



NAVAL HEALTH RESEARCH CENTER

Gulf War Veterans in the Millennium Cohort Study

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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.



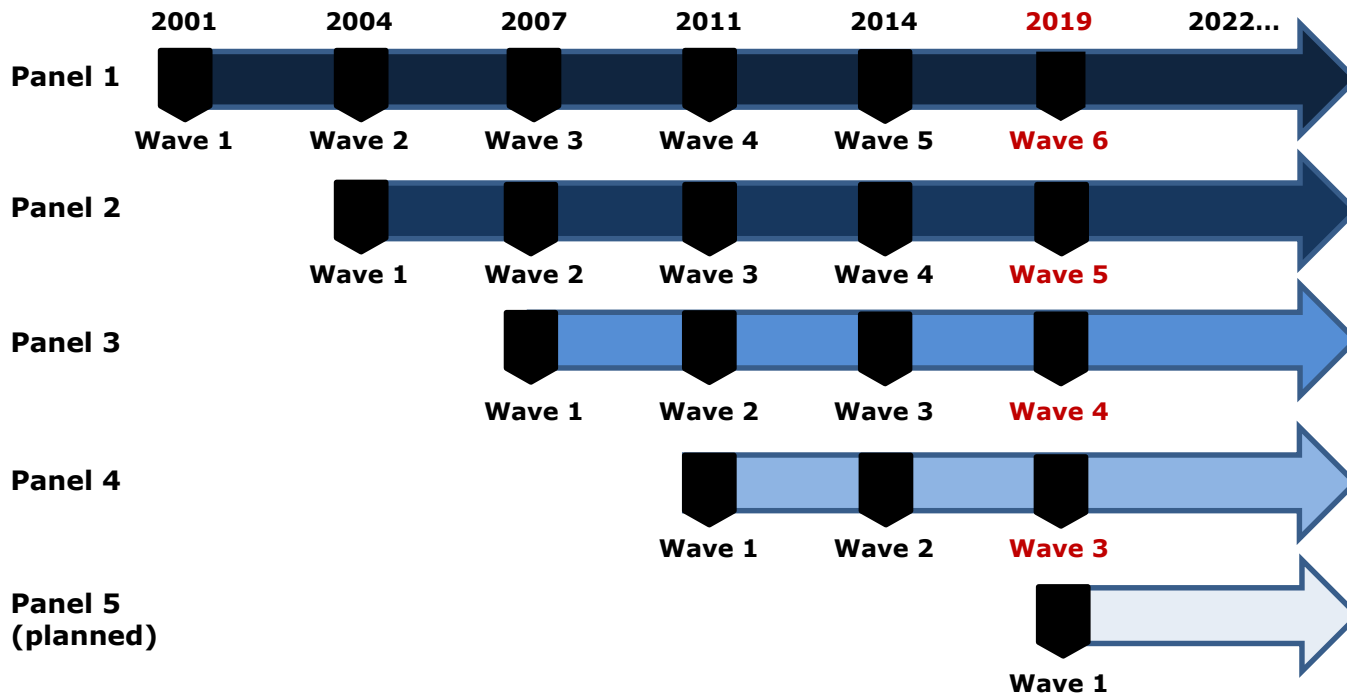
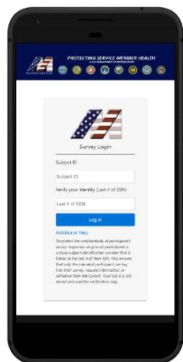
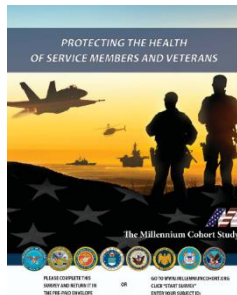
Study Origin in Gulf War



- 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 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
 - NHRC designated as the DoD Center for Deployment Health Research



Multiple-Panel Design



Enrollment Panels (N = 201,620)

