

**NAVAL HEALTH RESEARCH CENTER**

# The Millennium Cohort Program

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The study protocol was approved by the Naval Health Research Center Institutional Review Board in compliance with all applicable Federal regulations governing the protection of human subjects. Research data were derived from an approved Naval Health Research Center, Institutional Review Board protocol number NHRC.2000.0007.





# Millennium Cohort Program

- Millennium Cohort Study
  - Largest population-based prospective health study in US military history
  - Over 200,000 military personnel from all services and components enrolled since 2001
- Millennium Cohort Family Study
  - Only ongoing long-term study of military spouses
  - Only DoD-wide study of family health and well-being



# Study Origin

If I had to make one other suggestion in terms of future follow-up studies, a **longitudinal study** to look to see what happens to those individuals over time is critical, because all we have done is...taken a snapshot of the population.

We know what is going on with them 5 years after the Gulf War. We don't know how that is going to **change over a period of time and how that is going to impact on their lives.**

— Testimony from Dr. David Schwartz  
House Committee on Government Reform and Oversight  
(1997)



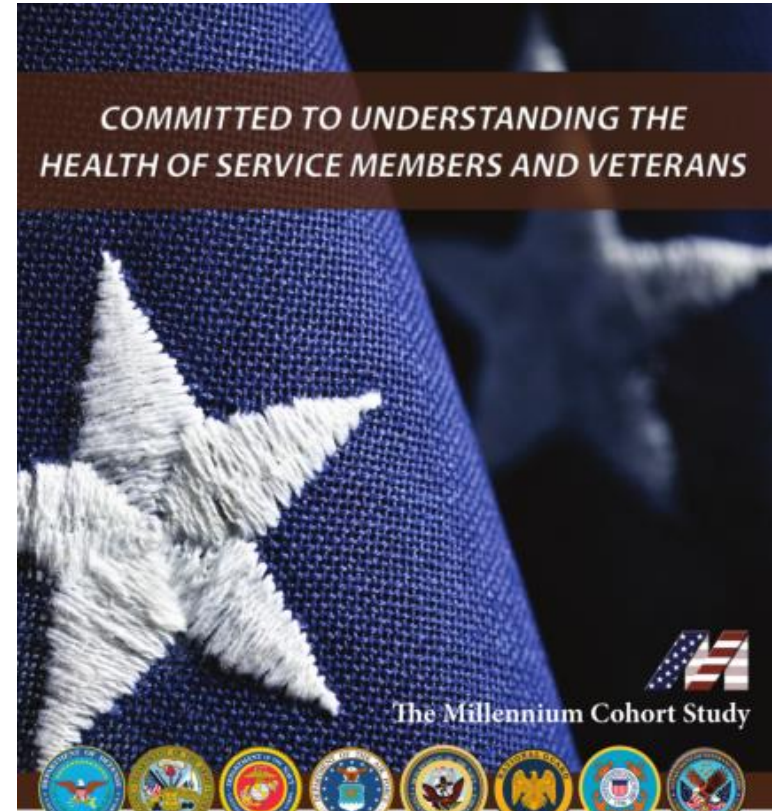
# Study Origin

- 1998: Department of Defense (DoD), Armed Forces Epidemiological Board, Department of Veterans Affairs (VA), and Institute of Medicine recommended a coordinated prospective longitudinal cohort study of service members
  - Newly available DoD surveillance and electronic health care data
- 1999 National Defense Authorization Act
  - Sect. 743: Establish “a longitudinal study to evaluate data on the health conditions of members of the armed forces upon their return from deployment”




# Millennium Cohort Study

- Largest and longest running cohort study in military history
  - Initiated July 2001
- Representative sample
  - All Services
  - All Components (Active, Reserve, National Guard)



COMMITTED TO UNDERSTANDING THE HEALTH OF SERVICE MEMBERS AND VETERANS

The Millennium Cohort Study



PLEASE COMPLETE THIS SURVEY AND RETURN IT IN THE PRE-PAID ENVELOPE OR GO TO [WWW.MILLENNIUMCOHORT.ORG](http://WWW.MILLENNIUMCOHORT.ORG) CLICK "START SURVEY" ENTER YOUR SUBJECT ID:

# Study Objective and Methodology

Prospectively determine the impacts of military deployments, experiences, and exposures on the long-term health of Service members and Veterans

Enrollment panels:  
2001, 2004, 2007, 2011, 2020

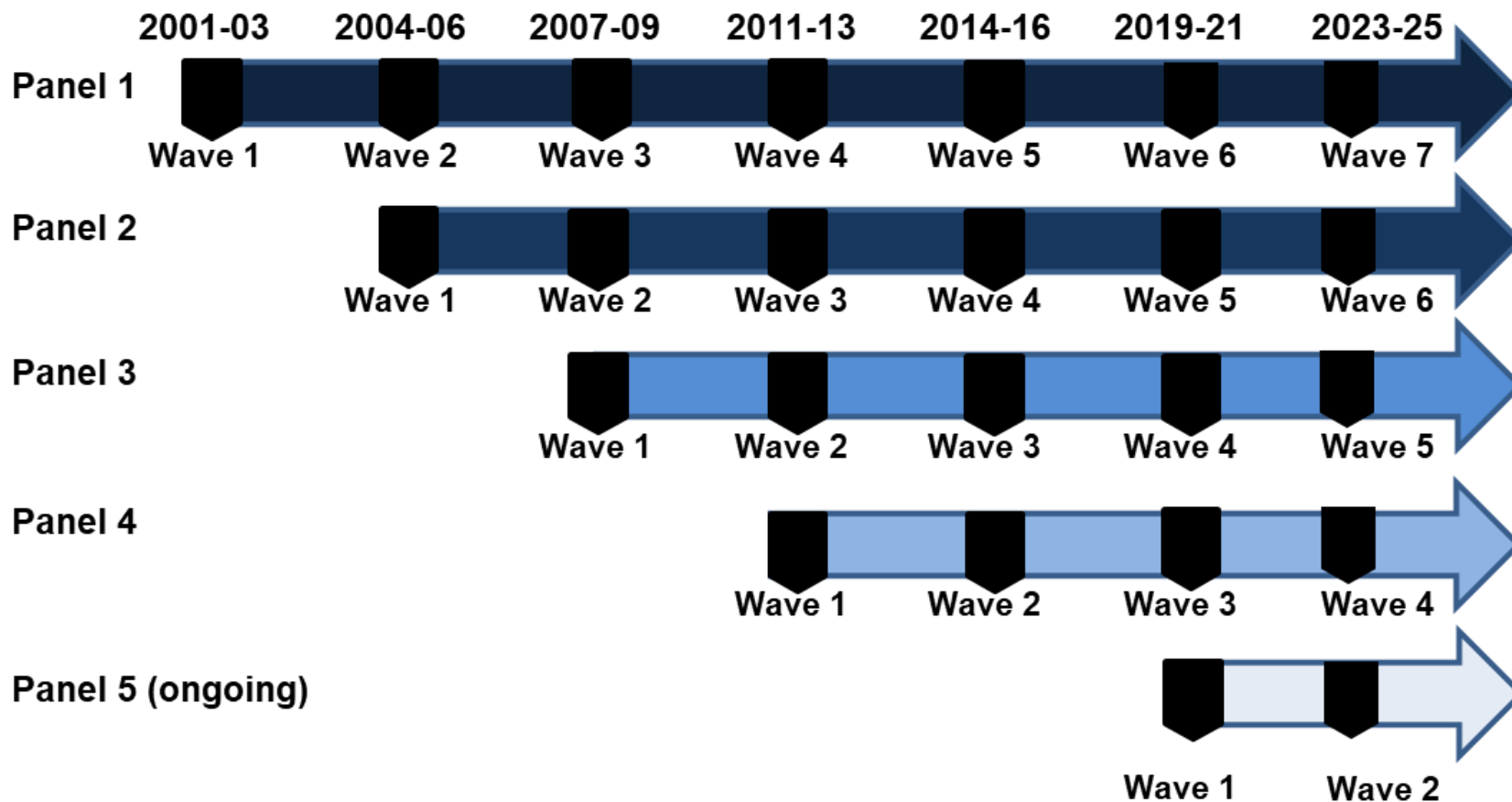
Surveys completed every 3-5 years, even after leaving military service, through 2068

