



Risk and Protective Factors Across Socioecological Levels of Risk for Suicide: An Evidence Map

Adrienne Landsteiner PhD, MPH; Kristen Ullman MPH; Timothy Wilt MD MPH

Minneapolis ESP Center
Minneapolis VA

December 1, 2021

Principal Investigator and ESP Center Director:

Timothy J. Wilt, MD, MPH

Co-Investigators:

Kristen Ullman, MPH

Adrienne Landsteiner, PhD, MPH

Maureen Murdoch, MD, MPH

Nina Sayer, PhD

Shahnaz Sultan, MD, MHSC

Noah Venables, PhD

Research Associates:

Eric Linskens, BS

Roderick MacDonald, MS

Lauren McKenzie, MPH

Benjamin Stroebel, MPH

Evidence Synthesis Program

Risk and Protective Factors Across Socioecological Levels of Risk for Suicide: An Evidence Map

August 2021

Prepared for:

Department of Veterans Affairs
Veterans Health Administration
Health Services Research & Development Service
Washington, DC 20420

Prepared by:

Evidence Synthesis Program (ESP) Center
Minneapolis VA Health Care System
Minneapolis, MN
Timothy J. Wilt, MD, MPH, Director

Authors:

Kristen Ullman, MPH
Adrienne Landsteiner, PhD
Eric Linskens, BS
Roderick MacDonald, MS
Lauren McKenzie, MPH
Maureen Murdoch, MD, MPH
Nina Sayer, PhD
Benjamin Stroebel, MPH
Shahnaz Sultan, MD, MHSC
Noah Venables, PhD
Timothy J. Wilt, MD, MPH

The review team developed the report's scope, study questions, and methodology in consultation with the Operational Partners (*ie*, topic nominators), the ESP Coordinating Center, and the technical expert panel (TEP). Broad expertise and perspectives were sought. Divergent and conflicting opinions are common and perceived as healthy scientific discourse. Therefore, in the end, study questions, design, methodologic approaches, and/or conclusions do not necessarily represent the views of individual technical and content experts.

The authors gratefully acknowledge the following individuals for their contributions to this project:

Operational Partners

Operational partners are system-level stakeholders who have requested the report to inform decision-making. They recommend TEP members; assure VA relevance; help develop and approve final project scope and timeframe for completion; provide feedback on draft report; and provide consultation on strategies for report dissemination.

Robert O'Brien, PhD, Scientific Program Manager, Health Services R&D

Terri Gleason, PhD, Director, Clinical Science R&D Service

Lauren Denneson, PhD, Representative of SPRINT, Core Investigator, Associate Professor

The authors gratefully acknowledge the following individuals for their contributions to this project:

Technical Expert Panel (TEP)

To ensure robust, scientifically relevant work, the TEP guides topic refinement; provides input on key questions and eligibility criteria, advising on substantive issues or possibly overlooked areas of research; assures VA relevance; and provides feedback on work in progress.

Elizabeth Karras-Pilato, PhD, Co-Research Director and Clinical Senior Instructor

Alan Teo, MD, Physician Investigator and Associate Professor

Lindsey Monteith, PhD, Clinical Research Psychologist

Julie Cerel, PhD, Clinical Psychologist and Professor

This report is based on research conducted by the Evidence Synthesis Program (ESP) Center located at the **Minneapolis VA Medical Center, Minneapolis, MN**, funded by the Department of Veterans Affairs, Veterans Health Administration, Health Services Research and Development. The findings and conclusions in this document are those of the author(s) who are responsible for its contents; the findings and conclusions do not necessarily represent the views of the Department of Veterans Affairs or the United States government. Therefore, no statement in this article should be construed as an official position of the Department of Veterans Affairs. No investigators have any affiliations or financial involvement (eg, employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties) that conflict with material presented in the report.