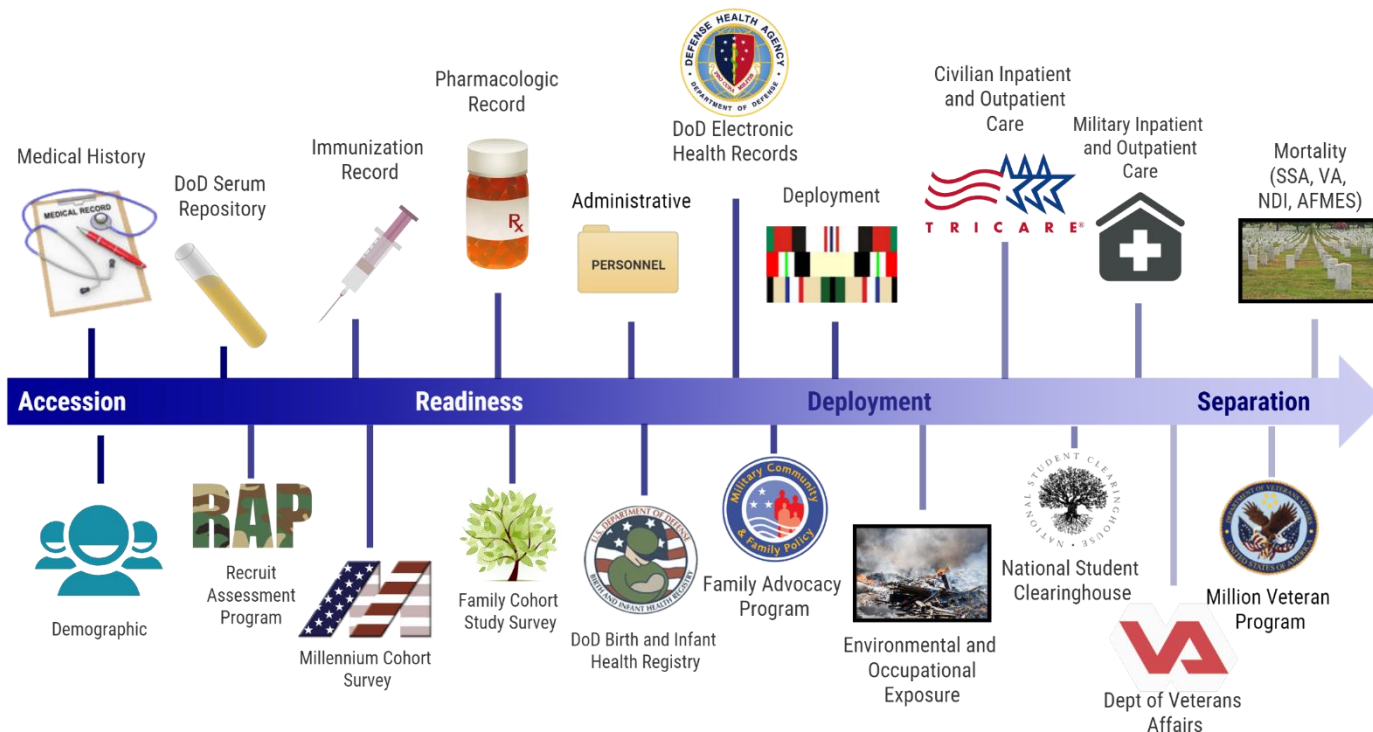


Panel (Group)	Enrollment Dates	Years of Service at Enrollment	Oversampled Groups	Roster Size (Date)	Total Contacted	Total Enrolled (%)
1	Jul 2001–Jun 2003	Unrestricted	Females Reserves/Guard Prior deployers*	256,400 (Oct 2000)	214,388	77,019 (36%)
2	Jun 2004–Feb 2006	1–2	Females Marine Corps	150,000 (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	TBD	1–4	Females Married	500,000 (TBD)	TBD	100,000 (expected)

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



Complementary Data



Manuscripts



Porter, B., Long, K., Rull, R. P., & Dursa, E. K. (2018). Health status of Gulf War and era veterans serving in the military in 2000. *Journal of Occupational and Environmental Medicine*, 60, e261–e267.

- Described the population of Gulf War and era veterans enrolled in the Millennium Cohort Study
- Compared the Millennium Cohort Study 2011–2013 survey and VA’s Follow-up Study of a National Cohort of Gulf War and Gulf War Era Veterans (2012) on self-reported conditions and standardized instruments

Porter, B., Long, K., Rull, R. P., & Dursa, E. K. (In Press). Prevalence of chronic multisymptom illness/Gulf War illness among Millennium Cohort participants, 2001–2016. *Journal of Occupational and Environmental Medicine*.

