

Defense Health Board

Naval Medical Center San Diego



NHRC

August 27, 2018



Overview

- Who We are
- Core Research
- Research Capabilities
- Success Stories
- DHB Findings & Recommendations
- Leadership
- Directorate Overviews
- MilCo Brief
- MilCo Family Study Brief



Who We Are



BUMED



NAVY MEDICINE WEST
(San Diego, SD)



NAVY MEDICINE RESEARCH AND DEVELOPMENT HQ
(Silver Spring, MD)



NAVAL HEALTH RESEARCH CENTER
(San Diego, SD)



NAVY MEDICAL RESEARCH CENTER
(Silver Spring, MD)



NAMRU- DAYTON
(Dayton, OH)



NAMRU-ASIA
(Singapore)



NAVAL SUBMARINE MEDICAL RESEARCH LABORATORY
(Groton, CT)



NAMRU-3
(Cairo, Egypt)



NAMRU- SAN ANTONIO
(San Antonio, TX)



NAMRU-6
(Lima, Peru)





Who We Are

Mission

To optimize operational readiness and warfighter health by informing DoD policy through research excellence.

Vision

To be the premier deployment health research center for the DoD.



Who We Are

NHRC Guiding Principles

Quality

Place the highest priority on meeting the mission—demonstrate meticulous accuracy, thoroughness, and effectiveness at every opportunity.

Teamwork

Enjoy the camaraderie at the command and take pride in your service to our country. People are the source of our strength. Partners enhance our capabilities.

Innovation

Be relevant by being on the cutting edge.





Who We Are

DoD Deployment Health Research Center

- Designated in 1999
- Re-designated in 2009

Over 300 professionals

- 17 Active duty
- 48 Civil service
- 264 Contractors
- 2 Military recruit training sites
- 7 Military treatment facilities in the United States and Naval Hospital Yokosuka

Global Reach

- Infectious disease surveillance along the U.S.-Mexico border and internationally
- Partnered with the Centers of Disease Control and Prevention (CDC) and the Global Emerging Infections Surveillance and Response System (GEIS) of the Armed Forces Health Surveillance Branch (AFHSB)
- International human performance partnerships



Who We Are

We are strategically located on Naval Base Point Loma

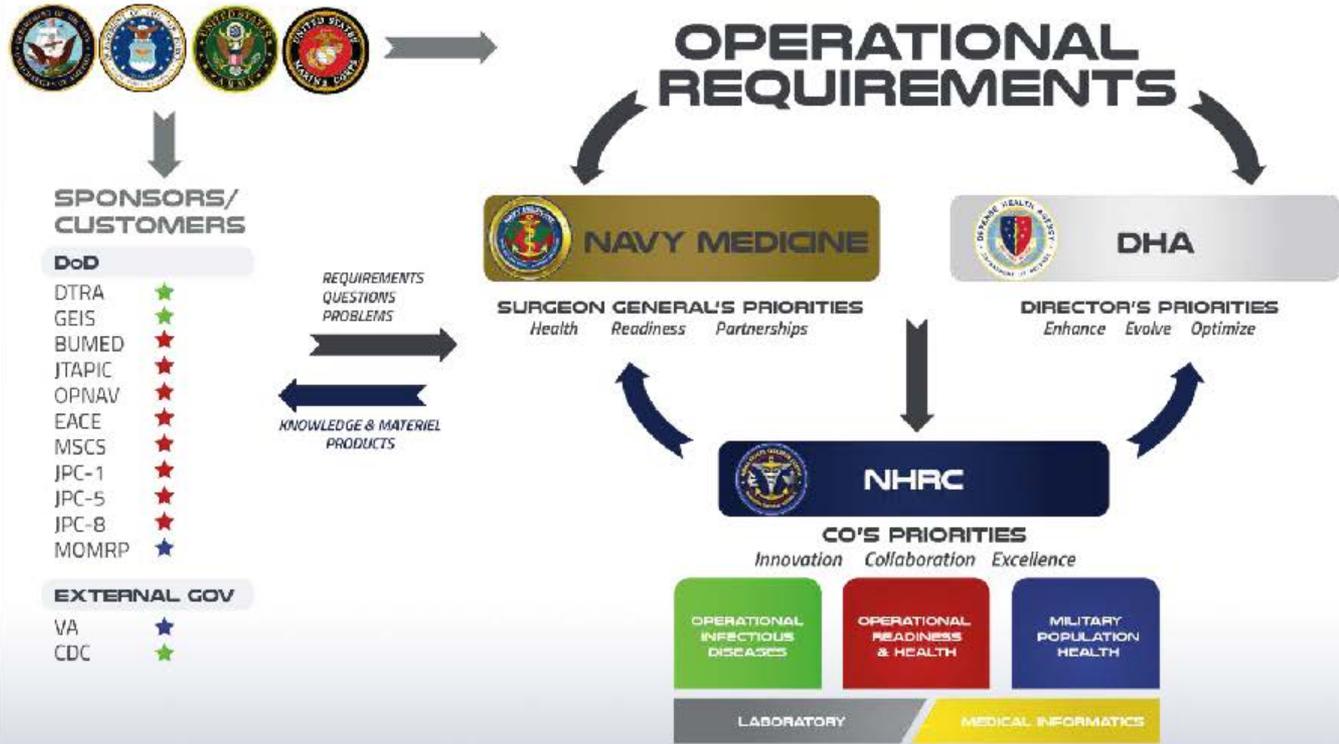
- Fleet concentration
 - Navy and Marine Corps
 - Air, land, sea, subsurface, and special warfare elements
- World-class universities
- Biotech and industry partners
- Navy Medicine West (NMW)
- Naval Medical Center San Diego (NMCS)

Facilities

- Spanning 24 buildings
- Infectious diseases laboratories
- Warfighter performance laboratories
- On-site servers
 - In support of databases for epidemiological research



Research



Aligned with Navy Medicine, DHA, and DoD sponsor requirements, supporting medical readiness, health, and well-being for service members and families.



NHRC Strategy map



NAVAL HEALTH RESEARCH CENTER

MISSION:		READINESS		
VISION:	The Premier DoD Deployment Health Research Center			
PRINCIPLES:	Innovation	Teamwork	Quality	
STRATEGIC GOALS:	To conduct state-of-the-science research, development, testing, and evaluation that improves the operational readiness of our armed forces.	To leverage scientific expertise and build partnerships that expand and enhance our research capacity to meet customer and sponsor requirements.	To deliver high quality, value-based research solutions that optimize troop and mission readiness for the battlespace of the future.	
CORE COMPETENCIES:		Physical Health and Wellness		
		Psychological and Behavioral Health		
		Injury, Injury Prevention, and Rehabilitation		
		Physical and Cognitive Performance		
		Medical Modeling and Decision Support		
		Infectious Diseases Surveillance and Research		
CORE RESEARCH AREAS:	Operational Readiness & Health	Military Population Health	Operational Infectious Diseases	
RESEARCH FOUNDATION:	Laboratories		Medical Informatics	
	Human Performance Labs	Microbiology Labs	Longitudinal Databases	Decision Support Tools, Epidemiological and Analytical Capacity



A soldier in full combat gear, including a helmet, sunglasses, and a rifle, is walking on a dirt path in a field. Other soldiers are visible in the background, and there are trees and mountains in the distance.

Core Research

- Operational Readiness and Health
- Military Population Health
- Operational Infectious Diseases



Core Research Areas

Operational Readiness and Health

- *We optimize health and performance*

Military Population Health

- *We protect and maintain health*

Operational Infectious Diseases

- *We contribute to force health protection by identifying critical pathogen threats*

Our research aligns with Navy Medicine and fleet requirements, supporting medical readiness, health, and well-being for service members and families.





Operational Readiness and Health

Optimize Health and Performance

EXCELLENCE

READINESS

OPTIMIZING HUMAN PERFORMANCE AND RECOVERY

DELIVERING MEDICAL PLANNING, LOGISTICS, AND DECISION SUPPORT

SPONSORS/CUSTOMERS

- 21ST CENTURY SAILOR
- NAVPERSCOM
- 3RD MAW
- JPC-5
- USC
- NSW
- EACE
- VA
- JTA/IC
- USAFSAM
- BRAID
- NICOE
- JCSC

COLLABORATION

Environmental Physiology

Injury Prevention & Rehabilitation

Fatigue & Sleep

Physical Readiness & Resilience

Expeditionary Medical Research

Modeling & Simulation

Operational Decision Support

WARFIGHTER PERFORMANCE

MEDICAL MODELING, SIMULATION, & MISSION SUPPORT

INNOVATION

- CAREN
- Environmental Chamber
- Expeditionary Medicine & Wounded Warrior Data Sets





Military Population Health

Protect and Maintain Health

EXCELLENCE

PROVIDE INCREASED UNDERSTANDING OF THE LONG-TERM IMPACT OF MILITARY SERVICE

PROVIDE SOLUTIONS THAT MITIGATE PSYCHOLOGICAL HEALTH IMPACT ON READINESS, RETENTION, & RESILIENCE

READINESS

SPONSORS/CUSTOMERS

- USLHS
- WRAIR
- DCEE
- SAPRO
- AF15D
- NCCOSC
- USAR EM
- VA
- MDMRP
- UNIVERSITY OF UTAH
- BUMED
- NMCS
- DMRDP
- COMRP
- WRAIR
- N1CP
- MOMRP