- Established in 2007
- Provides tailored, timely, and accurate evidence syntheses of VA-relevant, Veteran-focused healthcare topics. These reports help:
 - Develop clinical policies informed by evidence;
 - Implement effective services and support VA clinical practice guidelines and performance measures; and
 - Set direction for future research to address gaps in clinical knowledge.
- Three ESP Centers across the US:
 - Directors are VA clinicians, recognized leaders in the field of evidence synthesis, and have close ties to the AHRQ Evidence-based Practice Center Program
- ESP Coordinating Center in Portland:
 - Manages national program operations and interfaces with stakeholders
 - Produces rapid products to inform more urgent policy and program decisions

To ensure responsiveness to decision-maker needs, ESP is governed by a Steering Committee comprised of health system leadership and researchers.

The program solicits nominations for review topics several times a year via the [program website](#).

ESP Center locations

Coordinating Center
Portland, OR

ESP Center
Minneapolis, MN

**HSR&D/QUERI,
VACO**
Washington, DC

ESP Center
Los Angeles, CA

ESP Center
Durham, NC



Risk and Protective Factors Across Socioecological Levels of Risk for Suicide: An Evidence Map



Prepared for:
Department of Veterans Affairs
Veterans Health Administration
Health Services Research & Development Service
Washington, DC 20420

Prepared by:
Evidence Synthesis Program (ESP) Center
Minneapolis VA Health Care System
Minneapolis, MN
Timothy J. Wilt, MD, MPH, Director

Authors:
Kristen Ullman, MPH
Adrienne Landsteiner, PhD
Eric Linkens, BS
Roderick MacDonald, MS
Lauren McKenzie, MPH
Maureen Mandich, MD, MPH
Nina Sayer, PhD
Benjamin Stroebel, MPH
Shahraz Sultana, MD, MHSC
Noah Venables, PhD
Timothy J. Wilt, MD, MPH



August, 2021

Full-length report available on ESP website:

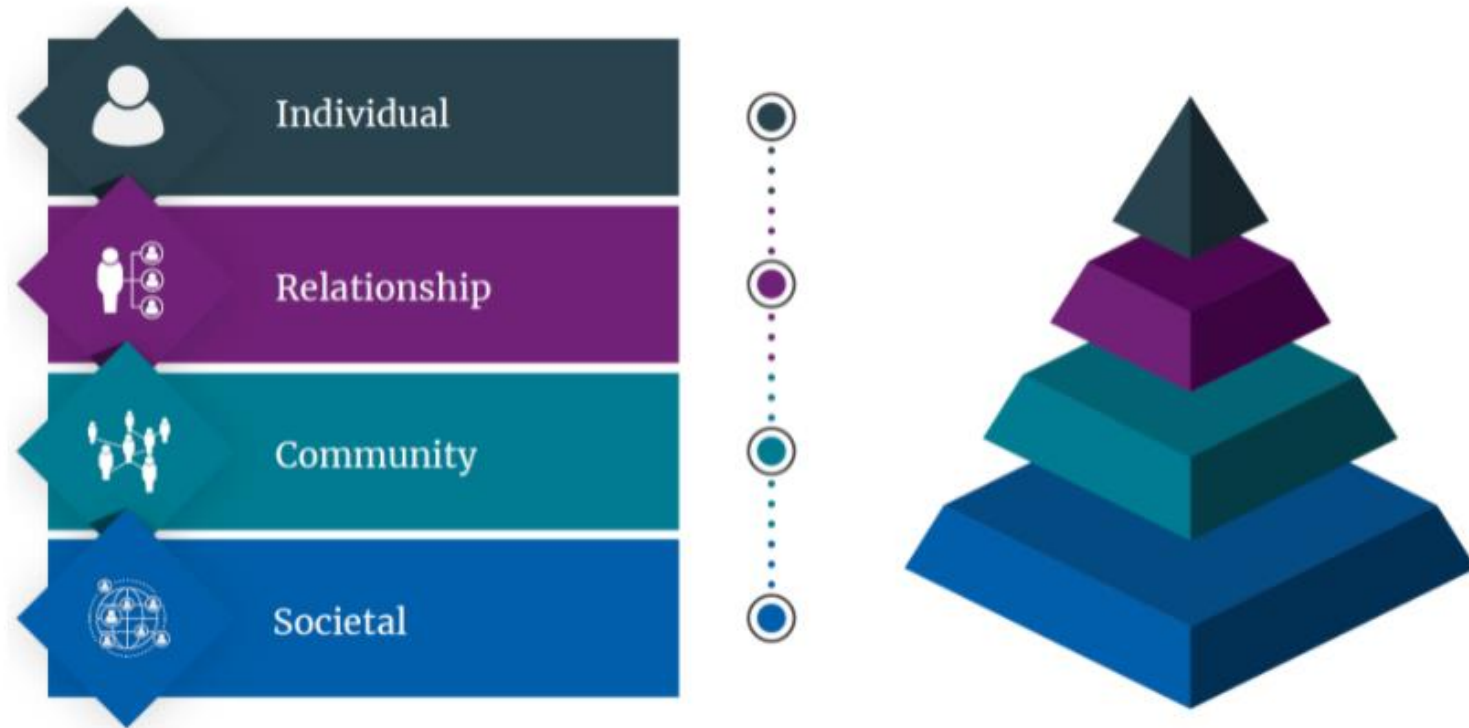
<http://www.hsrd.research.va.gov/publications/esp/reports.cfm>