- Compared prevalence of CMI/GWI over time between (1) Gulf War Veterans, (2) Era Veterans, and (3) non-Era Veterans
- Across five time points assessed between 2001 and 2016



HEALTH STATUS OF GULF WAR AND ERA VETERANS SERVING IN THE MILITARY IN 2000

Porter, B., Long, K., Rull, R. P., & Dursa, E. K. (2018). Health status of Gulf War and era veterans serving in the military in 2000. *Journal of Occupational and Environmental Medicine*, 60, e261–e267.



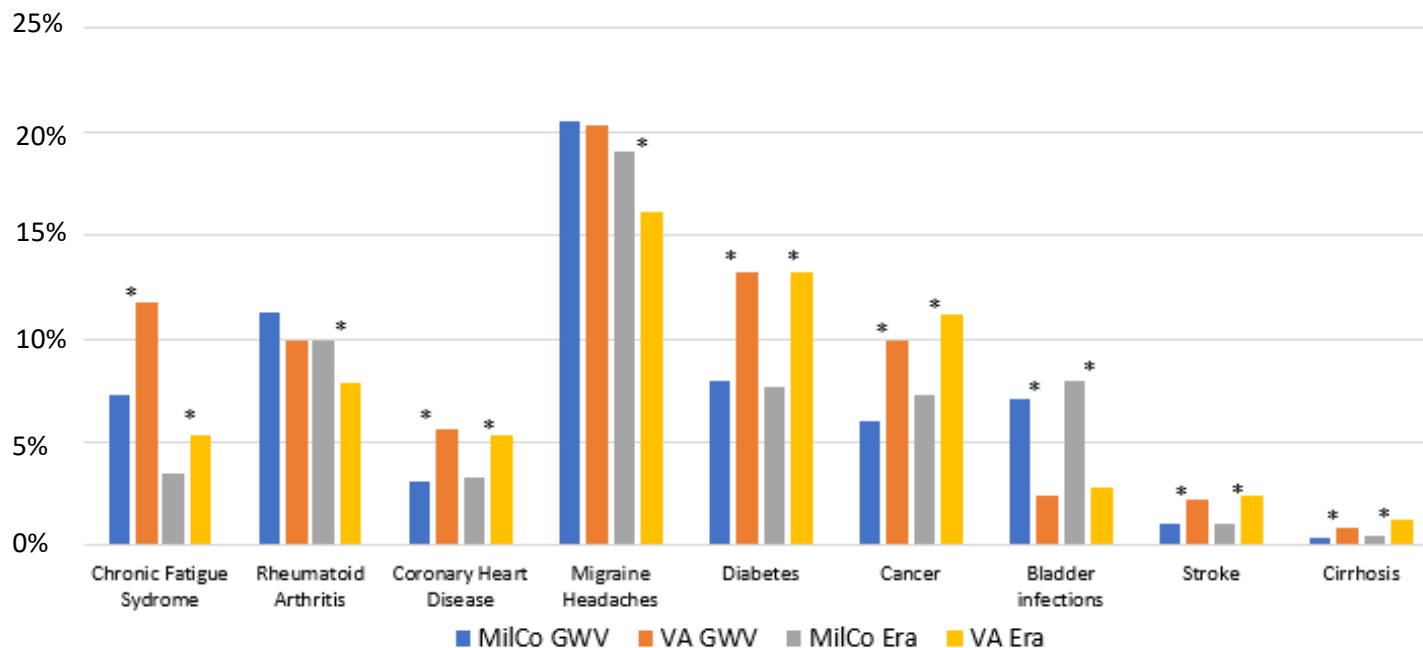
Demographics/Exposures of Enrolled Participants