COLLABORATION

Millennium Cohort Program

Family Cohort Program

Recruit Assessment Program

Reproductive Health

Clinical Treatment Studies

Epidemiological Studies

Health Promotion Interventions

DEPLOYMENT HEALTH

HEALTH & BEHAVIORAL SCIENCES

INNOVATION

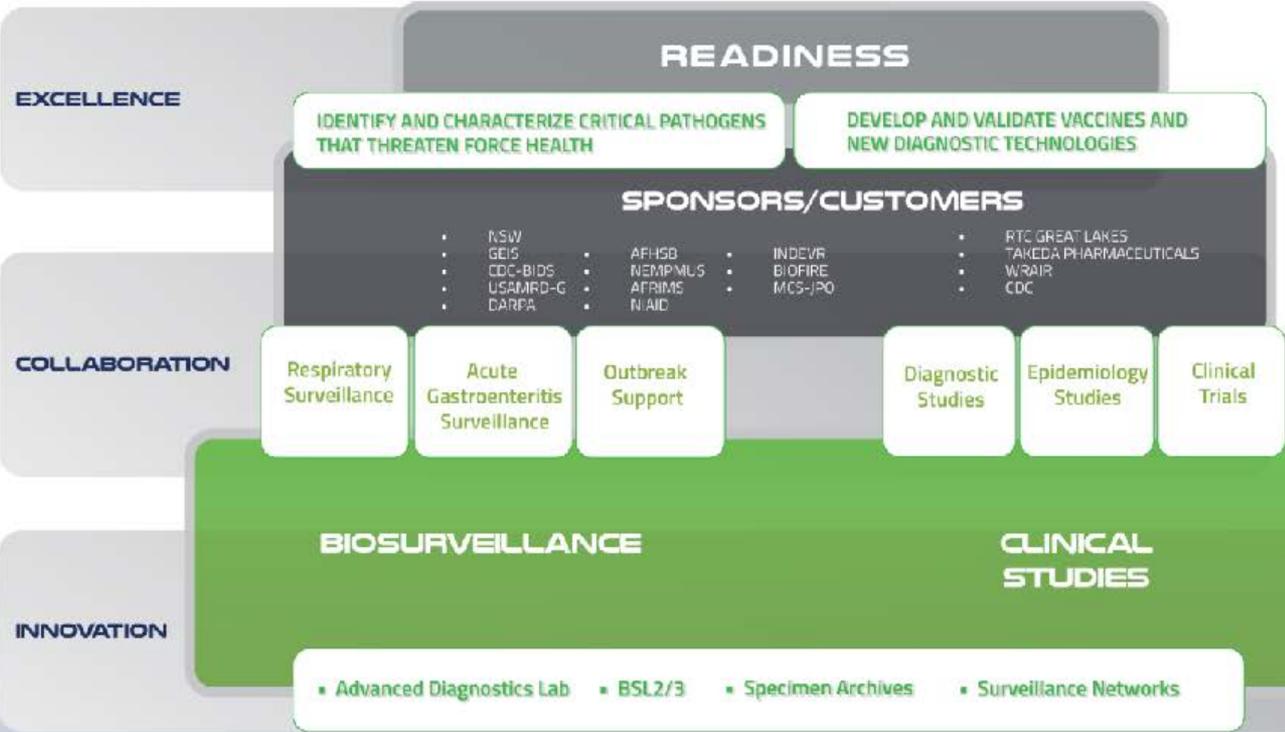
- CHAMPS
- Military Population Health Data Sets
- Medical Registries





Operational Infectious Diseases

Identify Critical Pathogen Threats





Research Capabilities

- Laboratories
- Medical Informatics

Laboratory Capabilities

Warfighter Performance

- Physical and Cognitive Operational Research Environment (PhyCORE) Lab
 - Create immersive virtual reality environments (CAREN)
- Environmental Physiology Lab
 - Replicate operational environmental conditions
 - Environmental Chamber
 - Swim Flume
- Sleep and Fatigue Lab
 - Sleep monitoring and disorder diagnostics using gold standard and innovative technologies
- Functional Fitness Lab
 - Biobehavioral monitoring

Infectious Diseases

- Microbiology Lab
 - Specializes in isolation and identification of respiratory and enteric pathogens
- Molecular Biology Lab
 - Ability to run Emergency Use Authorization Assays for Middle East respiratory syndrome coronavirus, Ebola, H7N9 influenza, enterovirus D68, and the Triplex assay (Zika, Chikungunya, Dengue)
- Specimen Archive
 - Large capacity, state-of-the-art freezer archive with nearly 1 million specimens





Medical Informatics

NHRC Databases

- Expeditionary Medical Encounter Database (EMED)
- Wounded Warrior Recovery Project (WWRP)
- Birth and Infant Health Research (BIHR)
- Career History Archival Medical and Personnel System (CHAMPS)
- Recruit Assessment Program (RAP)
- Millennium Cohort Study
- Millennium Cohort Family Study

Data Collection and Analytical Tools

- Medical Planners' Toolkit (MPTK) (Data Analysis and Interpretation)
- Joint Medical Planning Tool (JMPT)
- Joint Trauma Analysis and Prevention of Injury in Combat (JTAPIC)
- Infectious Diseases Detection and Surveillance Networks

Red = Operational Readiness and Health

Blue = Military Population Health

Green – Operational Infectious Diseases



A photograph of two sailors in white uniforms on a ship's deck. They are silhouetted against a dramatic sunset sky with orange and blue clouds. One sailor is adjusting the American flag on a tall, tripod-style flagpole. The ocean and a dark cliffside are visible in the background.

Success Stories

Bench to Battlefield

Knowledge and Materiel Transitions

- Automated Heat Stress System
 - Incorporated into construction plans for new destroyers
 - On 60+ Navy ships and 50+ shore installations
- OPLANS | Wargaming
 - First time for medical
- Operational Infectious Diseases Surveillance Report
 - Weekly report delivered to clinicians
- Adenovirus Vaccine
- AMAL Standardization
- Highly Realistic Training for Independent Duty Corpsmen
- Rx App (In Production)
- Navy Corpsman Wellness Guide



Bench to Battlefield

Policy Impact

Millennium Cohort Study

- DoD Instruction 6495.02—Sexual Assault Response and Prevention Program updates
- DoD Instruction 5505.18—Investigation of Adult Sexual Assault in the Department of Defense
- Army Directive 2015-40—Implementing Procedures for Anti-Harassment Policy
- Army Directive 2015-10—Sexual Assault Incident Response Oversight Report
- SECNAVINST 1752.4B—Sexual Assault Prevention and Response
- VHA Directive 2010-033—Military Sexual Trauma (MST) Programming

Environmental Physiology Research

- OPNAVINST 5100.19E—Navy Safety and Occupational Health (SOH) Program Manual for Forces Afloat
- Naval/Marine Corps Forces Ashore
 - NAVMED P-5010—Manual of Naval Preventive Medicine
 - MCO 6200.1E—Marine Corps Heat Injury Prevention Program
 - MARADMINS 111/15—Marine Corps Heat and Cold Stress Injury Prevention Program
- Joint guidance contained in TB MED 507/NAVMED P-5052-5/AFP 160-1

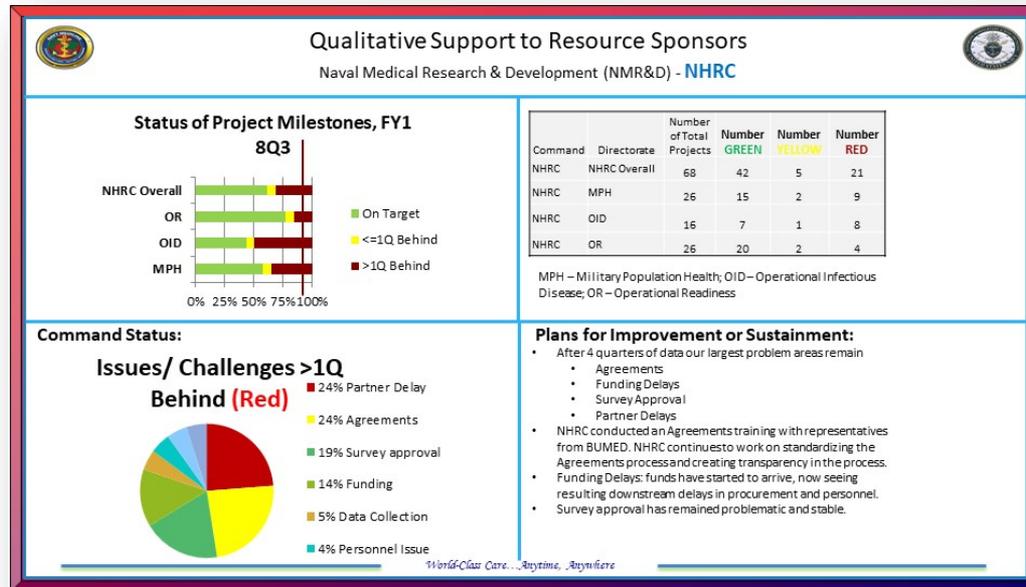




Defense Health Board Findings and Recommendations

Overarching Findings and Recommendations

Centers should establish rigorous metrics to measure outcomes, cost effectiveness, and return on investment.





Overarching Findings and Recommendations

The DoD should create viable, promotable career paths and ensure senior leaders value scientific leadership and careers to combat barriers to professional development in research.

FY19 Commander Promotion Statistics

	# Selects	Percentage		# Selects	Percentage
HCA	20/42	47.62%*	HCA	20/60	33.33%
HCC	13/42	30.95%**	HCC	13/67	19.40%
HCS	9/412	21.43%	HCS	9/49	18.37%

MSC promotion opportunity: 63.64% (42/66)

*2.2 and **1.5 times more promoted than HCS

Navy Health Care Scientists are under-promoted compared with their administrative counterparts

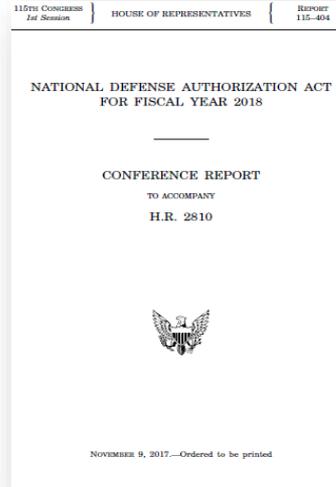


Overarching Findings and Recommendations

Transition contractor positions into government staff positions to reduce challenges created by heavy reliance on contract personnel and address barriers to the timely hiring of civilians.

Navy specific 51% rule

- ≤49% of sponsor funding may be spent on contractor staffing
- NHRC staff mostly contractor support
- Diminished ability to meet mission



Mandated to an STRL Demo Project

- Streamlines HR process and provides flexibilities



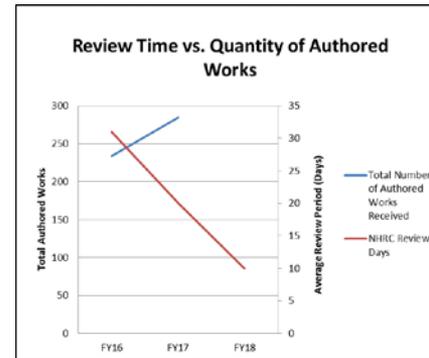
Overarching Findings and Recommendations

NHRC-Developed eProcesses

- ↑ Standardization, transparency, and efficiency
- ↓ Review time
- Developed with SharePoint for authored works and agreements
- Transitionable to NMR&D Enterprise



Authored Works



Processed **575+** authored works;
decreased processing time by **68%**



NHRC Findings and Recommendations

The Navy should encourage the recruitment of experienced researchers as leaders to maintain its quality leadership and significant research accomplishments at NHRC.



NHRC MILCON project will combine all administrative, research, and support functions currently occupying 24 historic WWII-era military barracks into one state-of-the-art facility.





NHRC Findings and Recommendations

The DoD should provide sufficient core funding through Program Objective Memorandum (POM) to reduce multiple sponsor funding and increase stability of research projects.