U.S. Department of Veterans Affairs
Veterans Health Administration
Health Services Research & Development Service

- Suicide remains a critical public health issue
 - Suicide rates increased by 33% between 1999 and 2019 in the United States
 - Variation in rates by sex, race, age, and occupation – including military service
- 13.8% of all suicides in the US in 2018 were among Veterans
 - Veterans Comprise 8% of US general population
 - Veterans are 1.5x more likely to commit suicide than general population
- Multiple Agencies have active initiatives to address suicide prevention
 - WHO
 - US Office of the Surgeon General
 - VA
- National Strategy for Preventing Veteran Suicide 2018 – 2028 Goals
 - Increase surveillance
 - Conduct research to identify at-risk individuals & evaluate additional risk & protective factors

- **CDC Social-Ecological Model:** four tiered framework for organizing risk and protective factors which may then inform prevention strategies



[The Social-Ecological Model: A Framework for Prevention |Violence Prevention|Injury Center|CDC](#)

- CDC Social-Ecological Model: examples of risk factors categorized into each domain

Individual	Relationship
<ul style="list-style-type: none">• Previous suicide attempt• Mental illness, such as depression• Gender• Criminal Problems• Financial Strain• Impulsive or aggressive tendencies• Job problems/unemployment• Legal Problems• Serious illness• Substance use disorder	<ul style="list-style-type: none">• Adverse childhood experiences, such as child abuse and neglect• Bullying• Family history of suicide• Relationship problems such as a break-up, violence, or loss• Sexual violence
Community	Societal
<ul style="list-style-type: none">• Barriers to health care• Cultural and religious beliefs, such as a belief that suicide is a noble resolution of a personal problem• Suicide cluster in a community	<ul style="list-style-type: none">• Economic downturn/depression• Seasonal variation• Stigma associated with mental illness or help-seeking• Easy access to lethal means, such as firearms or medications• Unsafe media portrayals of suicide