	GWV (N = 9,130)	Era (N = 36,132)		GWV (N = 9,130)	Era (N = 36,132)
Sex			Exposures reported, 2001–2003		
Female	1,279 (14.0%)	8,594 (23.8%)	Combat-like	6,156 (67.4%)	18,163 (50.3%)
Age in 1991			Chem/bio agents	1,663 (18.2%)	1,382 (3.8%)
17–25	2,798 (30.7%)	9,358 (25.9%)	Chem/bio countermeasures	2,731 (29.9%)	1,332 (3.7%)
26–32	4,159 (45.6%)	14,537 (40.2%)	Chem/bio alarms	5,386 (59.0%)	4,216 (11.7%)
33–39	1,511 (16.6%)	7,464 (20.7%)	Other deployments		
40+	662 (7.3%)	1,591 (4.4%)	Kosovo, Bosnia, or SW Asia, 1998–2000	3,550 (38.9%)	10,131 (28.0%)
Military branch in 1991			OEF/OIF (until 2016)	4,631 (50.7%)	15,292 (42.3%)
Army	4,547 (49.8%)	15,436 (42.7%)	Response to follow-up		
Navy/Coast Guard	1,769 (19.4%)	7,083 (19.6%)	2004–2006	7,101 (77.8%)	28,138 (77.9%)
Marine Corps	739 (8.1%)	1,142 (3.2%)	2007–2009	6,984 (76.5%)	28,247 (78.2%)
Air Force	2,075 (22.7%)	12,471 (34.5%)	2011–2013	6,551 (71.8%)	26,632 (73.7%)
Service component in 1991					
Active duty	7,364 (80.7%)	18,254 (50.5%)			



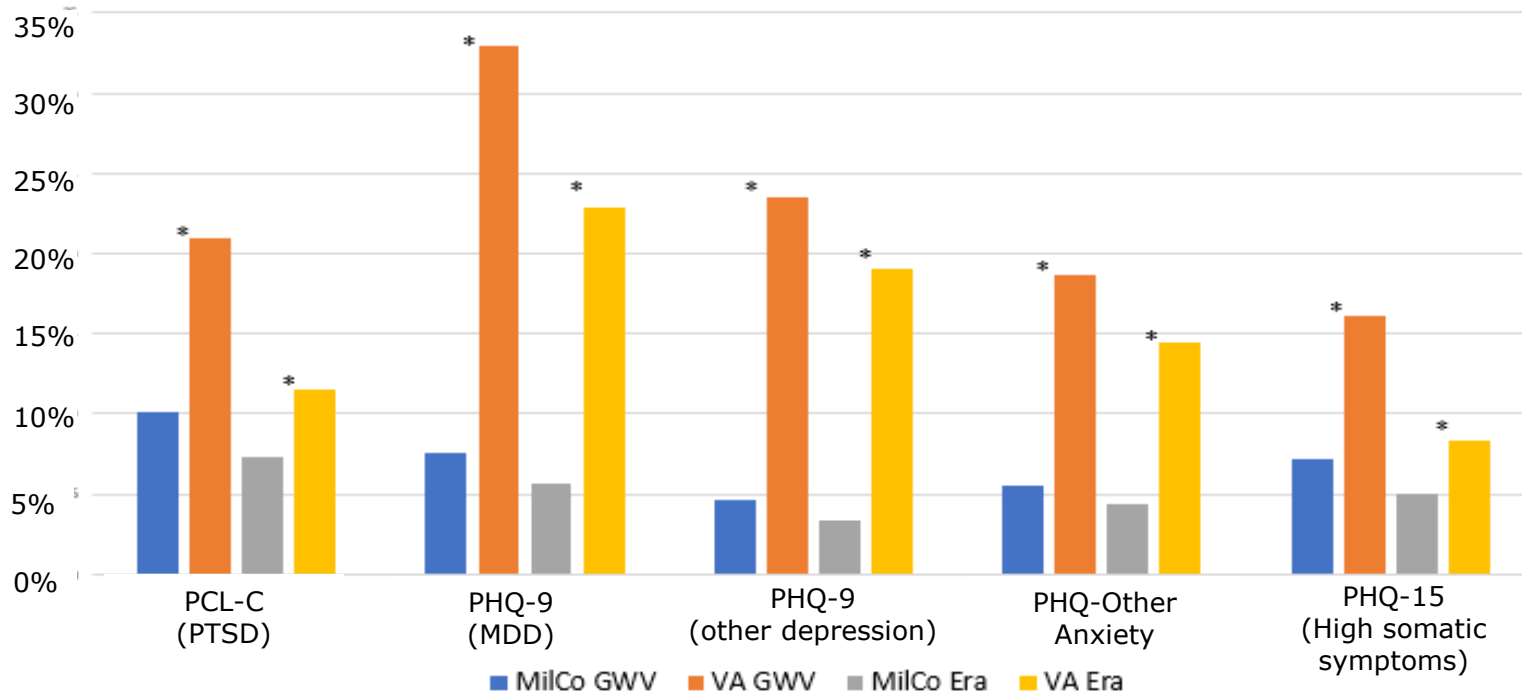
Comparing Self-Reported Physical Conditions