Surveys assess mental and physical health, health behaviors, military exposures and other experiences (combat, deployment)

Linkage with multiple enterprise military and medical databases



# Multiple-Panel Design





# Enrollment Panels

## (N = 201,620)

Panel (Group)	Enrollment Dates	Years of Service at Enrollment	Oversampled Groups	Roster Size (Date)	Total Contacted	Total Enrolled (%)
1	Jul 2001–Jun 2003	Unrestricted	Women Reserves/Guard Prior deployers*	256,400 (Oct 2000)	214,388	77,019 (36%)
2	Jun 2004–Feb 2006	1–2	Women Marine Corps	150,000 (Oct 2003)	123,001	31,110 (25%)
3	Jun 2007–Dec 2008	1–3	Women Marine Corps	200,000 (Oct 2006)	154,270	43,439 (28%)
4	Apr 2011–Apr 2013	2–5	Women Married	250,000 (Oct 2010)	247,266	50,052 (20%)
5	Sep 2020–Jun 2021	1–5	Women Married	500,000 (Jun 2020)	~500,000	TBD

\*Deployment to Southwest Asia, Bosnia, and/or Kosovo after August 1997.

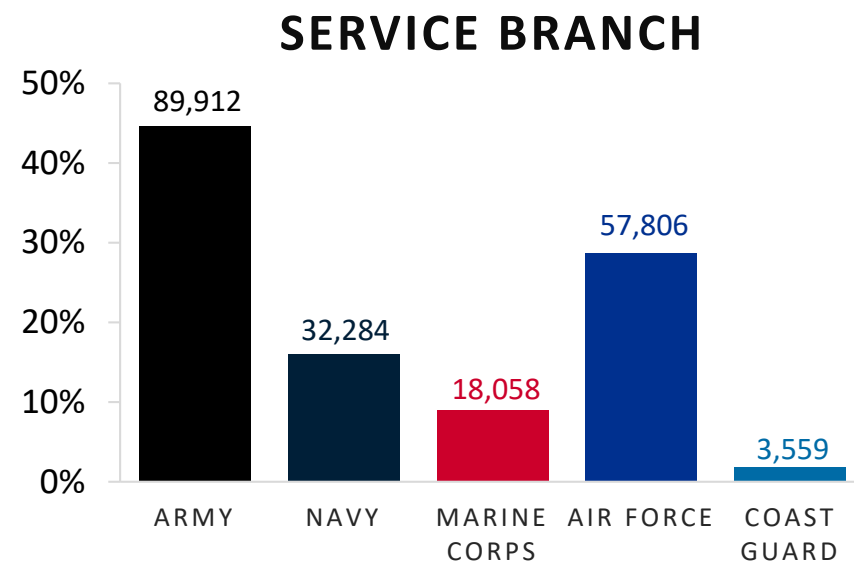


# Cohort Profile (Panels 1-4)

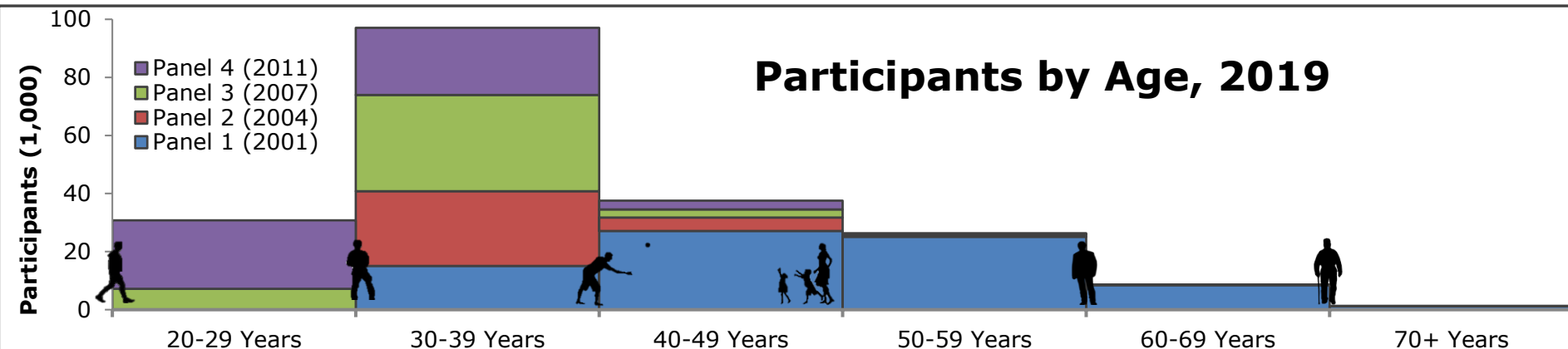
Baseline Characteristics	%
Female	31
Non-Hispanic White	70
Enlisted	83
Active component	67

Current Status	%
Ever deployed	65
Separated	71
Deceased	1.2

Panel	Mean Age (SD)	
	Enrollment	2019
1	35 (9)	52 (9)
2-4	25 (5)	36 (5)