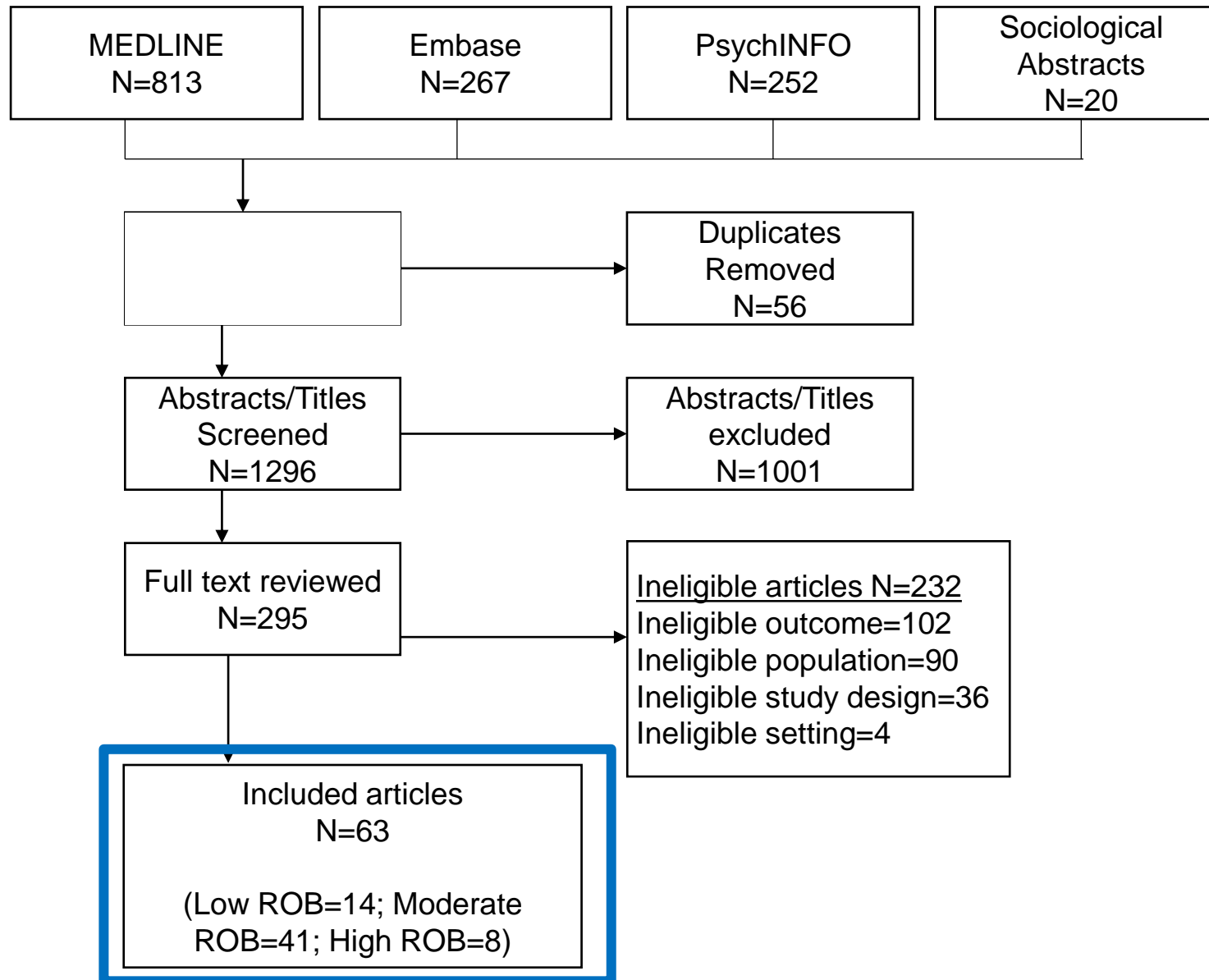
What are the risk and protective factors for suicidal behaviors (attempts or death by suicide) across social-ecological levels of risk?