Conditions that did not have any significant difference in prevalence between MilCo and VA studies: Multiple sclerosis, hypertension, asthma, hepatitis



Comparing Standardized Instruments



Associations Between Deployment and Health Between Studies



	GWV at higher risk	Nonsignificant	GWV at lower risk
Chronic fatigue syndrome	MilCo, VA		
Rheumatoid arthritis	MilCo, VA		
Multiple sclerosis		MilCo, VA	
Coronary heart disease		MilCo, VA	
Migraine headaches*	MilCo, VA		
Hypertension		MilCo, VA	
Asthma*		MilCo, VA	
Diabetes		MilCo, VA	
Cancer			MilCo, VA
Bladder infections		VA	MilCo
Stroke		MilCo, VA	
Hepatitis		MilCo, VA	
Cirrhosis		MilCo, VA	
PTSD*	MilCo, VA		
Major depression*	MilCo, VA		
Other depression	MilCo, VA		
Other anxiety	MilCo, VA		
High somatic symptom severity*	MilCo, VA		



Conclusions



- Large representation of Gulf War and Era Veterans were enrolled in the Millennium Cohort Study
- Gulf War Veterans still serving in the military in 2000 were likely to be deployed in subsequent conflicts
- Demographic differences
 - Age differences
 - More female participants (oversampled)
- Better health among Millennium Cohort participants than VA study participants
- Adverse health outcomes associated with deployment were similarly observed in Millennium Cohort and VA studies





PREVALENCE OF CHRONIC MULTISYMPTOM ILLNESS/GULF WAR ILLNESS AMONG MILLENNIUM COHORT PARTICIPANTS, 2001–2016

Porter, B., Long, K., Rull, R. P., & Dursa, E. K. (In Press). Prevalence of chronic multisymptom illness/Gulf War illness among Millennium Cohort participants, 2001–2016. *Journal of Occupational and Environmental Medicine*.



Study Design



- Compared CMI/GWI between three groups across five time points
 - Gulf War Veterans: N = 9,110
 - Era Veterans: N = 36,019
 - Non-Era Veterans: N = 31,446
- Nonlinear mixed models assessed differences in prevalence and change in prevalence over time



