WOMEN VETERANS IN THE WOMEN'S HEALTH INITIATIVE

Kristen Gray, PhD, MS, VA Puget Sound Health Care System, Health Services Research & Development, Department of Health Services, University of Washington School of Public Health

Joanne LaFleur, PharmD, MSPH, VA Salt Lake City Healthcare System, Utah, Department of Pharmacotherapy, University of Utah College of Pharmacy, Salt Lake City

Kushang Patel, PhD, MPH, Center for Pain Research on Impact, Measurement, and Effectiveness, Department of Anesthesiology and Pain Medicine, University of Washington, Division of Gerontology and Geriatric Medicine, Department of Medicine, University of Washington

Lori Bastian, MD, MPH, VA Connecticut Health Care System, West Haven, and Department of Internal Medicine, Yale University

Women Veterans in the Women's Health Initiative

- Overview
- Healthy Aging
- Diseases and Conditions
- Menopause Related
- Mortality

The Gerontologist, February 2016

http://gerontologist.oxfordjournals.org/content/56/Suppl_1.toc
http://gerontologist.oxfordjournals.org/content/56/1/115.full.pdf+html

What Motivated This Research in Older Women Veterans?

Unique opportunity to:

Examine positive and negative associations of military exposure

Address health behaviors and increased risk for disease in later life between women Veterans and non-Veterans

Begin clinical and research preparation for the projected 83% increase in older women Veterans between 2014-2025

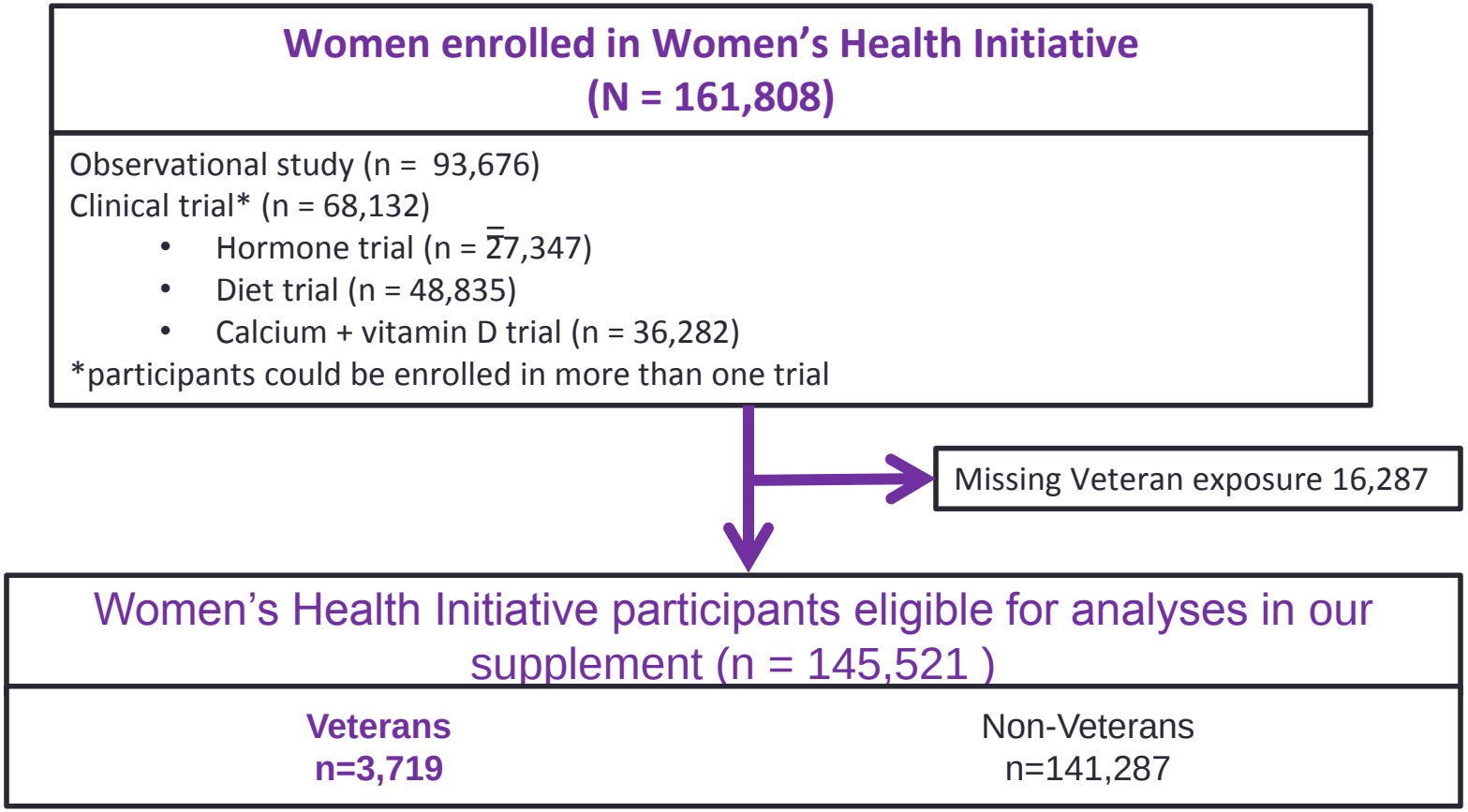
Women's Health Initiative (WHI)