- Literature Search:
 - Captured literature published between 2011 and January 2021
 - Databases included: MEDLINE, Embase, PsycINFO, and Sociological Abstract
- Identify studies meeting eligibility criteria
 - Primary outcome: suicide death or attempt
- Assess risk of bias, did not analyze high risk of bias
- All studies observational in nature, unable to provide certainty of evidence utilizing GRADE

Inclusion and Exclusion Criteria

PICOTS	Inclusion Criteria	Exclusion Criteria
Population	Community dwelling US Veteran or active military population (18 years of age or older)	<p>>50% known at increased suicide risk due to prior suicide attempts or with specific mental or physical health conditions (e.g. depression, psychoses, PTSD, recent cancer diagnoses, or terminal illness unless results are stratified)</p> <p>Studies of genetic factors associated with suicide risk</p>
Intervention	NA	NA
Comparison	NA	NA
Outcomes	Suicide attempts, suicide deaths	Composite outcome of suicide deaths plus attempts
Timing	Risk factors precedes suicide/suicide attempt	Did not capture suicide/suicide attempt prior to risk factor(s)
Setting	United States	Any
Study Design	Observational population-based studies; January '11 – January '21 examining risk factors for suicide deaths and/or suicide attempts. Capture risk factors/variables prior to outcomes (suicide, suicide attempt).	Systematic reviews, narrative review, case reports, editorials, commentary, conference abstracts, interventions, and non-English language publications.
Prognostic or Risk Factors	Any	Physiological, laboratory or imaging studies (must have clinical history or diagnosis; ie, include DM as risk, not A1C).

Literature Flow Diagram



Study Characteristics

Study Characteristics	Risk of Bias			
	Low (k=14)	Moderate (k=41)	High (k=8)	Total (k=62)
Study Design				
Case-Control	0	7	3	10
Cross-Sectional	1	2	2	5
Prospective Cohort	2	4	1	7
Retrospective Cohort	11	28	2	41

Study Characteristics

Study Characteristics	Risk of Bias			
	Low (k=14)	Moderate (k=41)	High (k=8)	Total (k=62)
Sample Size				
<1,000	0	3	5	8
1,000 – 9,999	1	5	1	7
10,000 – 99,999	1	11	0	12
≥ 100,000	12	22	2	36

Study Characteristics

Study Characteristics	Risk of Bias			
	Low (k=14)	Moderate (k=41)	High (k=8)	Total (k=63)
Population				
Veteran	11	22	2	35
Active Military	5	20	6	31
Era of Service: Vietnam	1	1	0	2
Era of Service: OEF/OIF	6	8	2	16
Era of Service: Gulf War	0	2	0	2

Study Characteristics

Study Characteristics	Risk of Bias			
	Low (k=14)	Moderate (k=41)	High (k=8)	Total (k=63)
Data Source				
VHA (administrative data)	10	18	0	28
DoD (administrative data)	7	21	4	32
VA/DoD SDR	1	4	0	5
STARRS	1	14	2	17
Survey/Self Report	1	3	4	8
National Death Index	9	15	1	25
Claims Data (CMS/Tricare)	2	0	0	2
Other Military Data	4	6	0	10
National Violent Death Reporting System	0	1	1	2
Other Data Sources	0	2	0	2

Study Characteristics	Risk of Bias			
	Low (k=14)	Moderate (k=41)	High (k=8)	Total (k=63)
Social-Ecologic Domains				
Individual	14	36	7	57
Relational	4	18	2	24
Community	0	3	0	4
Societal	0	0	0	0

Study Characteristics

Risk Factors	Number of Studies (k)
Social-Ecological Individual Level	
Previous suicide attempt/suicide ideation	10
Posttraumatic stress disorder	12
Other mental illness (eg, depression, anxiety, psychiatric conditions)	22
Emotions, such as anger, numbness, or hopelessness	4
Alcohol, tobacco, and/or drug use	17
Physical illness or pain	8
Sleep disorders	4
Cognitive or physical decline in functioning	3

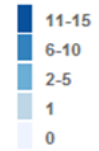
Risk Factors	Number of Studies (k)
Social-Ecological Individual Level	
Sexual minority status	1
Transition from incarceration to civilian life	1
Military occupation	7
Military rank	9
Service connected (service-related disability)	2
Deployment status	14
Service branch	5
Service component	5
Time spent in service	9
Time deployed	3
Time since military separation	4
Military part time vs. full-time	1
Military former vs. current service member	2