- Lack of core research funding threatens NHRC's ability to meet strategic objectives and puts research at risk
- BUMED M8 submitted a funding model for POM-20 that could provide 6.6 RDT&E core funding for GS positions



NAVAL HEALTH RESEARCH CENTER

Operational Readiness and Health Directorate

DoD Center for Deployment Health Research

Defense Health Board

27 Aug 2018

MS NREMT, Director

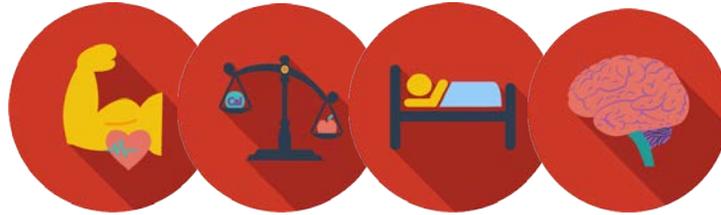


Operational Readiness Directorate

Warfighter Performance

Conducts Human Performance R&D

- Measurement
- Maintenance
- Reset, Recovery
- Enhancement
- Human Modeling
- Stress Mitigation, Inoculation
- Accelerated Rehabilitation
- Primarily Human Subject Oriented Studies
- Performed Both Laboratory and In-field
- Materiel Solution T&E (personal protective equipment [PPE], wearables, sensors)



Operational Readiness Directorate

Warfighter Performance



Optimize warfighter performance or rehabilitation and reset using physical and cognitive studies to enhance readiness, prevent injury, and build resilience

Capabilities:

- Mobile Neural and Physiological Monitoring
- Computerized Dynamic Posturography
- Gait and Balance Analysis Systems
- PhyCORE
- Environmental Chambers
- Dual-energy X-Ray Absorptiometry
- Functional Magnetic Resonance Imaging (access)
- Driving Simulators
- Eye-tracking Devices
- Automatic Heat Stress Systems (AHSS)
- Gunfighter Gym (Conflict Kinetics) Shooting Platform
- Equipment T&E (e.g., PPE, Sleep Assessment)
- Exercise Test (VO2Max, Strength, Power, Torque)

Supported Operational Forces:

- Navy Special Warfare, BUD/S candidates, SOCOM
- Navy EOD; Navy Surface Fleet
- Marine Corps 1st Marine Expeditionary Force
- Marine Corps Recruit Depot, San Diego
- Marine Corps School of Infantry West

Military Relevance/Operational Impact:

- Preventing injury and increasing physical and psychological resilience
- Frontline warfighter recovery (PTSD, TBI)
- Shaping operational ground mobility professional development
- Testing impacts of new PPE on operational human performance
- Optimizing operational performance with virtual environment correlates
- Heat tolerance testing
- Objective Close-Quarters Combat skills evaluation
- Mindfulness training
- Fatigue countermeasures

Products and Successes:

- Peer-reviewed manuscripts and technical reports
- Briefs to leadership
- Prototype testing of helmets, plate carrier, modular armor, full body armor
- Performance strategies
- New rehab programs for amputees, vestibular patients
- EEG recordings for diagnosis, treatment of PTSD, TBI
- Research linking biobehavioral constructs to health and performance
- Physical Readiness Test evaluation/anthropomorphic standards
- Input for Return to Duty vs. MEB dismissal decisions



Operational Readiness Directorate

Warfighter Performance



Conducts Informatics-Oriented R&D

- Operational Medical Decision Support Forecasting and Planning
- Table-top Course of Analysis Tools
- Data Capture, Verification, Integration (non-medical, non-protected health information [PHI])
- Data Created In-house when Non-existent Elsewhere (e.g., SinkEx)
- Data Warehousing (EMedKW) (non-medical, non-PHI)
- Injury/Disease Epi Research (DHA DSAs)



Operational Readiness Directorate

Medical Modeling and Simulation



Supporting readiness through decision support, wargaming, medical intelligence activities, and injury and outcome analysis.

Supported Operational Forces:

- Joint Staff/COCOM medical decision support (funding sponsor)
- DHA/services medical decision support (funding sponsor)
- Continuous Naval Air/Surface/Sub AMAL modernization
- Continuous Marine Corps AMAL modernization
- Continuous Air Force UTC (AMAL) modernization
- Joint/service-specific wargaming support
- Continuous OPLAN development assistance
- Injury epidemiology

Military Relevance/Operational Impact:

- Provide operational planning for each service from POI through Role 3
- Provide operational planning across the ROMO
- Medical sets across services remain efficient and up-to-date
- Real-time casualty data feedback to theater
- Wargaming T&E of OPLANS

Capabilities:

- DoD's sole medical planning M&S development program
 - JMPT – Accredited
 - MPtk – Accredited
- JTAPIC
- Research quality EMED
- Longitudinal WWRP
- Injury and disease epidemiological research tracks
 - Extremity injury (EACE)
 - Rehabilitation outcomes
 - PTSD/mental health
 - Head, face, neck injury

Products and Successes:

- Multiple annual peer-reviewed manuscripts and technical reports
- Wargaming scenario development and execution
- Joint Staff/DHA mandate use of NHRC M&S tools in all medical OPLANS
- Provide near real-time casualty data to intelligence community
- Desktop test and evaluation of emerging technologies and mission scenarios
- DoD's only long-term casualty quality of life tracking program (WWRP)



NAVAL HEALTH RESEARCH CENTER

Operational Infectious Disease Directorate

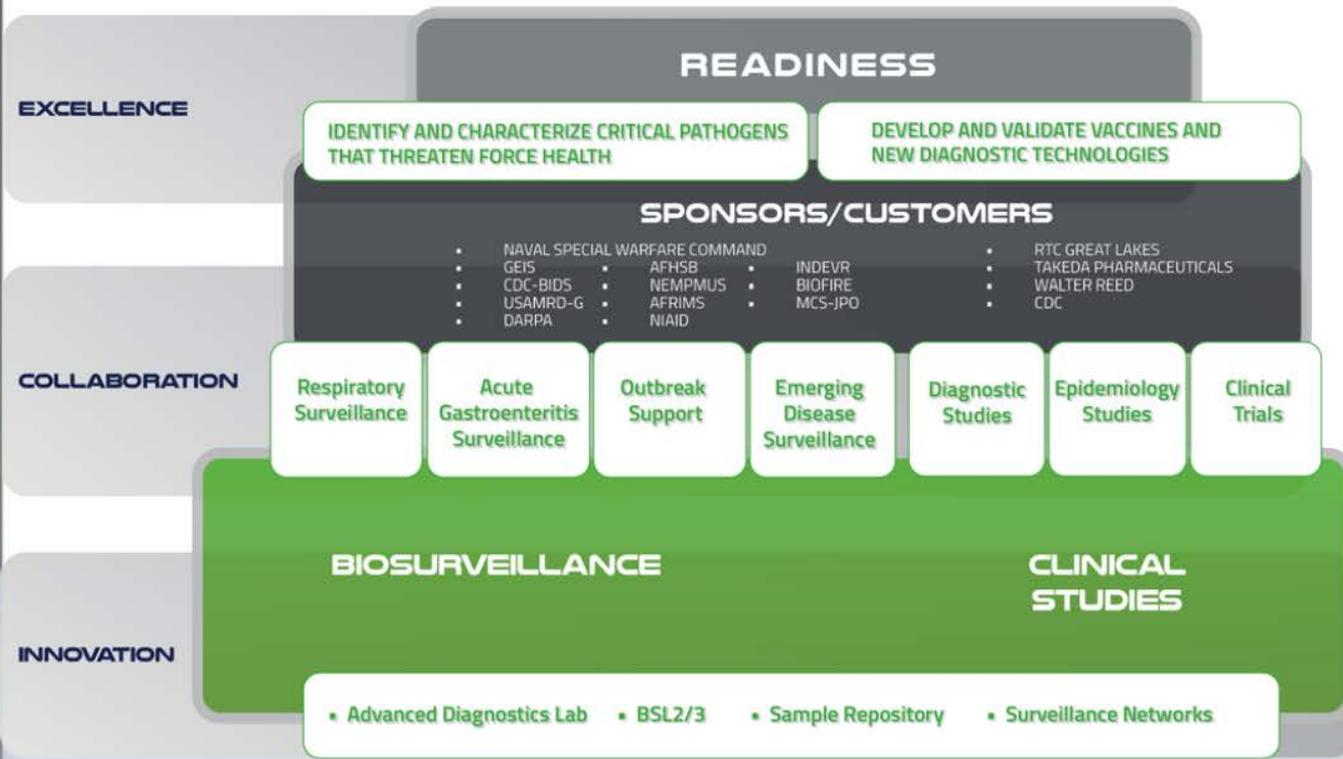
**DoD Center for Deployment Health Research
Director**





Operational Infectious Diseases

We Contribute to Force Health Protection by Identifying Critical Pathogen Threats



OID Surveillance Populations

U.S. Recruits

- 8 sites (6 staffed)
- \approx 2,000 samples/yr

Shipboard/Special Forces

- 17 ships in 3rd, 7th, and USFF Fleets
- \approx 200 samples/yr

DoD Dependents

- 9 staffed sites + Yuma (outside funding)
- \approx 800 samples/yr

U.S.-Mexico Border

- Collaboration with CDC-BIDS and local health departments
- 4 outpatient and 4 hospital (SARI) sites
- \approx 1,200 samples/yr



OID Surveillance Populations



Surveillance Sites:

- Recruit Febrile Respiratory Illness (FRI) Surveillance
- Recruit Acute Gastroenteritis (AGE) Surveillance
- Beneficiaries Febrile Respiratory Illness (FRI) Surveillance
- FRI Surveillance at the U.S.-Mexico Border

↓ Shipboard FRI Surveillance

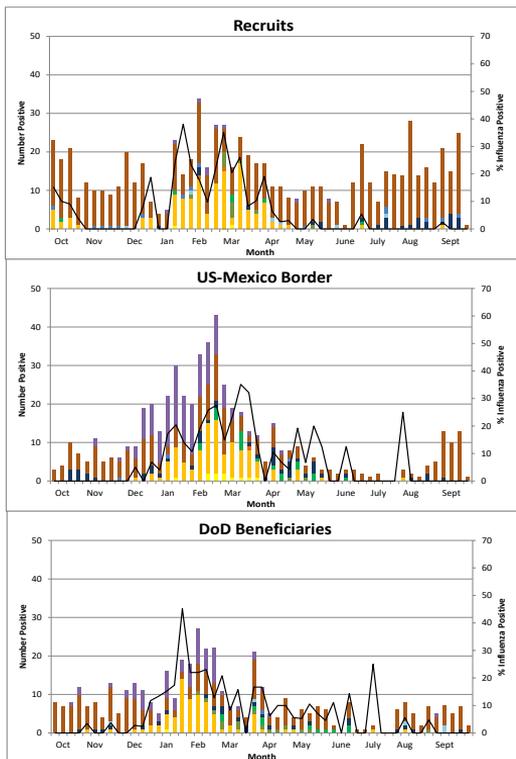
Influenza Diagnostic Collaborators:

■ Centers for Disease Control and Prevention (CDC)

▲ U.S. Air Force School of Aerospace Medicine (USAFSAM)



FY18-19 Results



- RSV
- Rhinovirus
- Mycoplasma pneumoniae
- Chlamydomphila pneumoniae
- Adenovirus
- Flu B/Untyped
- Flu B/Yamagata
- Flu B/Victoria
- Flu A unsubtype
- H3N2
- pH1N1
- % Flu Positive

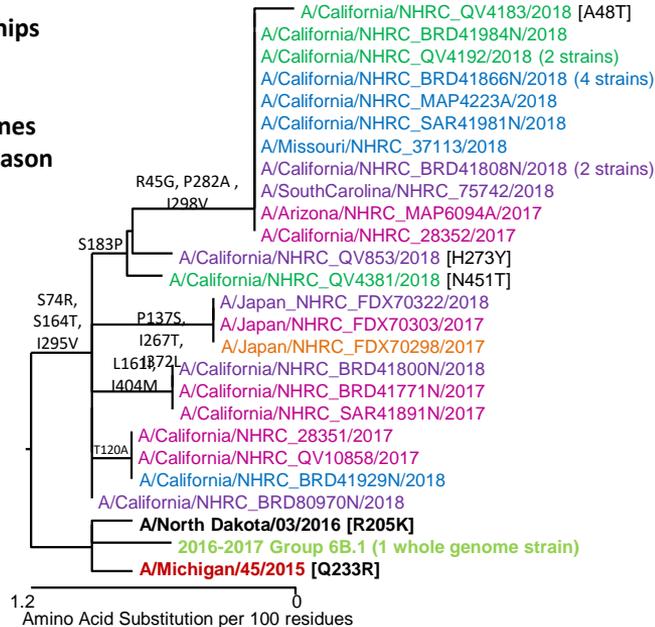


Influenza Sequencing

Evolutionary Relationships Among Influenza (H1N1)pdm09 Hemagglutinin (HA) Genes 2017-2018 Influenza Season

Vaccine Strain
Reference Strain
2016-2017 Consensus
(1 strain)
Nov 2017 (1 strain)
Dec 2017 (7 strains)
Jan 2018 (7 strains)
February 2018 (8 strains)
March 2018 (5 strains)

LOSS GLY: predicted loss of glycosylation
 ADD GLY: predicted addition of glycosylation
 NHRC: Naval Health Research Center
 BRD: US/Mexico Border outpatient
 SAR: US/Mexico Border inpatient
 FDJ: DoD beneficiaries
 JK or no prefix: US Recruit
 SEA: US Special Forces





Reference
Laboratory



Regulatory
Monitoring



Subject Enrollment
POC Diagnostics



Year	Title	Sponsor	Outcome
2008	Meso Scale Diagnostics	CDC/BARDA/HHS	CDC disc.
2008	Nanogen	CDC/BARDA/HHS	CDC disc.
2009	AVC H5	Arbor Vita Corp	510K approval
2009	PlexID pH1N1	Ibis Pharmaceuticals	EUA approval
2009	JBAIDS H5	MCS (JPO-MCBS)	EUA approval
2010	JBAIDS pH1N1	MCS	EUA approval
2011	RPS Influenza	RPS	Suspended
2011	JBAIDS "Big Flu"	MCS	FDA approval
2013	H3N2v JBAIDS	MCS	FDA approval
2013	H7N9 JBAIDS	MCS	FDA approval
2013	JBAIDS: PPEK-PAT	MCS	Equiv. approval
2014	AVC H7N9	AVC	EUA Approval
2016–2018	InDevR	BARDA	Just completed
2017–2021	RAMP	DARPA	Fall 2018 start
2018	Biofire Global Fever	JSTO-MCS	Fall 2018



Clinical Trials

Year	Title	Sponsor	Outcome
2006–2011	Adenovirus 4 & 7 vaccine	DoD, Barr Pharma.	FDA-cleared
2009–2014	ACAM smallpox study	CDC	Safety data with FDA
2014–2018	Norovirus GI & GII vaccine trial	Takeda Pharma.	Enrollment complete
2008–2012	Japanese encephalitis vaccine	IHB	Completed
2012–2018	IRC 003/IRC 004 TCAD studies	NIH/NIAD	Final data analysis



NAVAL HEALTH RESEARCH CENTER

Military Population Health Directorate

DoD Center for Deployment Health Research

Director





Health and Behavioral Sciences Department

Enhancing Psychological and Behavioral Health and Readiness

- Improving Universal Suicide Screening in Primary Care
 - A multi-service effort to empirically develop a more accurate suicide screening instrument for use in military primary care settings
- Improving Sleep to Enhance Health
 - Develop and test an intervention that provides service members with strategies for maximizing their sleep quality in operational settings
 - Evaluate a program that teaches leaders specific techniques for supporting sleep health among their subordinates
- Optimizing Resilience and Performance
 - Adapt and evaluate an evidence-based intervention designed to improve resilience and performance under stress
- Understanding Consequences of Chronic Occupational Overpressure Exposure
 - Investigate occupational overpressure exposure as a risk factor for mTBI/concussion and other medical outcomes





Health and Behavioral Sciences Department

Clinical Treatment Interventions

- Behavioral Activation [BA] + Cognitive Processing Therapy [CPT]
 - Integrate 2 evidence-based psychotherapies (BA + CPT) to treat comorbid PTSD and major depressive disorder (MDD)
- Surf Therapy
 - Evaluate whether a surf therapy program for wounded warriors reduces mental health symptoms
 - Compare the effectiveness of surf vs. hike therapy for service members with MDD
- Improving Military Mental Health Care Providers' Suicide Assessment and Response Practices
 - Develop and assess the effectiveness of a brief training to improve the skill and comfort of providers in assessing and responding to suicidal patients
- Improving Pain Management Materials
 - Adapt a DoD pain management workbook into an interactive mobile app in order to increase accessibility and engagement among clinic patients





Deployment Health Research Department Recruitment Assessment Program

- RAP is the only ongoing baseline health study in military recruits. With over 220,000 Marine recruits surveyed since June 2001, RAP boasts a 91% participation rate. 15,000 Marine recruits are surveyed each year.
- Major Findings
 - Deployment alone in support of the wars in Afghanistan and Iraq was not associated with an elevated risk for suicide, and most suicides occurred among non-deployed active duty Marines.
 - Service members from a military family had more issues dealing with authority prior to service, but higher AFQT scores and better military outcomes (less desertions and higher re-enlistment rates).

RAP





Deployment Health Research Department DoD Birth and Infant Health Research Program

- Established in 1998, by the Assistant Secretary of Defense for Health Affairs, the DoD BIHR program is a retrospective assessment of birth defects and other adverse infant health outcomes.
- BIHR captures approximately 100,000 live births per year, in the United States and overseas. It also captures pregnancy and maternal outcomes among military beneficiaries.
- Active Registries
 - National Smallpox Vaccine in Pregnancy Registry
 - BioThrax[®] (Anthrax) Vaccine in Pregnancy Registry
 - ACAM2000[®] Myopericarditis Registry



Deployment Health Research Department DoD Birth and Infant Health Research Program

Major Findings

- No increased risk of adverse pregnancy or infant outcomes associated with prenatal:
 - Smallpox vaccination (*Clin Infect Dis*, 2008; *Birth Defects Res A Clin Mol Teratol*, 2008)
 - Anthrax vaccination (*Vaccine*, 2017)
 - Pandemic H1N1 vaccine vs. seasonal influenza vaccine (*Vaccine*, 2018)
- Military wives whose husbands were deployed at time of delivery were more likely to develop postpartum depression than wives whose husbands were not deployed (*Arch Gynecol Obstet*, 2015).





NAVAL HEALTH RESEARCH CENTER

The Millennium Cohort Study

Principal Investigator





Study Origin

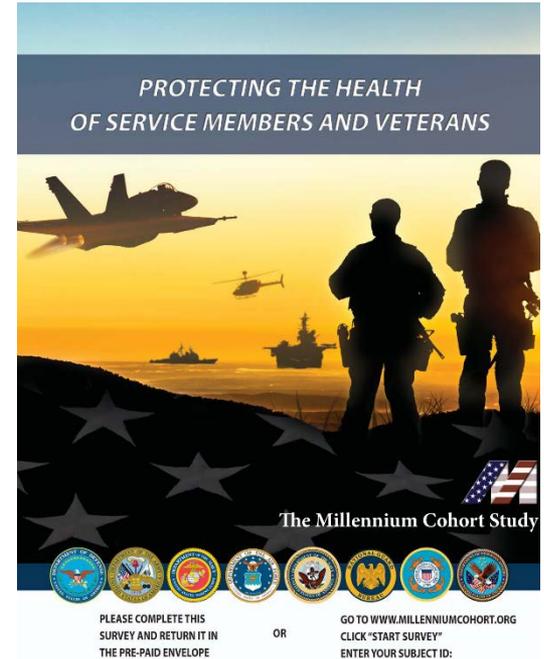
- 1998: DoD, Armed Forces Epidemiological Board, Institute of Medicine recommended a coordinated prospective longitudinal cohort study of service members
 - Newly available DoD surveillance and electronic health care data
- 1999 Strom Thurmond National Defense Authorization Act
 - Sect. 743: Establish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