## Participants by Age, 2019

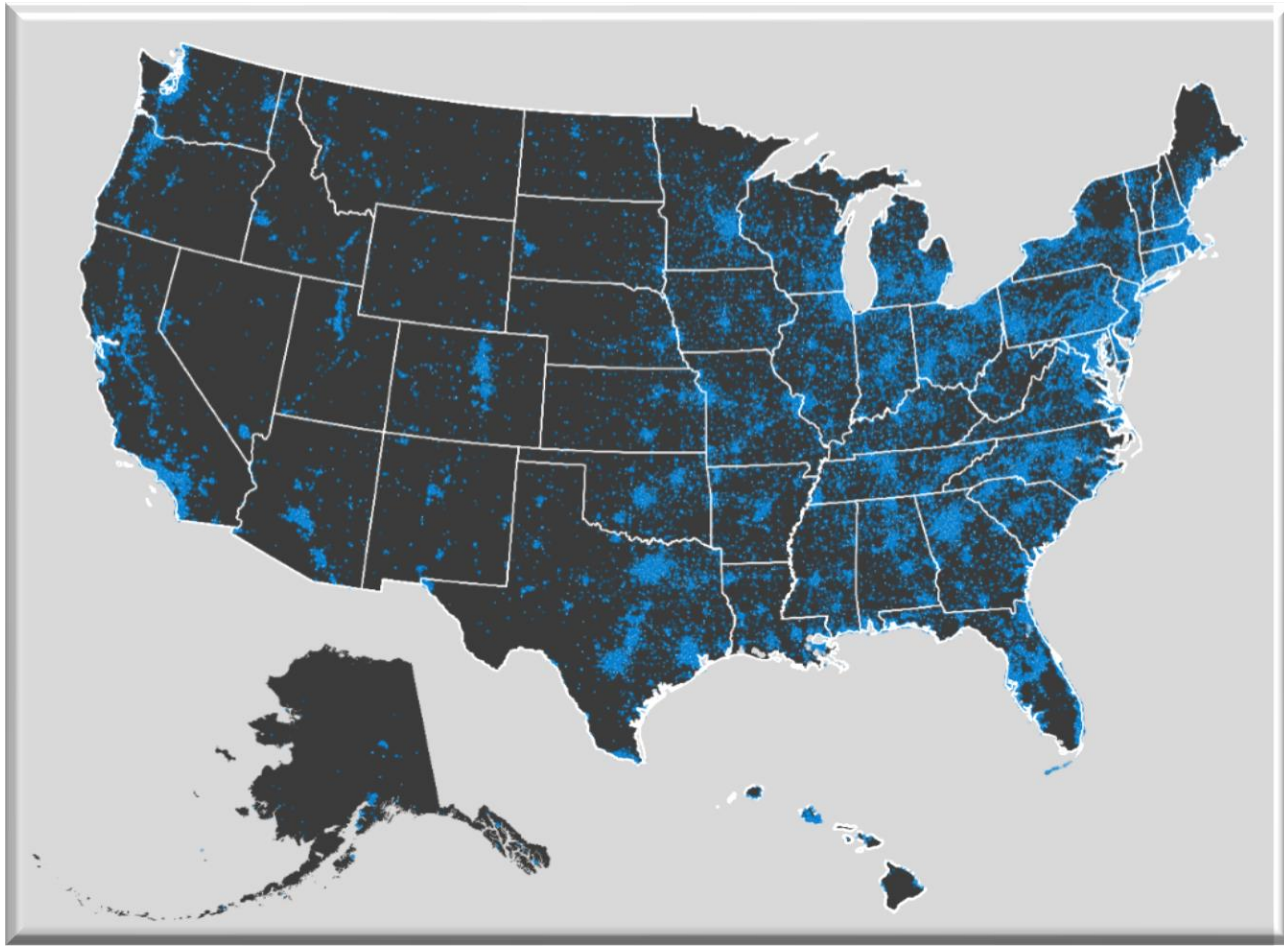


### Health Concerns by Age

Quality of Life (Injury Resilience	Family/Relationship Stability	Sleep Quality	Healthy Aging	Senescence)		
Behavioral/Mental Health (PTSD	Depression	Anxiety	Suicide	Substance Abuse	Disordered Eating)	
Cardiometabolic Disorders (Obesity	Diabetes	Hypertension	Heart Disease	Stroke	Kidney Failure)	
Respiratory Conditions (Exertional Dyspnea	Asthma	COPD (Emphysema/Chronic Bronchitis)				
Reproductive Health and Fertility Issues						
Cancer (Lung	Prostate	Breast	Skin	Colorectal	Brain	Leukemia/Lymphoma)
Musculoskeletal Conditions (Osteoarthritis	Muscle/Tendon Strain	Carpal Tunnel)				
Autoimmune Disorders (Multiple Sclerosis	Lupus	Crohn's	Rheumatoid Arthritis)			
Sensory Impairment (Vision	Hearing Loss	Dual)				
Neurodegeneration (Parkinson's	Alzheimer's)					