Risk Factors	Number of Studies (k)
Social-Ecological Individual Level	
Body mass index	2
Healthcare services use	10
Criminal or legal problems	7
Financial problems	2
Job problems or loss	5
Homelessness or housing instability	4
Life stressors (non-specific)	8
Firearm ownership/use/storage/accessibility	1
Demographics (eg, age, sex, race, education)	22

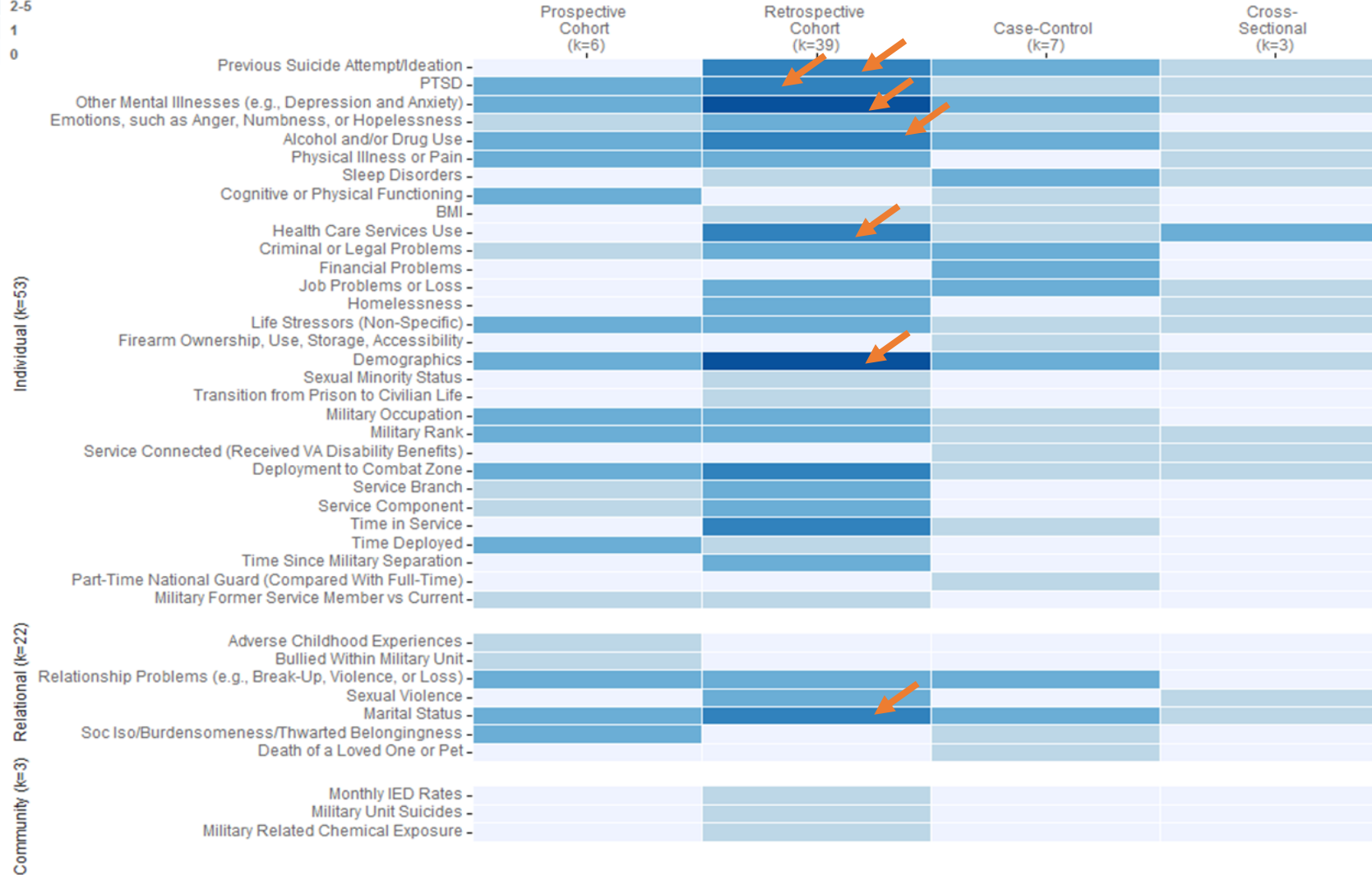
Risk Factors	Number of Studies (k)
Social-Ecological Relational Level	
Adverse childhood experiences	1
Bullying	1
Relationship problems (eg, break-up, violence, loss)	9
Sexual violence	4
Marital status	12
Social isolation/perceived burdensomeness/thwarted belonging	3
Death of a loved one or pet	1