Millennium Cohort Study

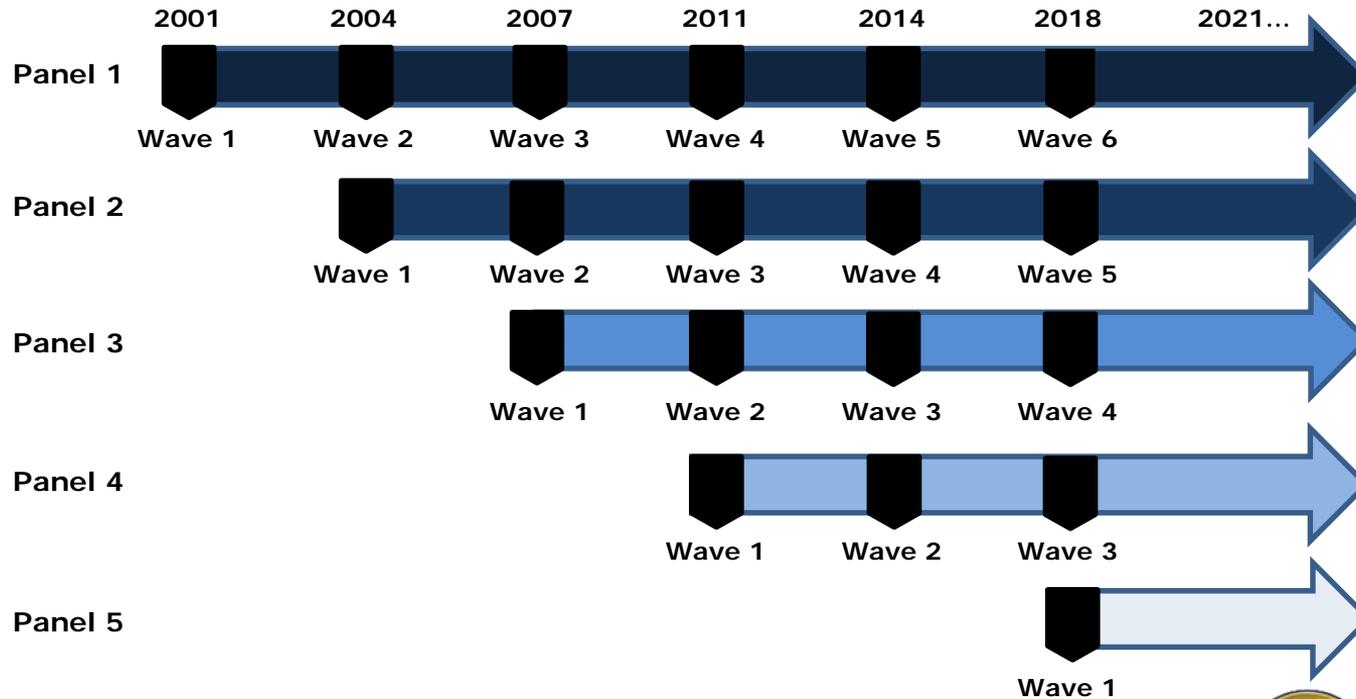


- Largest and longest running cohort study in military history
 - Initiated July 2001 (pre-9/11)
 - Includes all services, active duty, Reserve, and National Guard
- Participants complete surveys every 3 years (planned through 2068)
 - Standardized instruments assess physical and mental health outcomes and health behaviors (e.g., smoking)





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	Females Reserves/Guard Prior deployers*	256,400 (Oct 2000)	214,388	77,019 (36%)
2	Jun 2004–Feb 2006	1–2	Females Marine Corps	150,000 (Oct 2003)	123,001	31,110 (25%)
3	Jun 2007–Dec 2008	1–3	Females Marine Corps	200,000 (Oct 2006)	154,270	43,439 (28%)
4	Apr 2011–Apr 2013	2–5	Females Married	250,000 (Oct 2010)	247,266	50,052 (20%)
5	Nov 2018–Dec 2019	1-4	Females Married	500,000 (Jul 2018)	TBD	100,000 (expected)

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

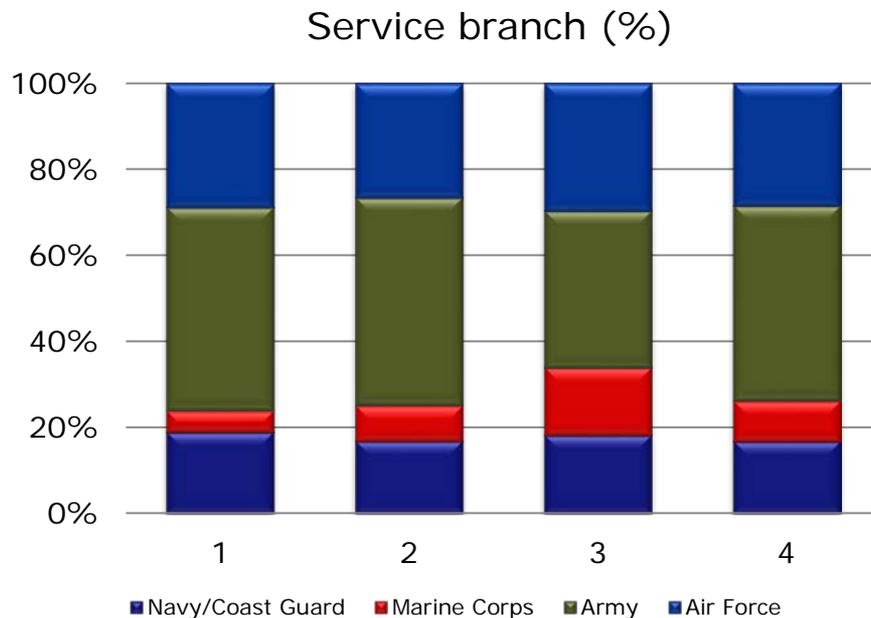


Cohort Profile

(N = 201,620)

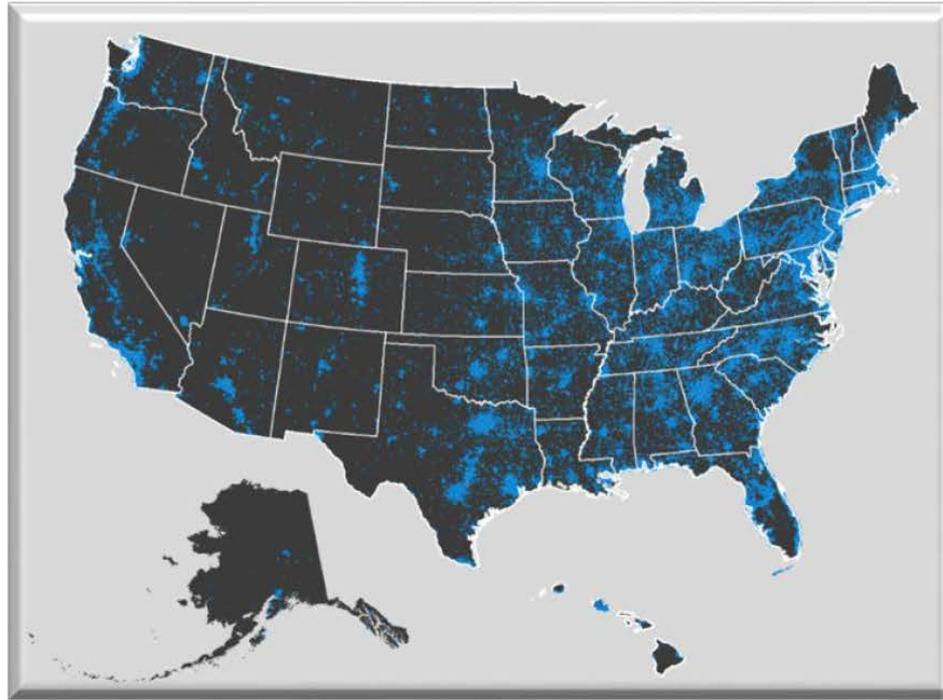


Characteristic	%
Female	31
Non-Hispanic White	70
Enlisted	83
Active component	67
Current status	
Ever deployed	62
Separated	70

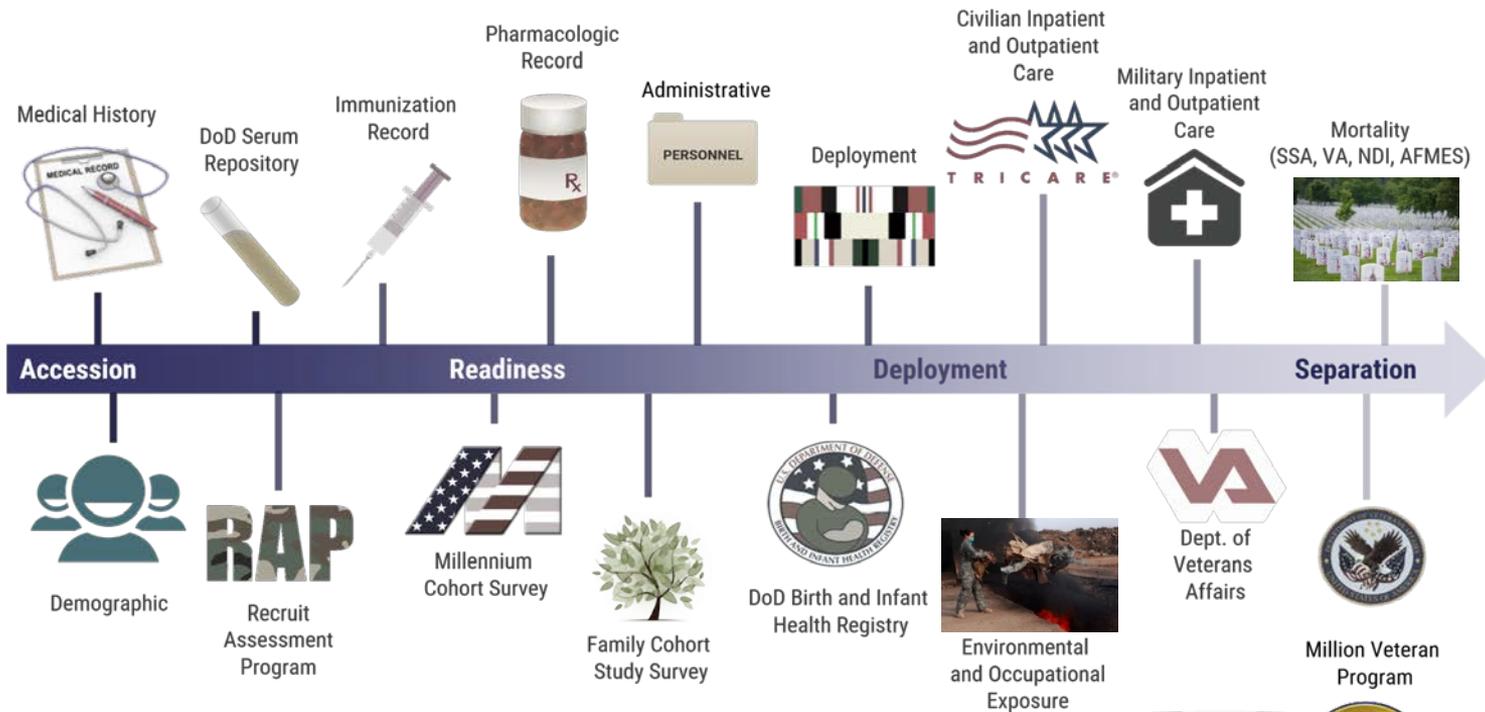




Study Participants (2017)



