6%)

Characteristic	Individuals, No. (%)		
	Overall (N = 860 892)	History of TBI (n = 108 785)	No history of TBI (n = 752 107)
<b>Age Category at end of index deployment, y</b>			
18-24	320 539 (37.2)	40 852 (37.6)	279 687 (37.2)
25-29	217 269 (25.2)	28 342 (26.1)	188 927 (25.1)
30-34	117 581 (13.7)	16 295 (15.0)	101 286 (13.5)
35-39	91 999 (10.7)	12 197 (11.2)	79 802 (10.6)
≥40	113 504 (13.2)	11 019 (10.1)	102 485 (13.6)
<b>Sex assigned in the medical record</b>			
Male	705 454 (89.0)	100 766 (92.6)	605 688 (88.5)
Female	94 438 (11.0)	8019 (7.4)	86 419 (11.5)
<b>Race and ethnicity</b>			
American Indian or Alaskan Native	7916 (0.9)	1195 (1.1)	6721 (0.9)
Asian or Pacific Islander	68 698 (8.0)	10 768 (9.9)	57 930 (7.7)
Black non-Hispanic	143 344 (16.7)	15 847 (14.6)	127 497 (17.0)
Hispanic	91 300 (10.6)	12 804 (11.8)	78 556 (10.4)
White non-Hispanic	539 411 (62.7)	66 787 (61.4)	472 624 (62.8)
Other*	7838 (0.9)	1159 (1.1)	6679 (0.9)
Unknown or missing†	2325 (0.3)	225 (0.2)	2100 (0.3)
<b>Fiscal year of return from index deployment</b>			
2006-2009	316 420 (36.8)	47 383 (43.6)	269 037 (35.8)
2010-2011	326 101 (37.9)	41 579 (38.2)	284 522 (37.8)
2012-2014	218 371 (25.4)	19 823 (18.2)	198 548 (26.4)
<b>Rank group</b>			
Junior enlisted (E1-E4)	413 451 (48.0)	51 260 (47.1)	362 191 (48.2)
Senior enlisted (E5-E9) or warrant officer	339 195 (39.4)	48 861 (44.9)	290 334 (38.6)
Officer	108 241 (12.6)	8863 (8.0)	99 378 (13.2)
Missing	5 (<0.1)	1 (<0.1)	4 (<0.1)
<b>Index deployment group</b>			
First deployers	598 307 (69.5)	65 780 (60.5)	532 527 (70.8)
≥2 Deployers	262 585 (30.5)	43 005 (39.5)	219 580 (29.2)





## Mental Health Diagnosis Category by TBI Status

Diagnosis category	History of TBI (n = 108 785)				No history of TBI (n = 752 107)			
	No. (%)		Before vs after change, %	New-onset after TBI, No. (%)	No. (%)		Before vs after change, %	New onset after match date, No. (%)
	Before TBI	After TBI			Before match date	After match date		
Anxiety	25 775 (23.7)	45 046 (41.4)	74.8	27 882 (25.6)	55 613 (7.4)	90 231 (12.0)	62.4	73 786 (9.8)
Mood	24 460 (22.5)	40 997 (37.7)	67.7	24 326 (22.4)	62 363 (8.3)	85 731 (11.4)	37.5	66 631 (8.9)
PTSD	22 592 (20.8)	44 204 (40.6)	95.6	26 044 (23.9)	30 320 (4.0)	57 723 (7.7)	90.3	48 347 (6.4)
Adjustment	33 144 (30.5)	45 526 (41.9)	37.3	25 960 (23.9)	85 757 (11.4)	106 275 (14.1)	23.9	83 128 (11.1)
Alcohol use	14 035 (12.9)	18 518 (17.0)	31.9	11 402 (10.5)	37 884 (5.0)	41 808 (5.6)	10.3	34 279 (4.6)
Substance use	5295 (4.9)	10 616 (9.8)	100	8392 (7.7)	17 567 (2.3)	20 131 (2.7)	14.5	17 847 (2.4)

“The largest disparity was observed for substance use disorders, in which soldiers with a history of TBI had a 100% increase compared with a 14.5% increase among soldiers without a history of TBI.”



## Mediation Model Results for the Association of TBI with Suicide

For the total association of TBI with suicide, the time to suicide for those with a history of **TBI was 21.3% faster** (deceleration factor, 0.787; 95% CI, 0.715-0.866) than for those without a history of TBI, after accounting for age, sex assigned in the medical record, race and ethnicity, and FY of return from index deployment. The direct effect estimate of TBI on suicide ranged from a time to suicide for soldiers with TBI **8.5% faster** (deceleration factor, 0.915; 95% CI, 0.829-1.010) than those without a TBI for the **2 or more mental health diagnoses** category model, to a time to suicide for soldiers with TBI **16.7% faster** (deceleration factor, 0.833; 95% CI, 0.756-0.918) than those without a **TBI for the adjustment disorder model**.