# Study Participants

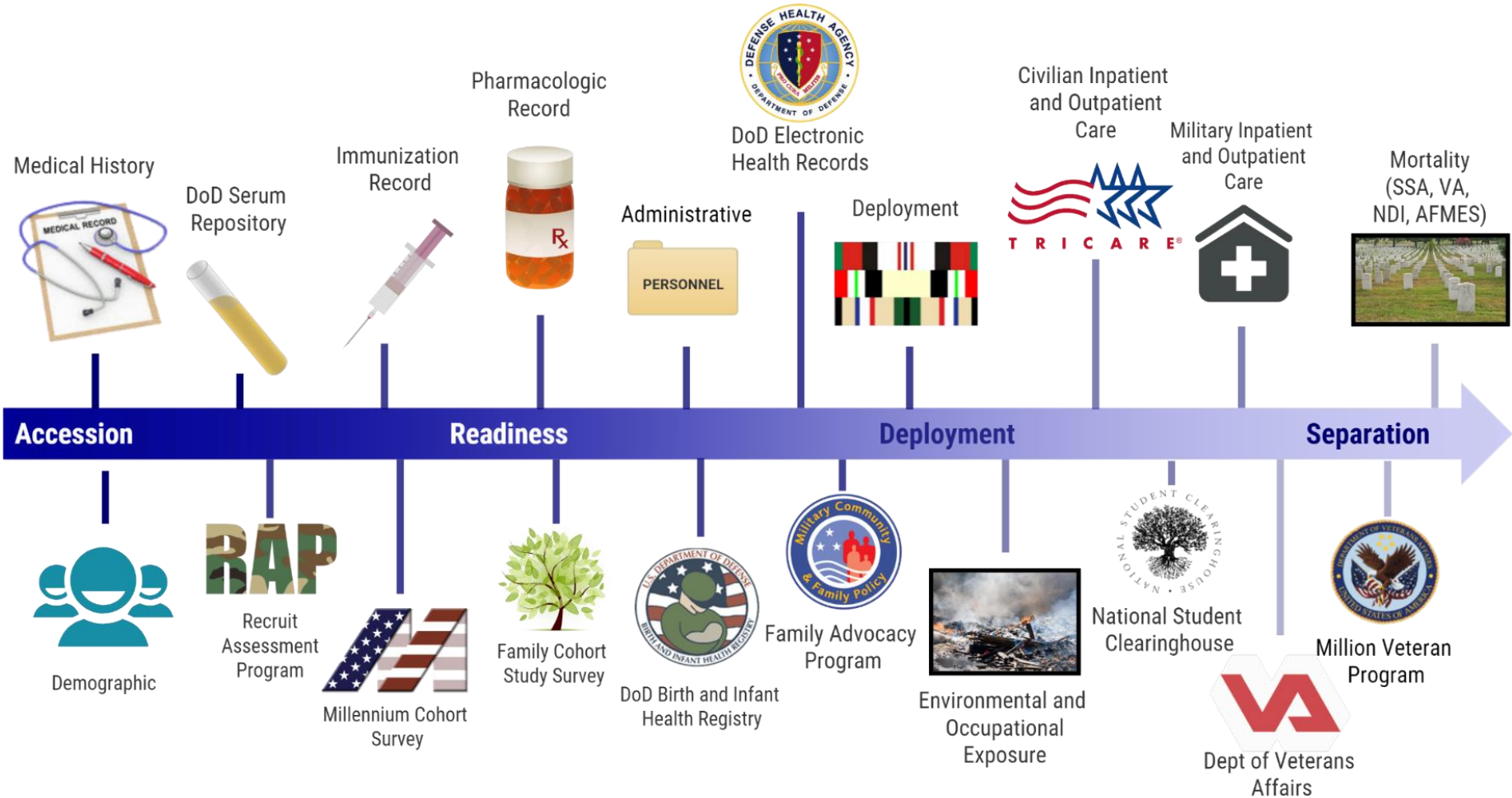


# Standardized Instruments

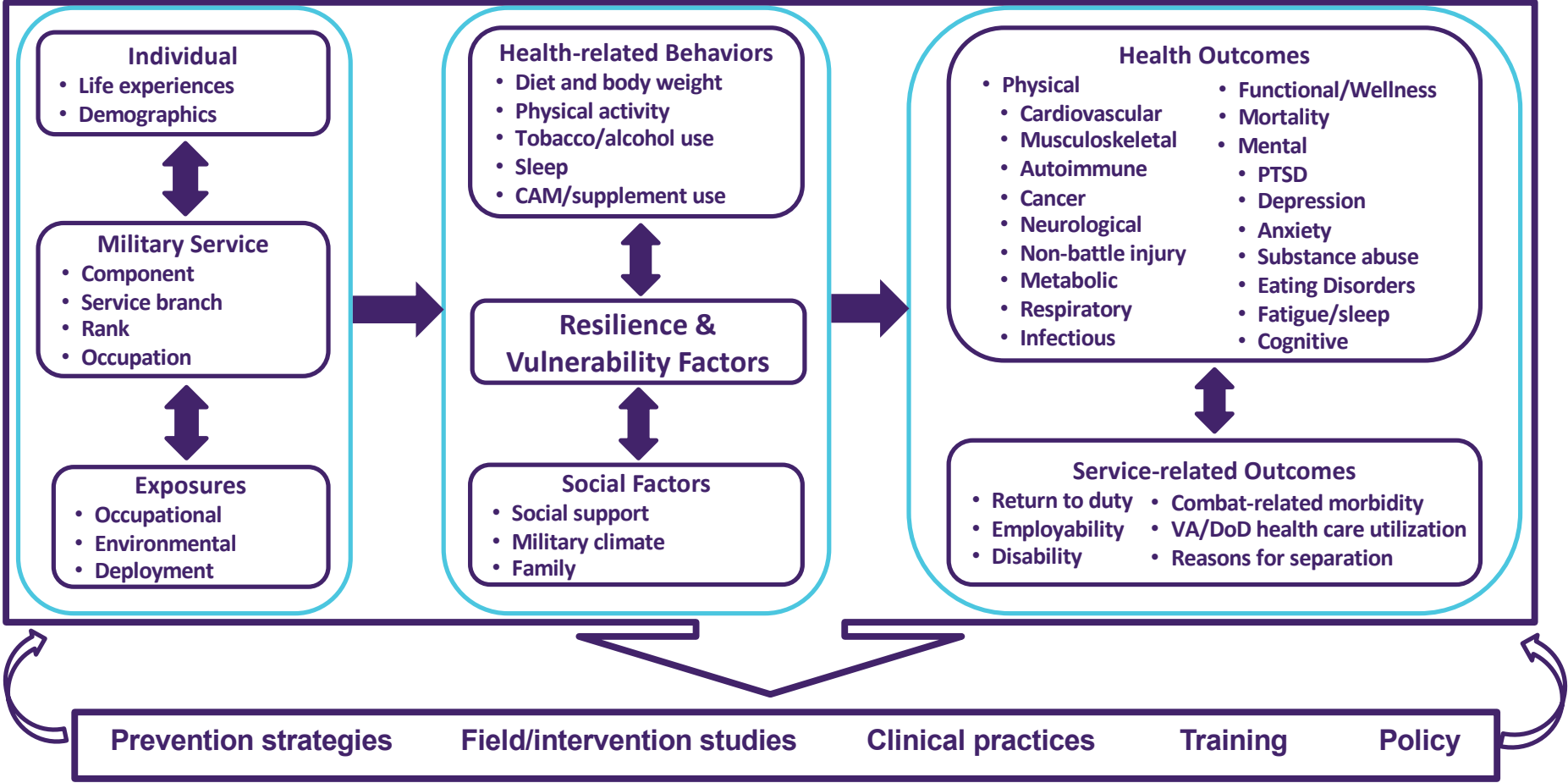
Instrument	Construct
Short-Form 36	Physical, mental, functional health
Patient Health Questionnaire	Depression, anxiety, panic syndromes, binge eating, alcohol-relation problems
PTSD Checklist–Civilian Version	Posttraumatic stress disorder
Posttraumatic Growth Inventory	Posttraumatic growth
CAGE	Alcohol problems
Department of Veterans Affairs Gulf War Survey	Specific war-time exposures (i.e., depleted uranium, chemical or biological warfare agents)
Deployment Risk and Resilience Inventory	Military and unit support
Insomnia Severity Index	Sleep
Adverse Childhood Experiences	Childhood trauma