Risk Factors	Number of Studies (k)
Social-Ecological Community Level	
Access to mental health care	0
Monthly IED rates	1
Military unit suicides	1
Military related chemical exposures	1

Low-Moderate ROB Studies



Risk and Protective Factors for Suicides and Attempts



Direction of Effect (Individual Level)

↑=increased risk
 ↓=decreased risk
 ↔=no difference or inconsistent
 Blue=Low risk of bias study
 Orange=Moderate risk of bias study

Risk/Protective Factor	Prospective Cohort (k=6)		Retrospective Cohort (k=39)		Case-Control (k=7)		Cross-Sectional (k=3)	
	Deaths (k=4)	Attempts (k=3)	Deaths (k=28)	Attempts (k=13)	Deaths (k=6)	Attempts (k=3)	Deaths (k=3)	Attempts (k=0)
Previous suicide attempt/ideation			↑↑↑↑	↑↑↑	↑ ↔↔↔↔	↑↑	↑	
PTSD	↔↔↔		↑↑↑↑ ↓↓↓	↑↑↑		↑	↑	
Other mental illnesses (eg. depression and anxiety)	↑↑	↔	↑↑↑↑↑↓	↑↑↑↑↑↑↔	↑↑↑↑	↑↑ ↔	↑	

Direction of Effect (Relational Level)

Risk/Protective Factor		Prospective Cohort (k=6)		Retrospective Cohort (k=39)		Case-Control (k=7)		Cross-Sectional (k=3)	
		Deaths (k=4)	Attempts (k=3)	Deaths (k=28)	Attempts (k=13)	Deaths (k=6)	Attempts (k=3)	Deaths (k=3)	Attempts (k=0)
Relational (k=22)	Adverse childhood experiences	↑							
	Bullied within military unit		↑						
	Relationship problems (eg. break-up, violence, or loss)	↑	↔	↑	↑↑	↑↑↑ ↔	↑↑		
	Sexual Violence			↑	↑ ↔			↑	
	Marital status (unmarried)	↔↔		↑↑↑	↑↑ ↔↔↔↔	↔↔↔		↔	
	Social isolation/ perceived burdensomeness/ thwarted belongingness	↑	↔			↔			
	Death of a loved one or pet					↔			

↑=increased risk
↓=decreased risk
↔=no difference or inconsistent
Blue=Low risk of bias study
Orange=Moderate risk of bias study

Direction of Effect (Prospective Cohort Studies)