New onset mental health category (mediator)	Estimate (95% CI)			
	Direct effect deceleration factor <sup>a</sup>	TBI relative risk for mental health category <sup>b</sup>	Mediator deceleration factor <sup>a</sup>	Indirect effect deceleration factor <sup>a</sup>
Anxiety	0.834 (0.756-0.920)	2.61 (2.58-2.64)	0.725 (0.656-0.802)	0.735 (0.670-0.814)
Mood	0.874 (0.792-0.964)	2.52 (2.49-2.58)	0.540 (0.490-0.596)	0.566 (0.518-0.622)
PTSD	0.863 (0.781-0.953)	3.63 (3.58-3.68)	0.641 (0.574-0.716)	0.563 (0.485-0.653)
Adjustment	0.833 (0.756-0.918)	2.14 (2.11-2.17)	0.686 (0.623-0.755)	0.750 (0.700-0.810)
Alcohol	0.852 (0.773-0.938)	2.19 (2.15-2.24)	0.418 (0.374-0.467)	0.504 (0.460-0.551)
Substance	0.848 (0.769-0.935)	3.10 (3.02-3.18)	0.417 (0.364-0.478)	0.372 (0.322-0.433)
≥2 Categories	0.915 (0.829-1.01)	2.69 (2.66-2.72)	0.538 (0.492-0.588)	0.541 (0.495-0.591)

## Mediation Model Results for the Association of TBI with Suicide

The largest **indirect effect estimate of TBI on suicide was observed for the substance use model**, such that for soldiers with TBI, the time to suicide was **62.8% faster** (deceleration factor, 0.372; 95% CI, 0.322-0.433) through the occurrence of a **new-onset substance use disorder**, compared with soldiers without TBI. Indirect effect estimates were of similar magnitude for alcohol use disorders, PTSD, mood disorders, and 2 or more mental health condition categories, while there was a smaller indirect effect estimate for anxiety and adjustment disorders

New onset mental health category (mediator)	Estimate (95% CI)			
	Direct effect deceleration factor <sup>a</sup>	TBI relative risk for mental health category <sup>b</sup>	Mediator deceleration factor <sup>a</sup>	Indirect effect deceleration factor <sup>a</sup>
Anxiety	0.834 (0.756-0.920)	2.61 (2.58-2.64)	0.725 (0.656-0.802)	0.735 (0.670-0.814)
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≥2 Categories	0.915 (0.829-1.01)	2.69 (2.66-2.72)	0.538 (0.492-0.588)	0.541 (0.495-0.591)



## Limitations




- Data regarding all pre- and post-TBI mental health conditions, as well as history of all TBIs are certainly incomplete
- Differential diagnosis in terms of health conditions sustained by those who served has been challenging, partially due to overlapping symptoms
- Diagnoses were from electronic medical records and thus only include diagnosed conditions
- While our method for assessing potential confounding due to pre-TBI mental health diagnoses did not indicate that these variables were confounders in our data, it is possible that these variables will act as confounders of the TBI and suicide association in other samples and data sources
- It will be important to replicate our results in other samples to further examine the varying potential complex relationships between these variables



### Lethal Means Safety Training

#### Training Description:

This web-based presentation will educate VHA mental health providers on lethal means safety counseling. Participants will learn about the purpose of lethal means safety counseling, including how to work with Veterans and their friends and family to facilitate lethal means safety during high-risk periods. The training emphasizes Veteran autonomy and teaches clinicians to work collaboratively with Veterans towards solutions that align with each Veteran's values and preferences. Following completion of the training, providers will have a better understanding of how to utilize lethal means safety counseling to enhance suicide prevention efforts with the Veterans they serve.

<p><b>Flexible</b></p>  <p>Recommendations will differ from person to person.</p>	<p><b>Patient-centered recommendations</b></p>  <p>✓ Acceptable ✓ Achievable</p>	<p><b>Behavior change over time</b></p>  <p>Even small safety improvements are protective.</p>
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*Lethal Means Safety Counseling (LMSC) is flexible, patient-centered and similar to other behavior change counseling conversations.*

<https://www.mirecc.va.gov/lethalmeanssafety/training/>



# Supporting Providers Who Serve Veterans



## Learn How SRM Helps

Are you a provider supporting Veterans? Learn how SRM can help you treat Veterans at risk of suicide.

[Start Here](#)



## Request A Free Consult

SRM offers providers a safe space to address Veteran suicide treatment concerns. Request a free consult.

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## Sharpen Your Skills

Providers can best serve Veterans when they have the resources they need. Access SRM's free tools and trainings.

[Start Here](#)



<https://www.mirecc.va.gov/visn19/consult/request-a-consult.asp>

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