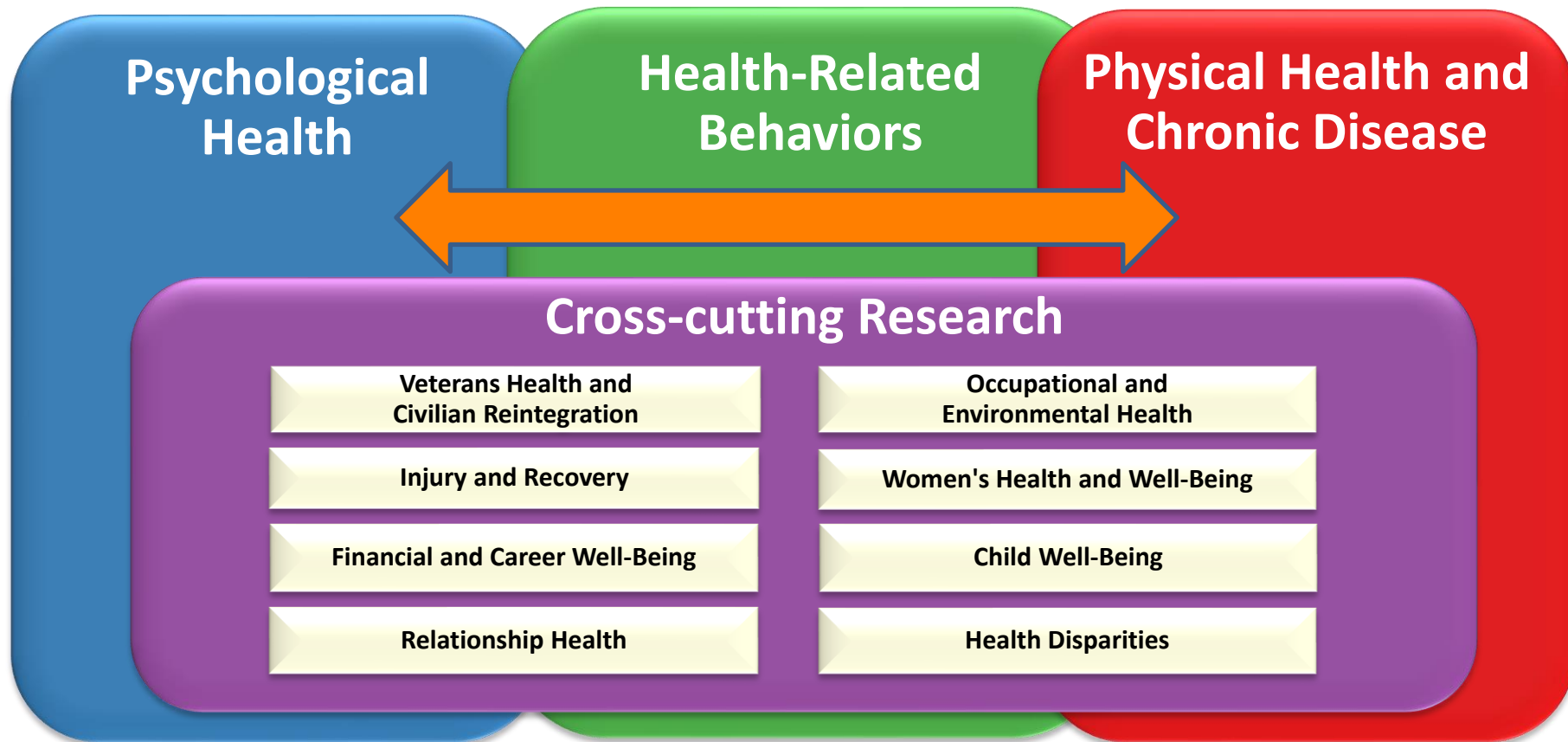
# Complementary Data



# Contribution to a Healthy and Fit Force



# Research Portfolio





# Veterans Health: Research Priorities

- Identification of factors that predict successful or unsuccessful transitions from the military
  - Post-service economic well-being
  - Homelessness
  - Health care access and utilization



# Veterans Health: Research Priorities

- Post-deployment health concerns
  - Diseases with long latency periods (cancer, dementia)
  - Gulf War illness/Chronic multisymptom illness
- Linkage with VA medical and benefits data
- Coordination with
  - VA Cooperative Studies Program #505
    - Parallel VA research program for conducting research responsive to Veterans and VA concerns
  - VA Office of Patient Care Services, Post-Deployment Health
  - VA Office of Research and Development



# VA-MilCo Collaborative Projects

- Risk factors for homelessness among Veterans
- Chronic multisymptom illness and mental health symptoms
- Probable PTSD and care seeking by VHA enrollment status
- Comparison of health measures between survey self-reports and electronic health records among MilCo participants receiving VA care
- Mental health disorders among rural vs urban Veterans
- Mortality among MilCo participants, 2001-2018





# Millennium Cohort Family Study

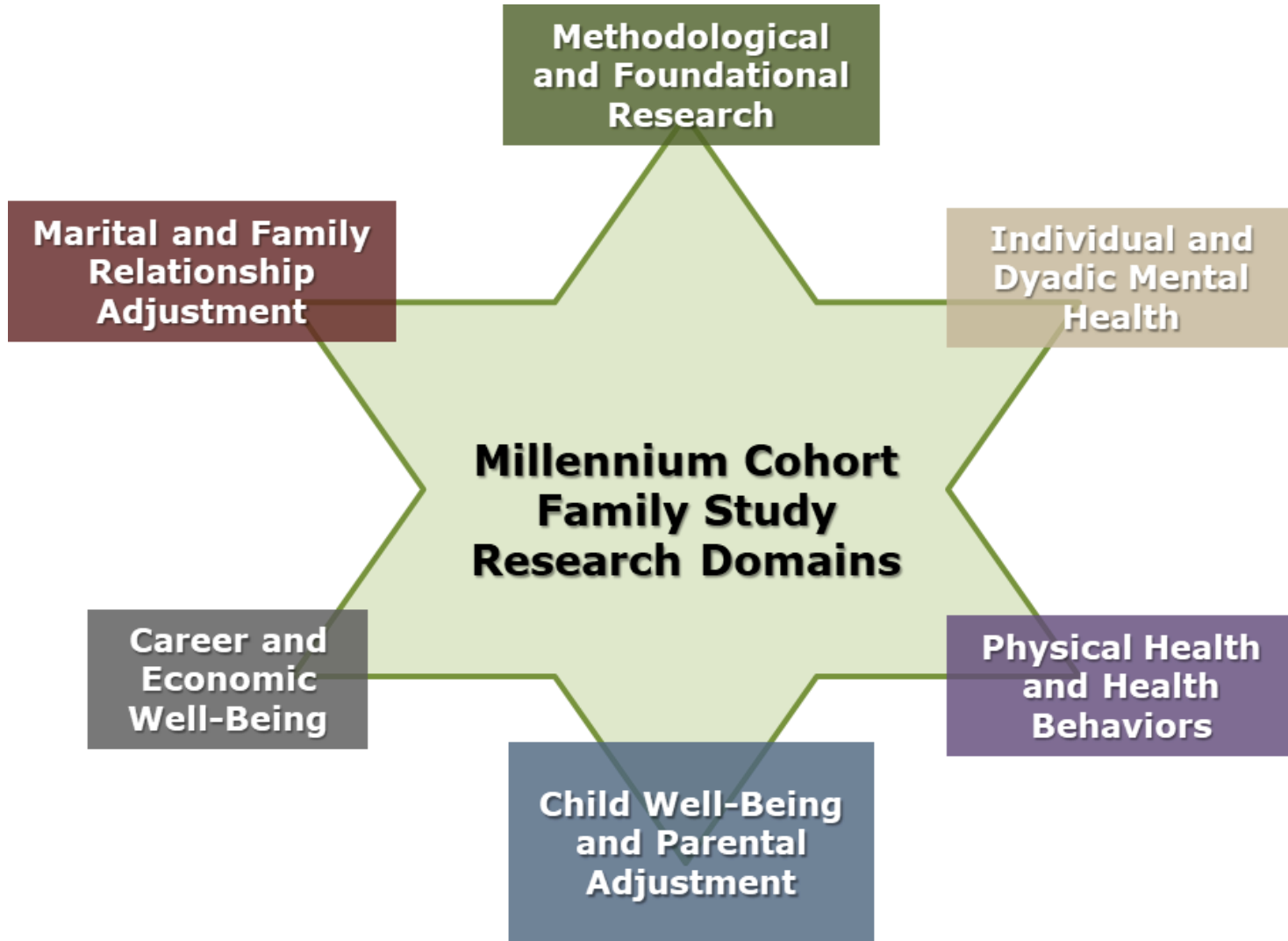
- Objectives
  - Determine the long-term association between military experiences—particularly combat deployment—and the health and well-being of service members and their families
  - Provide strategic evidence-based policy recommendations that inform leadership and guide interventions
- PI: Valerie Stander, PhD