Complementary Data



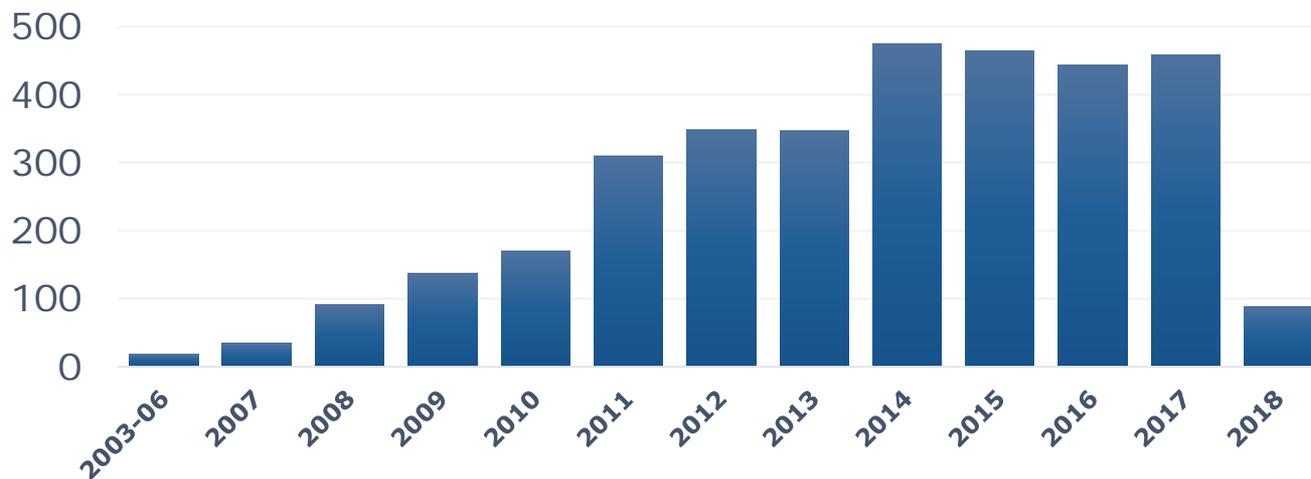


Study Productivity

Active Projects: 40

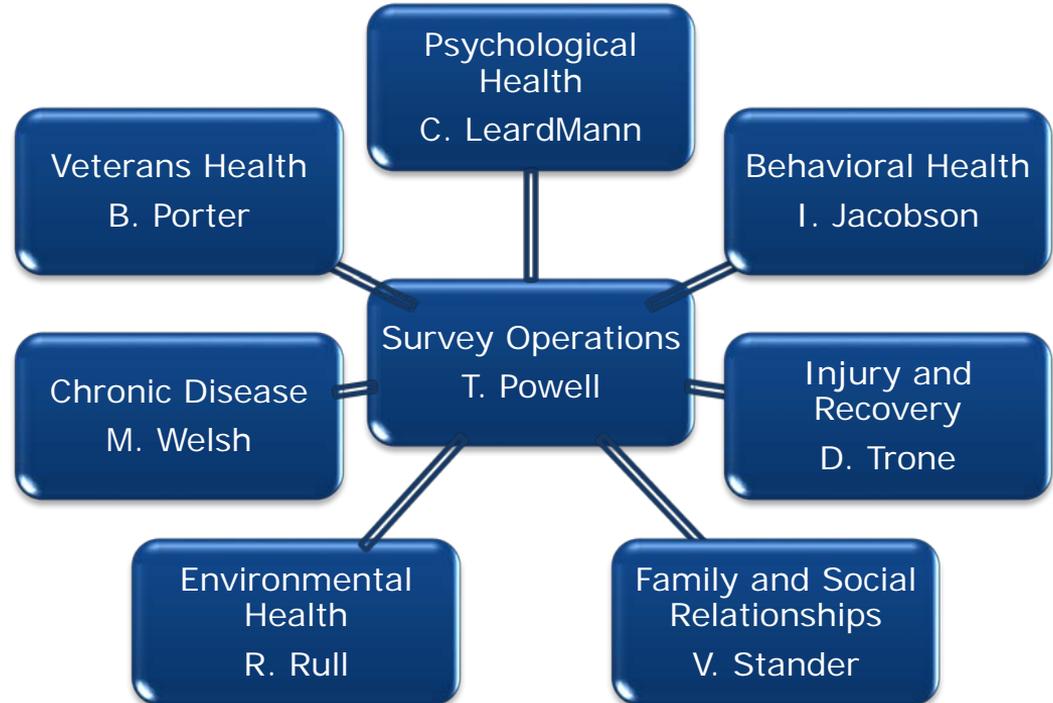
Publications: 101 (3 in press)

Citations by Year



Study Leadership

**Principal Investigator:
Dr. Rudy Rull replaced
CAPT Dennis Faix
(October 2017)**



Psychological Health: Research Priorities



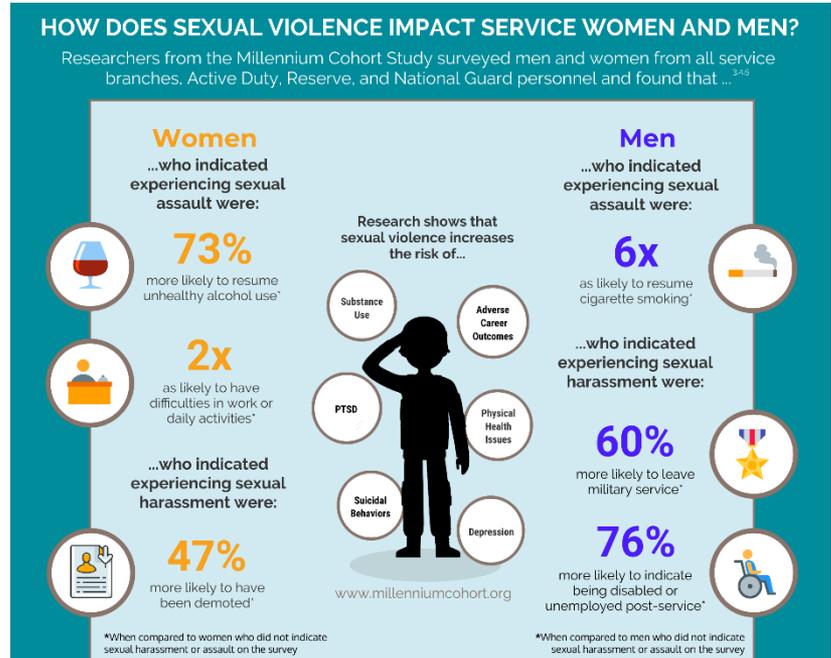
- Impact of service-related experiences, such as combat, on psychological health and well-being
 - Focus on specific occupations: veterinarians and Special Forces
- Long-term patterns and trends of disorders, such as PTSD
 - Co-morbidity of disorders, such as PTSD and depression
 - Specific biomarkers associated with mental disorders (e.g., serum miRNA profiles and PTSD)
- Aspects of military service and/or transitions that increase risk for suicide and suicidal behavior
 - Progression of suicidal behaviors



Behavioral Health: Research Priorities



- Sexual trauma
- Sexual health and gender roles
- Sleep issues
- Modifiable behaviors including substance use





Chronic Disease: Research Priorities



- Cardiometabolic outcomes
 - Obesity
 - Diabetes mellitus
 - Hypertension
 - Cardiovascular disease
- Autoimmune disorders
- Cancer morbidity and mortality
- Chronic disease burden in vulnerable populations, including women, racial/ethnic minorities, and sexual and gender minorities

Who Is At Risk?

While current Service members are less likely to be obese compared with civilians, this rapidly changes around the time of their separation from the military.

Over a 6 year period (~2001-2007), men and women who left the military gained significantly more weight (an average of 12.6 and 13.9 pounds, respectively) compared with continuing Service members (7.7 and 8.8 pounds, respectively).¹



1. Littman AJ, Jacobson IG, Boyko EJ, Powell TM, Smith TC for the Millennium Cohort Study Team. Weight change following US military service. International Journal of Obesity (Lond). 2013 Feb;37(2):244-53.



Environmental Health: Research Priorities



- Airborne hazards and respiratory health (asthma and COPD)
 - Burn pits
 - Deployment proximity to burn pits
 - Serum biomarkers of exposure (DHP JPC-5 funded, collaboration with USACEHR)
 - Fuels and fumes exposures

2018 publication:

Elevated risk of new-onset asthma among deployed personnel who experienced combat vs. deployers without combat experience and non-deployed personnel

Rivera et al. New-onset asthma and combat deployment: findings from the Millennium Cohort Study. *Am J Epidemiol.* 2018 (in press).



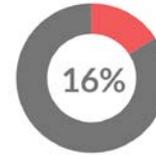
Injury and Recovery: Research Priorities



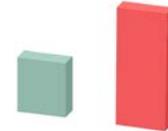
- Musculoskeletal injury
- TBI
- Sensory impairments (vision, hearing)
- Metabolic responses to injuries
- Prescriptions (sedatives, opioids)

BACK PAIN IN THE U.S. MILITARY

Findings from the Millennium Cohort Study



16% of the Service Members reported that they had experienced **recent** back pain.



Those Service Members who deployed and experienced combat had a **38%** higher odds of reporting back pain than non-combat deployers.



58% of the Service Members in this study reported having **repeated** back pain over the survey period of 4 years.

In military personnel, back pain is one of the top reasons for medical visits and lost duty time, and has been associated with pain-related disability.

Other research suggests that deployment length may impact back pain risk due to sustained operations and wearing protective gear for long periods of time. Additional risk factors may include genetics, age, gender, enlisted rank, high workload, smoking and being overweight.



Granado NS, Pietrucha A, Ryan M, Boyko EJ, Hooper TI, Smith B, Smith TC. Longitudinal Assessment of Self-Reported Recent Back Pain and Combat Deployment in the Millennium Cohort Study. Spine. 2016;41:1754-1763.



Family and Social Relationships: Research Priorities



- Relationship formation and stability
- Sexual health, fertility, and pregnancy
- Family violence risk
- Household economic resilience

DEPLOYMENT AND REPRODUCTIVE HEALTH OF SERVICEWOMEN

A PROJECT FROM THE MILLENNIUM COHORT PROGRAM

Study findings indicate that deployment does NOT increase the risk for miscarriage or infertility



Women account for about 17% of the U.S. Armed Forces
>250,000 Servicewomen deployed in support of OEF/OIF

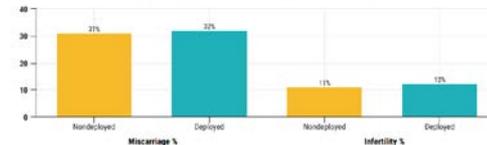
As many as 1 in 3 pregnancies end in miscarriage among US women



About 12% of women in the US have difficulty getting pregnant

What the study found...