Risk/ Protective Factor		Author, Publication Year, Population, Sample Size, Cohort Name											
		Bernecker 2019 ⁸ Active Military N: 10,000-99,999 STARRS		Bohnert 2014 ⁷ Veteran N: ≥100,000 VHA		Chu 2020 ⁸ Active Military N: 1,000-9,999 STARRS		LeardMann 2013 ⁸ Veteran and Active Military N: ≥100,000 Millennium Cohort Study		Naifeh 2017 ¹⁰ Active Military N: 10,000-99,999 STARRS		Phillips 2017 ¹¹ Active Military N: ≥100,000 Recruit Assess Program	
		SD	SA	SD	SA	SD	SA	SD	SA	SD	SA	SD	SA
Individual	PTSD							↔				↔	
	Other mental illnesses (eg, anxiety, depression)		↔					↑				↑	
	Hopelessness						↔						
	Alcohol, tobacco, or other drug use			↑				↑				↑	
	Physical illness or pain		↔									↑	
	Cognitive or physical decline in functioning							↔		↑	↑		
	Criminal or legal problems		↑										
	Life stressors (non-specific)		↔					↔					
	Military rank (enlisted vs officer)		↔					↔					
	Service branch (Army/Marine)							↔					
	Service component (active vs reserves)							↔					
	Longer time or larger proportion of time deployed							↓				↑	
	Military former vs current service member							↔					
	Relational	Adverse childhood experiences											↑
Bullied within military unit			↑										
Relationship problems			↔									↑	
Marital status ^c								↔				↔	
Social isolation/ perceived burdensomeness/ thwarted belongingness								↔				↑	

6 studies identified as low or moderate risk of bias with a prospective cohort design were summarized separately.

↑=increased risk
↓=decreased risk
↔=no difference or inconsistent
Blue=Low risk of bias study
Orange=Moderate risk of bias study

- All were cohort studies, predominantly retrospective
- The majority had study populations greater than 100,000 people
- All made use of secondary administrative datasets
- For those that investigated suicide attempts, researchers paid careful attention to temporality of risk factors and outcome
- Variables to control for potential confounders were included in the analyses

Military Employment Definition Variation

Griffith, 2017	LeardMann, 2013	Phillips, 2017	Trofimovich, 2013	Ursano, 2017a/2017b
<p>Combat military occupation (yes/no)</p>	<ul style="list-style-type: none"> • Combat specialist • Health care • Functional support, service and supply • Mechanical or electrical repair • Other 	<ul style="list-style-type: none"> • Occupational Grade E01 – E03 • Occupational Grade E04 – E07 	<ul style="list-style-type: none"> • Infantry, gun crews, and seamanship specialists • Functional support and administration • Service and supply handlers • Communications and intelligence specialists • Electronic equipment repairers • Health Care Specialists • Other Technical and allied specialists • Craftworkers • Tactical operations offices • Health care officers • Groups with < 25 	<ul style="list-style-type: none"> • Combat arms • Special forces • Combat Medic • Other

Model Adjustment Variation Example

Barry, 2018	Barth, 2016	Bishop, 2020	Blow, 2012	Bullman, 2019
<ul style="list-style-type: none">• Homelessness• Sum of 13 med. conditions• TBI• Any psychiatric disorder	<ul style="list-style-type: none">• Race• Branch of Service• Type of unit• age	<ul style="list-style-type: none">• Sleep-related breathing disorders• Insomnia• Nightmares• PTSD• Depression• Anxiety• Schizophrenia• Bipolar disorder• SUD• Medical comorbidity• Obesity• Number sleep medicine visits 180 days prior to the index date	<ul style="list-style-type: none">• Age	<ul style="list-style-type: none">• Age at entry• Race• sex

- Quality and quantity of information in Veterans and active military is limited
- Greatest amount of information is related to individual risk factors
- Individual-level factors, are consistently predictive of, or associated with suicide and attempts:
 - history of prior suicide ideation or attempts
 - mental illness (other than posttraumatic stress disorder)
 - substance, alcohol or tobacco use
- Community-level, relational-level, and other individual-level factors were reported in only one or two studies

If you have further questions, please feel free to contact:

Adrienne Landsteiner adrienne.Landsteiner@va.gov

Kristen Ullman Kristen.Ullman@va.gov

Timothy Wilt tim.wilt@va.gov

Full-length report and cyberseminar available on ESP website:

<http://www.hsrd.research.va.gov/publications/esp/>