# Methodology

- Recruit spouses of service members enrolled in the Millennium Cohort Study
  - Follow-up surveys every ~3 years
- Develop a comprehensive database including self-report and archival data from service members and spouses (i.e., dyads)

Panel	Enrollment Dates	Total Contacted	Total Enrolled
1	Apr 2011–Apr 2013	28,603	9,872 (35%)
2	Fall 2020	185,000	TBD



# Questions?



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[www.millenniumcohort.org](http://www.millenniumcohort.org)



Millennium Cohort  
Family Study

Valerie Stander, PhD  
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[www.familycohort.org](http://www.familycohort.org)



# VETERANS HEALTH ADMINISTRATION

## CSP #505: Millennium Cohort Study

Edward J. Boyko, MD, MPH

VA Puget Sound Health Care System

Seattle WA





# VA Role in the Millennium Cohort Study

- I have been involved starting with planning in 1999
- The study was designed with the plan to follow-up participants using VA health care data after separation from the military
  - VA can provide objectively measured health outcomes and other information in addition to survey self-report
- VA Research leadership support
  - VA Cooperative Studies Program for research staff in Seattle
  - VA Research & Development and Post-Deployment Health Service provide support for Veteran focused research conducted at Naval Health Research Center



# How Do We Follow-Up Millennium Cohort Participants Using VA Records and Data?

By sharing data



**DOD/VA PARTNERSHIP**



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# Data Sharing Agreement



Approval was received from both DoD and VA in late 2018



Bilateral Millennium Cohort participant data sharing between these two agencies



Identifiers sent securely from NHRC to VA Puget Sound for matching



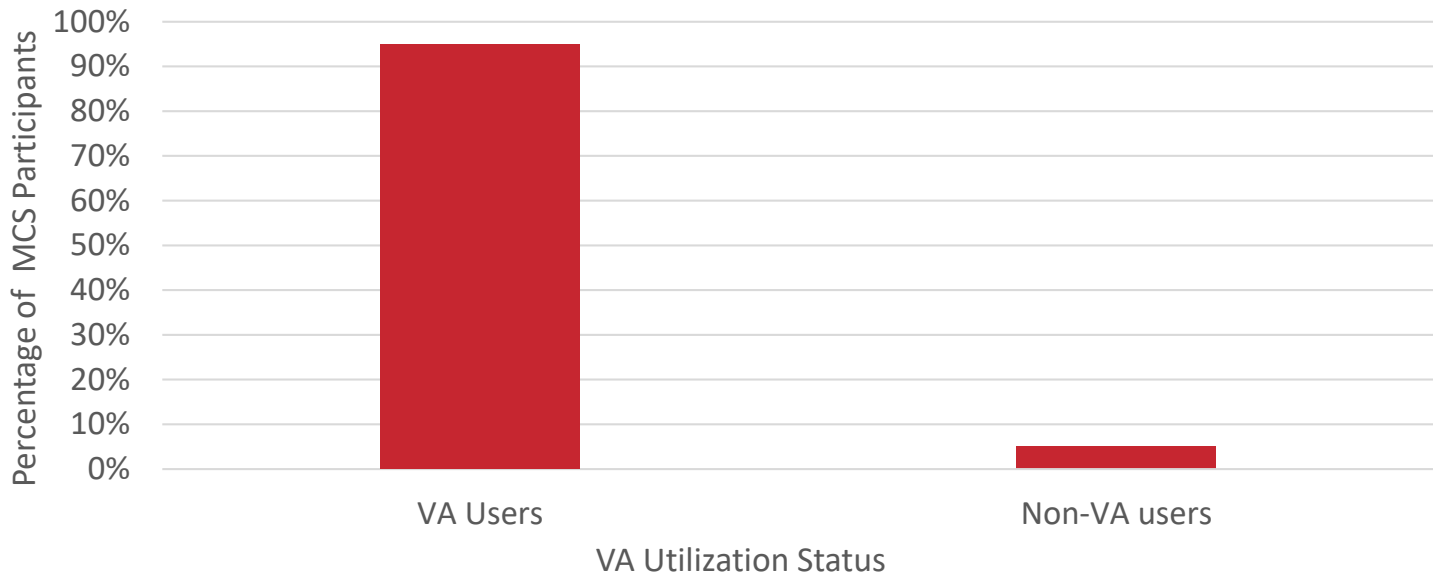
Millennium Cohort participant identifiers matched to VA care facility encounters nationally



# Capturing VA Utilization

- Of the 141,133 Millennium Cohort Study participants who have separated from military service, approximately 95% (134,687) have a VHA record

Percentage of MCS Participants Utilizing VA Care



# Millennium Cohort Study - VA Top 10 Outpatient Diagnoses

## ICD-9 (before Oct 1 2015)

Dx Code	Description
30981	Prolonged PTSD
V6549	Other specified counseling
V6540	Other unspecified counseling
311	Depressive disorder, not elsewhere classified
7242	Lumbago
V571	Care involving other physical therapy
V703	Other general medical examination for administrative purposes
4019	Essential Hypertension
30000	Anxiety state, unspecified
V6810	Disability examination

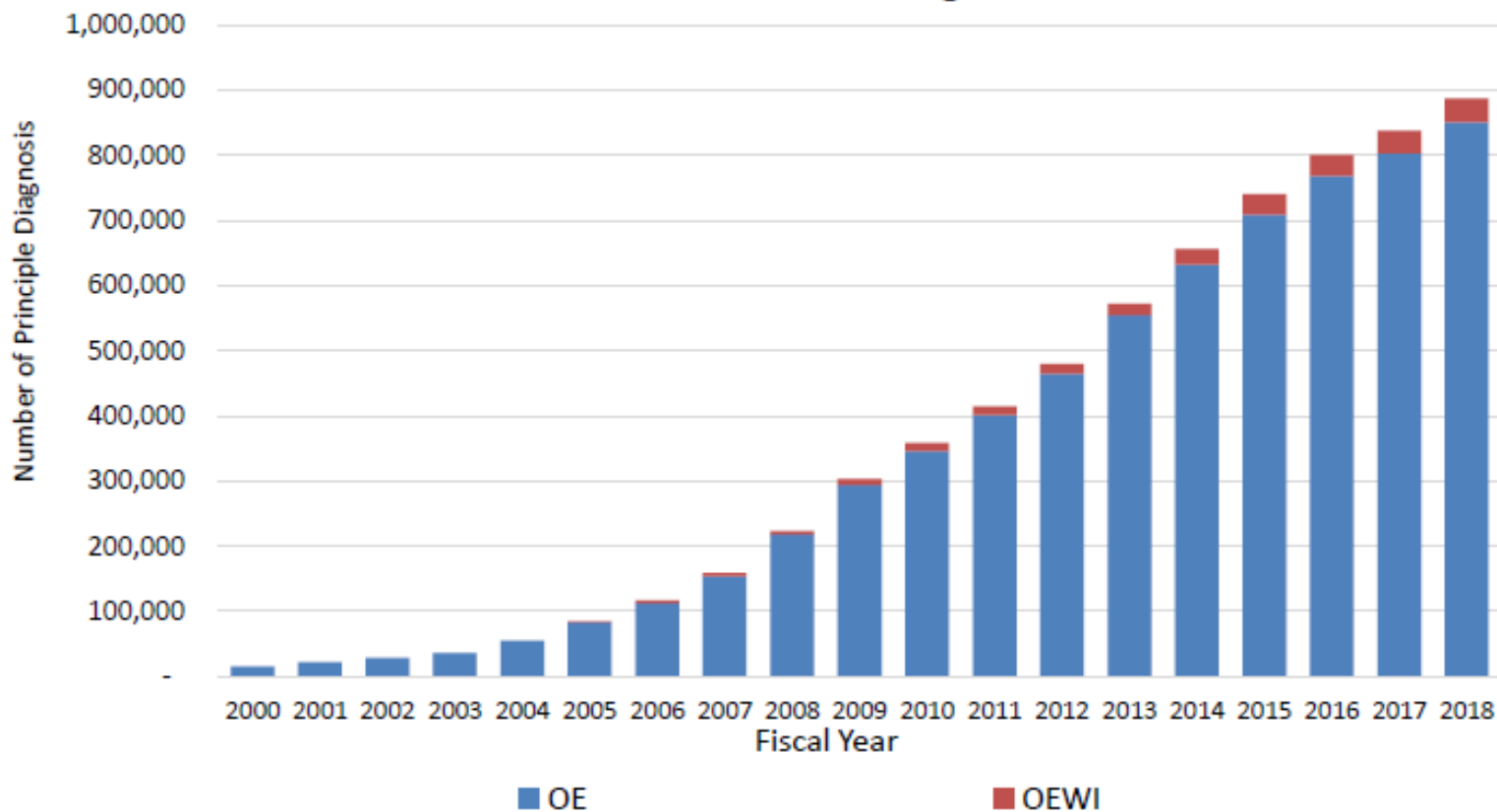
## ICD-10 (October 1 2015 or later)