Researchers examined data from 14,549 female Millennium Cohort Study participants aged 18-45 who completed two surveys over a three year time period



Deployment did NOT increase the risk for miscarriage or infertility



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
- Diseases with long latency periods (cancer, dementia)
- Post-deployment health concerns
 - Gulf War illness/Chronic multisymptom illness

New capability:
Linkage of VA data with
Millennium Cohort Study data

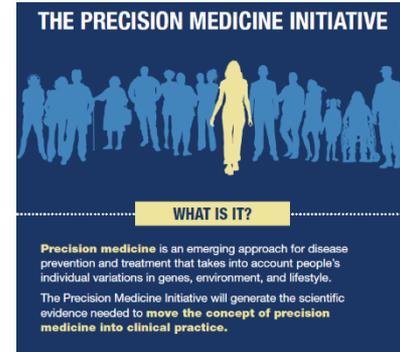
- Data Use Agreement signed
August 2018



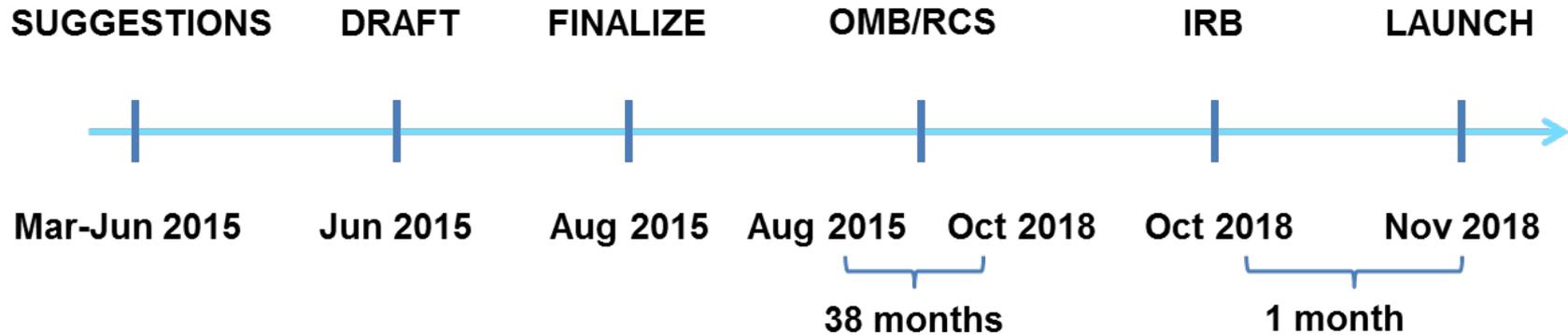
Millennium Cohort: VA MVP Collaboration



- DoD-VA partnership to facilitate expansion of VA Million Veteran Program (MVP) by co-enrolling Millennium Cohort participants
 - DoD-VA Memorandum of Agreement signed March 2017
 - Current: 6,200 MilCo veterans enrolled in MVP
 - MVP survey
 - Whole blood collected for whole genome sequencing
- Cohort panel presentation at Military Operational Readiness: Precision Medicine Research conference (May 2017)



~~2017~~ 2018 Launch Timeline



FY19 Funding Realignment



- Study core funding will be transferred from MOMRP Army Core to DHA as a directed requirement (DHP RDT&E)



Stakeholder Research Requests



- USSOCOM/Preservation of the Force and Family (POTFF)
 - Mental and physical health of Special Operations Forces
- Army Office of the Surgeon General
 - Mental and behavioral health of Army veterinarians and veterinarian technicians
 - Study results included in briefing to Chief of Army Veterinary Corps (August 2018)
- Department of Veterans Affairs
 - Health of Gulf War veterans



Stakeholder Research Requests



- Assistant Secretary of Defense for Health Affairs
 - Burn-pit exposure and respiratory health
- Deputy Assistant Secretary of Defense Office of Personnel and Readiness, Health Services Policy and Oversight
 - Obesity and deployment
 - Analyses requested by Dr. Donald Shell to inform Medical and Personnel Executive Steering Committee (MEDPERS) on revising body composition standards
 - Close Combat Lethality Task Force (CCLTF)
 - Millennium Cohort Program and previous studies featured as a population health resource to inform performance and readiness optimization



Knowledge Transitions



- Knowledge Transition Agreement (KTA) signed
 - POTFF/SOCOM
 - SAPR: Sexual trauma manuscripts
- KTA approval pending
 - DSPO: Suicide progression, risk factors, and high-risk groups
 - MC&FP: Family-related knowledge products
- KTA in development
 - USU Center for Deployment Psychology: Results relevant to educational programming for military service providers
 - Deputy Assistant Secretary of Defense Office of Personnel and Readiness, Health Services Policy and Oversight: Requested obesity and deployment analyses
 - Humana Military (contractor for TRICARE East)



Future Directions

- Veteran-focused module in future surveys
- Linkage with cancer registries
 - DoD Consolidated Cancer Registry
 - VA Central Cancer Registry
 - States (Virtual Pooled Registry)
- Potential for biospecimen collection in future surveys



Questions?





NAVAL HEALTH RESEARCH CENTER

The Millennium Cohort Family Study

Principal Investigator





Family Study Background



- DoD recommended conducting research on post-deployment adjustment for family members
- Abt Associates submitted “Family Impact Study” proposal to the MOMRP. MOMRP partnered Abt with NHRC to benefit from existing survey implementation infrastructure
- A multidisciplinary team of investigators from NHRC, Abt Associates, Duke University, and New York University formed to co-lead the Family Study

“Our ultimate goal is...to ensure that the health and well-being of our military personnel and their families is at the top of our list of priorities. Apart from the war itself, we have no higher priority!”



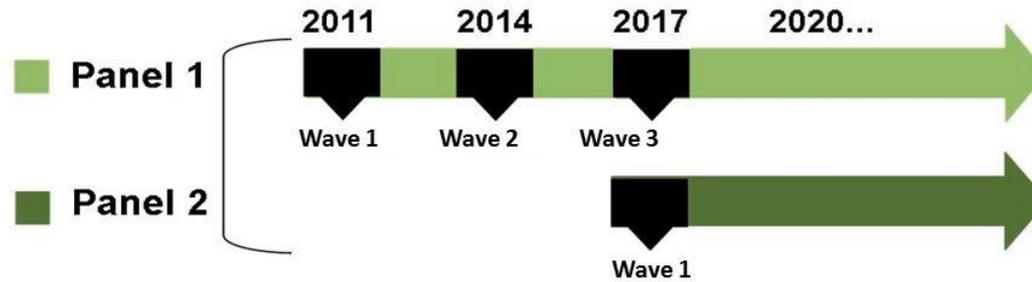
Family Study Methodology



- Recruit participants using a common baseline sampling frame in coordination with the Millennium Cohort Study
- Develop a comprehensive database including self-report and archival data from service members and spouses (i.e., dyadic)
- Conduct follow-up surveys approximately every 3 years in tandem with the Millennium Cohort survey cycles
- Promote internet-based electronic survey response, with paper mail survey options only offered to late responders



Family Study Enrollment



Panel	Enrollment Dates	Oversampled Groups	Total Eligible	Total Enrolled
1	Apr 2011–Apr 2013	Females, married	28,603	9,872 (35%)
2	Sep 2017–Sep 2019	Females, married special forces	175,000	~50,000 (33% projected)

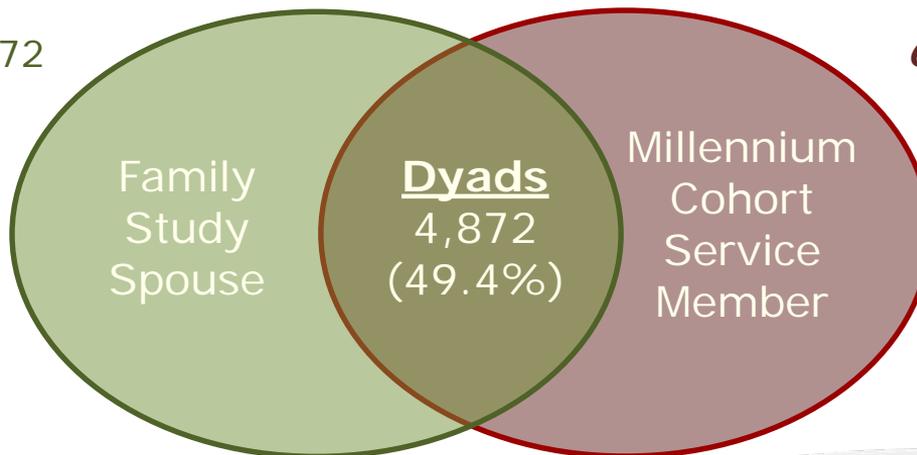




Family Study Panel 1 Progress

- At baseline, the Millennium Cohort Program enrolled 9,872 married dyads.
- At wave 2, a total of 4,872 dyads responded to a follow-up survey.

6,625/9,872
(67.1%)



6,447/9,872
(65.3%)





Family Study Panel 2 Progress

- Maximize response rates by encouraging early responders to engage their married partners.
- Dual-enroll single parent service members in the Family Study to complete a brief parenting and child well-being module.

YOUR CHILDREN

We would like to ask you about your children and parenting. We realize that these questions are sensitive, but it is important as accurately as you can. Your answers will provide insight into how families and children are coping with military life. We assure that the information you share will not be reviewed by any medical provider to inform decisions about treatment. If you fit medical care or counseling, you should make contact with an appropriate medical provider.

You noted that you have 2 child(ren) and 2 child(ren) live(s) in your household. Please answer the following questions for each of these years old or younger.

	Age	Gender	Relationship to you (if more than one option applies, pick the lowest number)	Does this child currently share a household with you?	the year?
Child 1	7	Male			
Child 2					

1 - Biological
 2 - Adopted
 3 - Legal guardian

[Add Child](#)

You're invited to the Family Study!