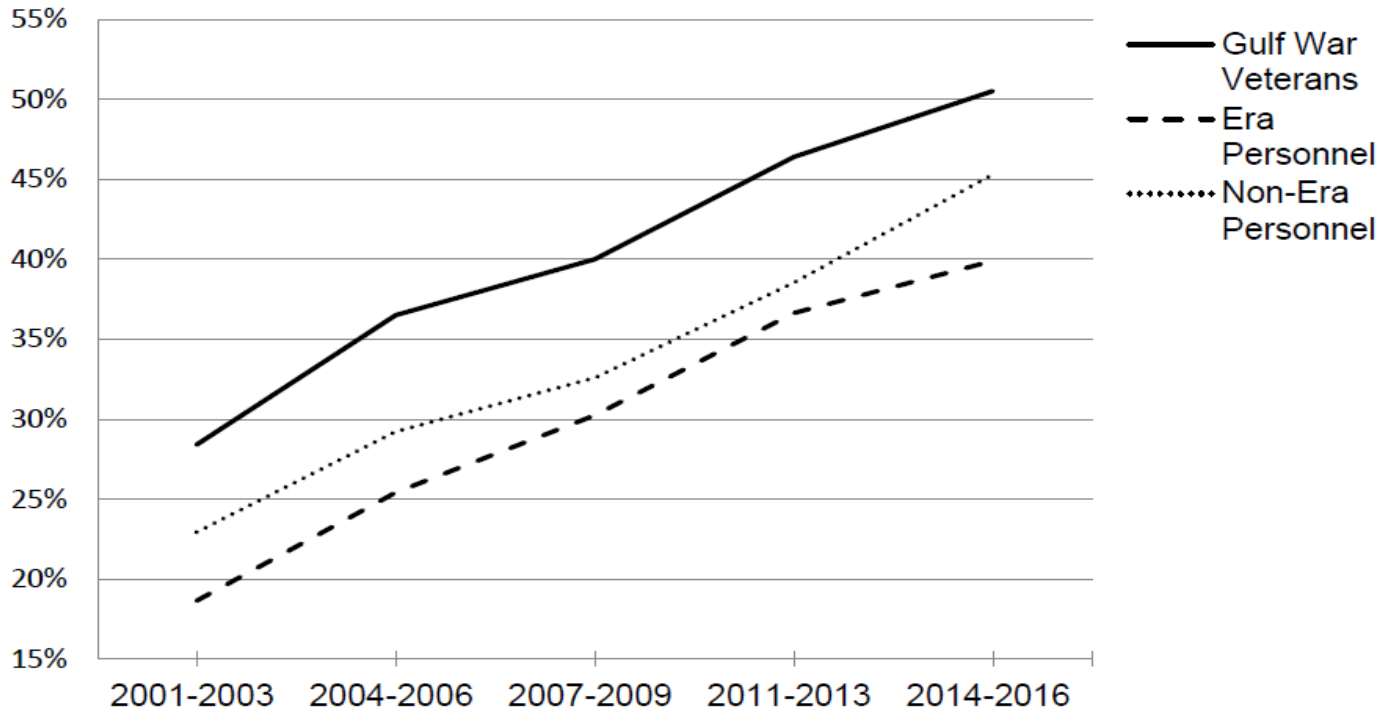
Study Design



- CMI/GWI assessed using modified CDC definition
 - Symptoms pulled from previous Gulf War Seabees questionnaire (6 items), PHQ-15 (2 items), PCL-C (2 items), VR-36 (2 items), and PHQ Other Anxiety subscale (1 item)
 - Items assess symptoms in the previous month or previous 3 years
 - Symptoms in 2/3 clusters indicative of CMI/GWI



Crude Prevalence of CMI/GWI



Planned Model Results (N = 76,575)



		Model 1: Unadjusted	Model 2: Fully Adjusted
Group	GWV (ref)	1.00	1.00
	Era	0.41 [0.38, 0.44]	0.76 [0.70, 0.83]
	Non-Era	0.59 [0.54, 0.64]	0.74 [0.68, 0.81]
Time	Time (5 years)	1.90 [1.84, 1.96]	1.71 [1.65, 1.77]
	Time * Era	1.06 [1.02, 1.10]	1.05 [1.01, 1.09]
	Time * Non-Era	1.04 [1.00, 1.08]	0.99 [0.95, 1.03]



Models With Exclusions for Mental/Physical Health



		Model 3: Mental Health Excluded (N = 52,498)	Model 4: Mental and Physical Health Excluded (N = 30,093)
Group	GWV (ref)	1.00	1.00
	Era	0.77 [0.69, 0.86]	0.74 [0.63, 0.88]
	Non-Era	0.79 [0.70, 0.89]	0.88 [0.75, 1.04]
Time	Time (5 years)	1.71 [1.63, 1.79]	1.69 [1.57, 1.83]
	Time * Era	1.05 [1.00, 1.11]	1.02 [0.94, 1.11]
	Time * Non-Era	0.97 [0.92, 1.02]	0.93 [0.86, 1.01]



Conclusions



- Gulf War Veterans report an increased prevalence of CMI/GWI compared with Era and non-Era Veterans
 - This increased prevalence does not substantively remit over time nor does it worsen over time
 - This increased prevalence cannot be attributed to mental health conditions
- Stratification by race/ethnicity and sex demonstrated similar models regarding the impact of Gulf War deployment



ONGOING STUDIES



CMI/GWI and Mental Health



- Analysis planned to examine the observed high association between mental health conditions and CMI/GWI in the longitudinal study
- Research question: Does requiring a certain level of impairment in physical functioning increase the specificity of CMI/GWI definition to the condition?



THANK YOU!