Dx Code	Description
F4312	PTSD, chronic
Z7189	Other specified counseling
F4310	PTSD, unspecified
Z719	Counseling, unspecified
M545	Low back pain
Z0289	Encounter for other administrative examinations
F331	Major depressive disorder, recurrent, moderate
I10	Essential (primary) hypertension
G4733	Obstructive sleep apnea (adult) (pediatric)
F419	Anxiety disorder, unspecified



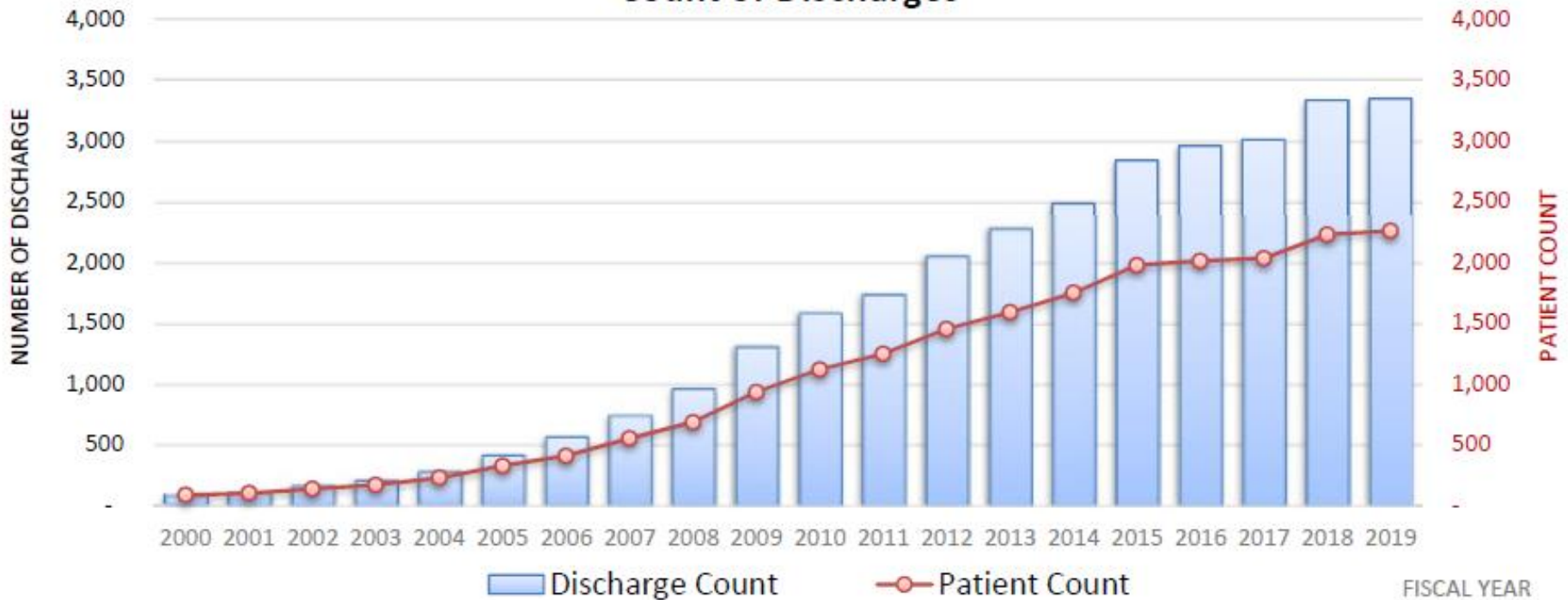
# Millennium Cohort Study - VA Outpatient Encounters