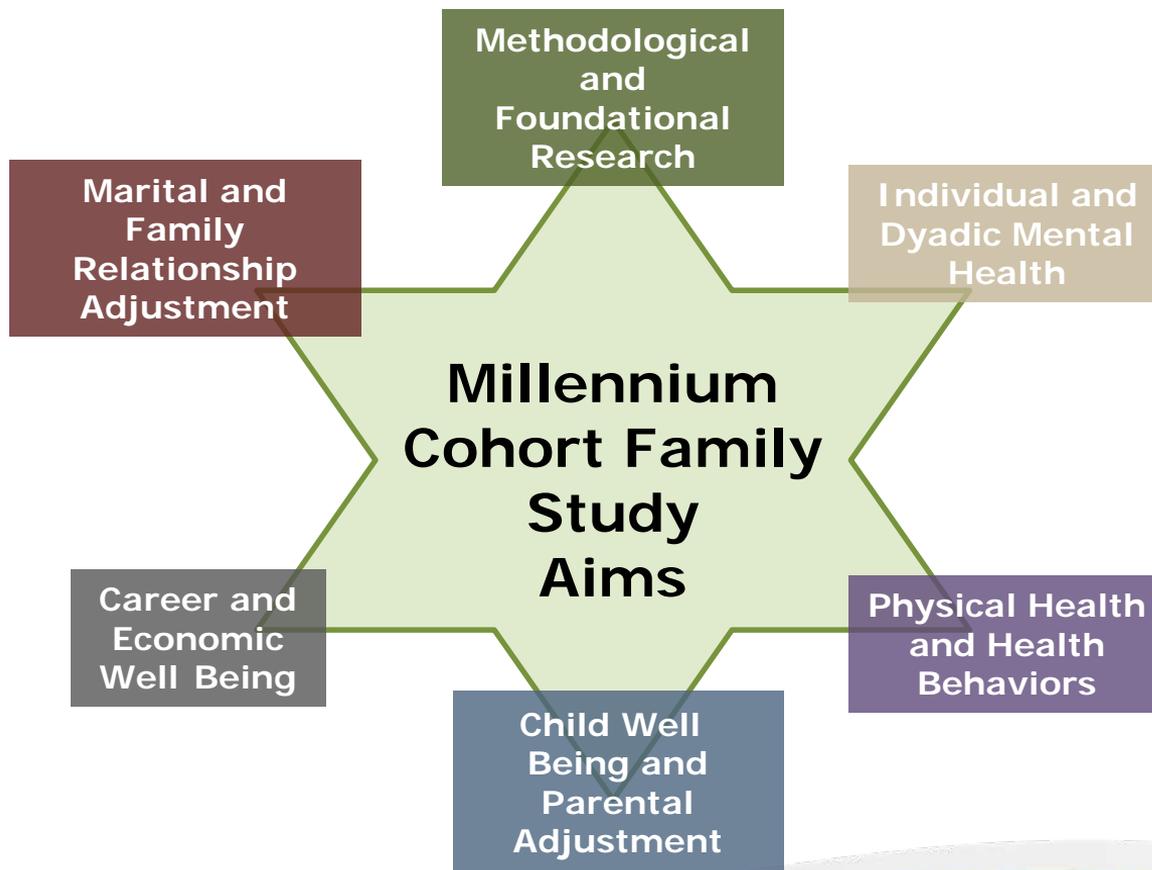


We need your help! For an **additional \$10 gift card**, you are invited to complete a brief 15-20 minute survey. This survey asks questions about your children and family life.

As a single service member with children, your experiences are important to our understanding of military families.

[Yes, take me to the brief survey now!](#)
[Yes, remind me later!](#)
[No, not interested](#)





Featured Program Area: Child Well-Being



➤ Child Domain Mission

- To examine the impact of military and nonmilitary stress on family functioning and an array of child processes (i.e., vulnerability to resilience) using a developmental framework (i.e., from infancy through adolescence)

➤ Research Priorities

- Child well-being
- Parenting
- Fertility and birth
- Adverse events

Mental Health of Children of Deployed and Nondeployed US Military Service Members: The Millennium Cohort Family Study

John A. Fairbank, PhD,*†‡ Ernestine C. Briggs, PhD,†‡§ Robert C. Lee, MS,†‡ Nida H. Corry, PhD,||
Jacqueline C. Pflieger, PhD,*† Ellen T. Gerrity, PhD,†‡ Lisa M. Amaya-Jackson, MD, MPH,†‡§
Valerie A. Stander, PhD,** Robert A. Murphy, PhD‡§

ABSTRACT *Objective:* Families experience multiple stressors as a result of military service. The purpose of this study was to investigate the associations among service member deployment experiences, family and military factors, and children's mental health using baseline data from the Millennium Cohort Family Study, a study designed to evaluate the health and mental health effects of military service on families, including children. *Method:* This study examined administrative data on deployment status (combat, noncombat, and no deployment), as well as service member- and spouse-reported data on deployment experiences and family functioning in relation to the mental health of children in the family who were aged 9 to 17 years. *Results:* Most children were not reported to have mental health, emotional, or behavioral difficulties regardless of parental deployment status. For an important minority of children, however, parental deployments with combat, compared with those with no deployment, were associated with a parental report of attention-deficit disorder/attention-deficit hyperactivity disorder and depression as diagnosed by a clinical provider, after accounting for demographics, psychosocial context, and military factors. Children's odds of a parental report of depression were significantly higher in both the combat and the noncombat deployment groups than in the no deployment group. *Conclusion:* These findings extend our understanding of the association between parental deployments and children's mental health, with implications for services and training mental health providers serving military families.

J Dev Behav Pediatr 00:1–10, 2010) **Index terms:** military-connected youth, children's mental health, family stress, military deployments, combat experience.

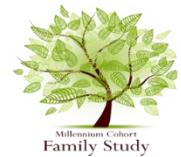
As of 2015, the families of US military personnel were estimated to include 1,819,659 dependent children, with

37.4% aged 0 to 5 years, 31.1% aged 6 to 11 years, 24.4% aged 12 to 18 years, and 7.1% aged 19 to 22 years.¹ Recent findings from large state and national surveys of the general population of youth in the United States, such as the California Healthy Kids Survey and the National

From the *MidAtlantic (VBN) Mental Illness Research, Education and Clinical Center, Durham VA Medical Center, Durham, NC; †UGA/Duke University National Center for Child Traumatic Stress, Durham, NC; ‡Department of Ps-



Child Well-Being: Collaborative Work



SUPPORTING THE HEALTH & FUTURE OF MILITARY KIDS
HIGHLIGHTING TWO EFFORTS AT NHRC

CHILDREN ARE INTEGRAL MEMBERS OF MILITARY FAMILIES
Service-related stressors may impact the health of military children: moves, unique exposures, & hazardous duties by service members

NHRC conducts research to evaluate the health of military kids, from birth through adolescence, to promote a bright future for them.

BIRTH AND INFANT HEALTH RESEARCH

2003-2016 1.5 MILLION infants monitored

Goals: monitor the health of infants born to military families.

BORN TO:

- 41% Active duty women
- 65% Married spouses
- 60% Military service
- 66% Non-Hispanic white spouses
- 78% Spouses with less than a college education

BIHR DEFINES BASELINE INFANT HEALTH METRICS

Outcomes can vary based on type & timing of exposure.

Exposures can include: geographic location, deployment, or vaccines.

Examples: Birth defects, Growth problems in utero & in infancy, Preterm births.

BIHR, established in 1998, assesses if the outcomes among exposed groups differ from baseline/expected levels.

MILLENNIUM COHORT FAMILY STUDY

EST. 2011 Millennium Cohort Family Study surveys spouses to determine if, and how, deployment experiences and service member readjustment impact family health and well-being.

Family Study participants or married to service members who have 2-5 years of service and are part of the Millennium Cohort Study. This allows a complete picture of these families' unique experiences.

DEPLOYMENT AND MENTAL HEALTH OF MILITARY KIDS

Deployments can be STRESSFUL for families.

Most children appear to be doing well. But, during or after deployment, children may have a greater likelihood of ADHD or depression.

What can spouses do to reduce risk? Odds are lower when spouses at home can remain engaged in normal social activities.

70% of Family Study participants encountered at least one deployment.

70% of Family Study participants encountered at least one deployment.

MILLENNIUM COHORT FAMILY STUDY

EST. 2011 Millennium Cohort Family Study surveys spouses to determine if, and how, deployment experiences and service member readjustment impact family health and well-being.

~10,000 participants

At the time of the 1st survey >60% have kids, most ages 1-5.

60%

Family Study participants or married to service members who have 2-5 years of service and are part of the Millennium Cohort Study. This allows a complete picture of these families' unique experiences.

DEPLOYMENT AND MENTAL HEALTH OF MILITARY KIDS

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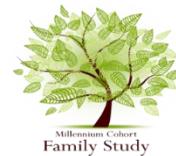
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Child Well-Being: Collaborative Work



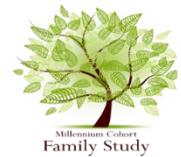
➤ Parental Stress and Infant Health

- Large sample (range of 6,000–20,000 infants by model) of military parents with linked data from Millennium Cohort and NHRC BIHR program
- Complimentary maternal and paternal analyses
- Multiple birth outcomes: birth defects in the first year, growth problems in utero, growth problems in infancy, preterm birth, alterations in sex ratio (indicating fertility problems)





Child Well-Being: Research Directions



- **Expanding resources on adverse childhood events (ACE)**
 - Family Study and Millennium Cohort Studies have been linked to Family Advocacy Central Registry met criteria reports of child abuse and neglect.
 - At the request of the DoD Office of Military Community and Family Policy (MC&FP), a measure has been added to obtain parental reports of child ACE exposure.
 - A new measure has been added assessing parental engagement as a proximal protective factor for neglect.
 - Under the guidance of the DoD Family Advocacy Program, a screening tool has been added for possible intimate partner violence in the home.





Child Well-Being: Adverse Events



Did [SAMPLE CHILD] ever live with a parent or guardian who got divorced or separated after [SAMPLE CHILD] was born?	Yes/No
Did [SAMPLE CHILD] ever live with a parent or guardian who died?	Yes/No
Did [SAMPLE CHILD] ever live with a parent or guardian who served time in jail or prison after [SAMPLE CHILD] was born?	Yes/No
Did [SAMPLE CHILD] ever see or hear any parents, guardians, or any other adults in [his/her] home slap, hit, kick, punch, or beat each other up?	Yes/No
Was [CHILD] ever the victim of violence or witnessed any violence in [his/her] neighborhood?	Yes/No
Did [SAMPLE CHILD] ever live with anyone who was mentally ill or suicidal, or severely depressed for more than a couple of weeks?	Yes/No
Did [SAMPLE CHILD] ever live with anyone who had a problem with alcohol or drugs?	Yes/No
Since [SAMPLE CHILD] was born, how often has it been very hard to get by on your family's income, for example, it was hard to cover the basics like food or housing?	1: Very Often 2: Somewhat Often 3: Not Very Often 4: Never



Future Directions: Research



- Expand portfolios and programmatic planning process
- Enroll Family Study Panel 2
- Evolve study content to match an evolving participant base
- Encompass full range of relevant DoD/VA archival data
- Extend research collaborations
- Engage key stakeholders (MC&FP and their chain of command, SOCOM, VA, TVPO, SAPRO, Humana Military)
- Explore ways to disseminate a range of research deliverables
 - Educational information such as public health messaging and infographics (support personnel, military families, general public)
 - Answers to direct questions from stakeholders
 - Recommendations for programs and policies
 - Directions for future research



Future Directions: Networking



- Family Study and Millennium Cohort have public facing websites providing information on study progress, guidelines for collaboration, and searchable research publications
- Millennium Cohort Program keeps a list serve of researchers, providers, and stakeholders interesting in regularly receiving study products
- Family Study maintains a list of researchers interested in collaborating and strives to include an external subject matter expert (SME) on every project
- Family Study accepts external proposals for projects within our research objectives; proposals are reviewed and approved by a committee of SMEs
- Family Study has limited ability to provide analytic support for external projects, and does not provide monetary support





Questions?

www.familycohort.org

www.millenniumcohort.org