## MILCO Cohort Outpatient Utilizations Count of Encounter with Diagnoses



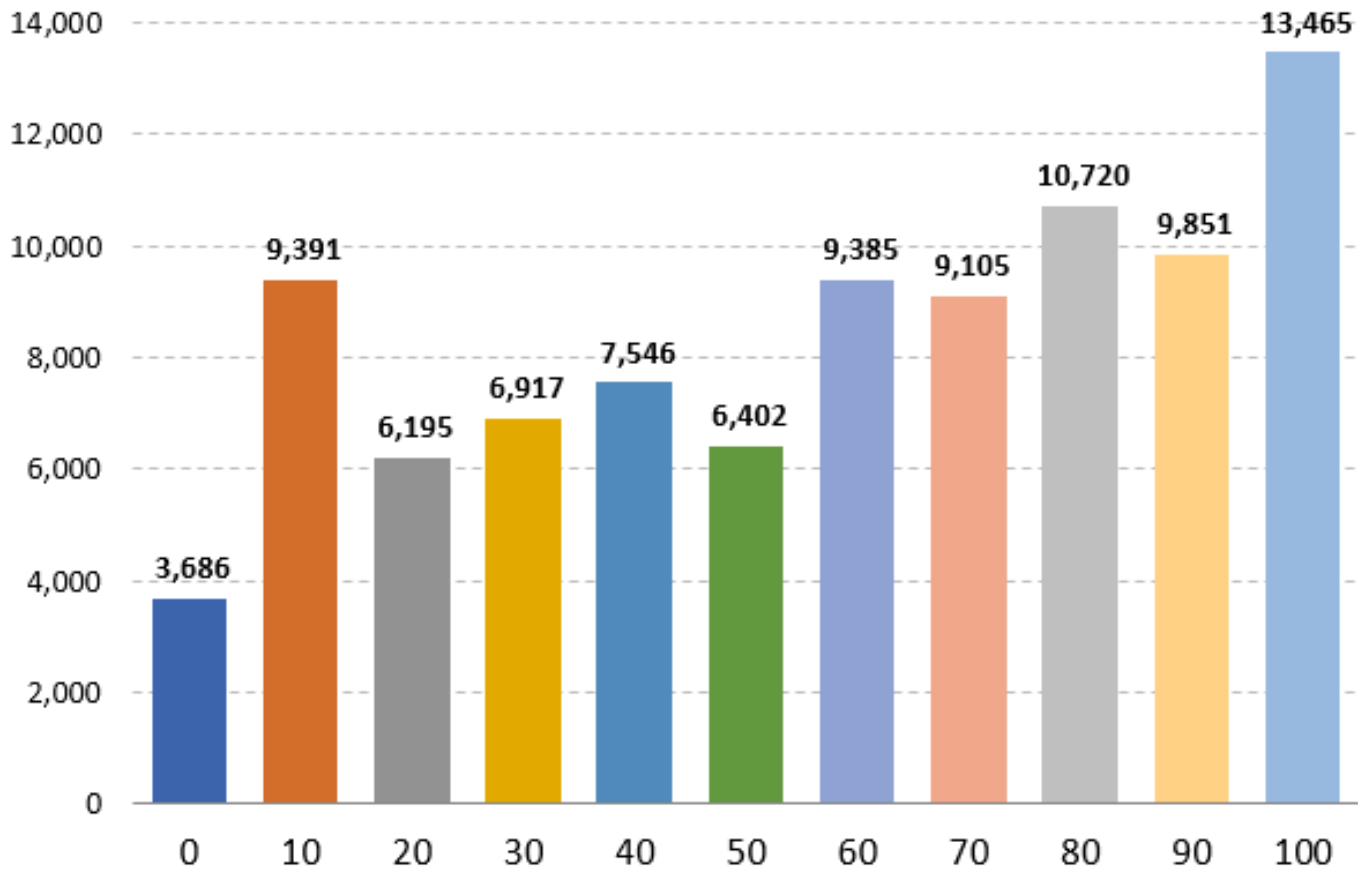
# Millennium Cohort Study -VA Inpatient Discharges

MILCO Cohort Inpatient Utilizations  
Count of Discharges



# Capturing Veteran Benefits Administration Disability Data

Unique Person Count by Combined % Service Connection  
Source: VetsNet, run June 10th, 2020





# Data Merging: Next Steps

- The merging of Millennium Cohort Study participants with VA data was only recently initiated
- Over time, more VA data will be matched to Millennium Cohort Study participants including information on:
  - Service-connected conditions
  - Pharmacy prescription fills
  - Laboratory results
  - Other diagnostic and illness severity information



# Impact of DoD/VA Data Sharing

- Improve ability to validate survey information obtained from Millennium Cohort Study protocol using objective VA data
- Expand the types of health outcomes we can identify in relation to military service beyond what is available in the Millennium Cohort survey that is conducted every 3-5 years
- Enhance the ability of Millennium Cohort Study to assess long-term health effects of military service



# Current Status as a Resource for VA Investigators

- VHA inpatient and outpatient data have been transmitted to DoD colleagues at Naval Health Research Center
- Veteran focused research on this merged data must be conducted at NHRC by analysts working there
  - Several Veteran focused research projects are underway
  - Two grant applications have been submitted by VA investigators to study melanoma and Parkinson's Disease risk factors



# Future Plans as a Resource for VA Investigators

- Approval has been granted for transfer of Millennium Cohort data to VA CSP #505
- Plans are underway to make these data available for analysis within the VA firewall
  - Data will reside on VINCI
  - Data resource guide and dictionary are being developed
  - Information and instructions for access are now available on the INVESTD-R website and will be updated as needed
  - <https://www.vacsp.research.va.gov/CSPEC/Studies/INVESTD-R/Millennium-Cohort-CSP-505.asp>

# Future Plans as a Resource for VA Investigators

- Stay tuned to the HSR&D cyberseminar series for future updates on Millennium Cohort Research
- Plans include presentations on:
  - Women's Health research in Dec 2020
  - Millennium Cohort Family Study and DoD Birth and Infant Health Registry in early 2021
  - Practical guidance on proposing and accessing Millennium Cohort data inside the VA firewall for approved research after data are successfully transferred to VA in hopefully early 2021



**THANK YOU !**



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# VETERANS HEALTH ADMINISTRATION

## Millennium Cohort Study (CSP #505): A VA / DoD Collaboration

Aaron I. Schneiderman, PhD MPH RN  
Post Deployment Health Services  
Washington, DC



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# Visual Pause



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# Why Does it Matter?

- MilCo Study and Family Study represent tremendous resources for researchers
  - Data collections include significant detail and depth across domains of health, risk factors and other covariates
  - Large sample sizes
  - Longitudinal & cross-sectional analytical opportunities
  - Family Study provides the ability to understand effects of military service and veteran experience in the context of the family unit through dyadic analysis

# Why Does it Matter?

## CSP 505 is a VA DoD Interagency Partnership

- Partnership across agencies represents
  - “Whole of Government” approach
  - Maximizes the significant investment
  - Serves policy needs and increases generalizable knowledge
  - Brings strength of research to understanding the Veteran Journey



# How Did We Get Here?

- A new initiative, but a collaboration with a long history
- Very few principals remain from the very start
  - Dr. Boyko's patience paid off
  - Collaboration continued but not on the intended scale
- What happened?
  - Changes in the Data Security Landscape
  - ORD and PDHS renewed the partnership with MilCo
  - Funding for CSP 505
  - Development of an Interagency Agreement (IAA)
  - Development of the Data Use Agreement (DUA)



# Policy Implications

- MilCo has supported DoD force health and readiness providing background and support to congressional testimony, legislation, clinical practice guidelines and DoD policy
  - Sexual Assault
  - Suicide
  - Chronic Multisymptom Illness /Physical Symptoms
  - Substance Abuse
  - Sleep and Resilience/Readiness
  - Mental Health/Traumatic Brain Injury
  - Women’s Health in the Military
  - Environmental Health/Pulmonary Health
  - Health Promotion/Disease Prevention



# Research Advancing Veteran Well-Being

- Current collaborations
  - Risk factors for homelessness
  - Chronic multisymptom illness / Mental health symptoms
  - Health care access
  - Urban vs rural differences in mental health
  - Million Veteran Program co-enrollment
- There is opportunity for growth!
  - Veteran survey module (methodological considerations)
  - Cancer ascertainment (Virtual Pooled Registry)
  - New panel 5 enrollment (multigenerational cohort a possibility)

# Where Are We?

- Introducing this collaboration
  - Additional webinars planned
- Currently merged data analysis conducted at Naval Health Research Center
- Goal: is merged data available to VA researchers
- Now: Developing knowledge tools to support investigator engagement
- Planning infrastructure to enable collaboration
- Dialogue with ORD to support specific funding mechanisms -- existing funding solicitations may be applicable