- Goal: Answer major questions about postmenopausal women's health (cancers, heart disease, osteoporosis-related bone fractures)
- Vast scientific undertaking
  - 161,808 participants from 40 U.S. centers followed up to 12 years in main study (1993-2005)
  - 115,403 participants enrolled in WHI Extension Study 2005-2010 (71%)
  - 93,500 participants enrolled in WHI Extension Study 2010-2015 (81%)

WHI Eligibility Criteria

- General inclusion criteria
  - Aged 50 to 79 years
  - Postmenopausal
  - Planning to reside in the area for at least 3 years
  - Able/willing to provide written informed consent
- Additional eligibility criteria specific to each study component, related to:
  - Safety
  - Competing risk
  - Adherence/retention

Women Veterans in the WHI



Who are the Women Veterans in the WHI?

- 3,719 women Veterans in WHI

~ 3% of total WHI Recruits

- Health similar to non-Veterans

- Demographically distinct from non-Veterans—
  - Older
  - Highly Educated
  - Disproportionately Caucasian
  - Less Likely to be Married

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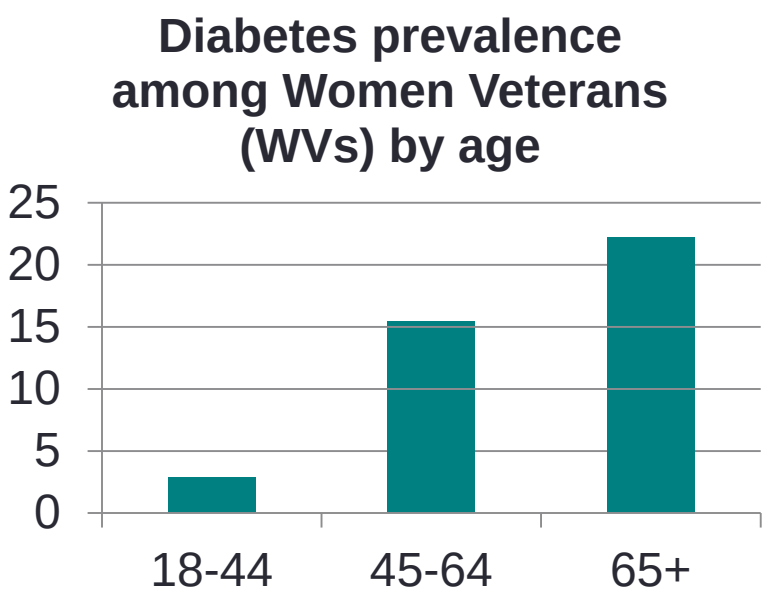
OXFORD

Research Article

Association Between Chronic Conditions and Physical Function Among Veteran and Non-Veteran Women With Diabetes

Kristen E. Gray, PhD, MS,[*,1,2] Jodie G. Katon, PhD, MS,[1–3] Eileen Rillamas-Sun, PhD, MPH,[1,4] Lori A. Bastian, MD, MPH,[5,6] Karin M. Nelson, MD, MSHS,[1,7,8] Andrea Z. LaCroix, PhD,[9] and Gayle E. Reiber, PhD, MPH[1,2,10]

State of the Art/Gap in Knowledge



- Diabetes associated with poor physical function
- Compared to non-Veterans, WVs:
  - Have more chronic disease and health risk factors
  - More often report poor health due to physical, mental, or emotional problems

AIMS

Among women with diabetes:

1. Compare chronic condition burden and the effect on subsequent physical function by Veteran status
2. Estimate associations of individual chronic conditions plus diabetes on physical function compared to diabetes alone in Veterans and non-Veterans

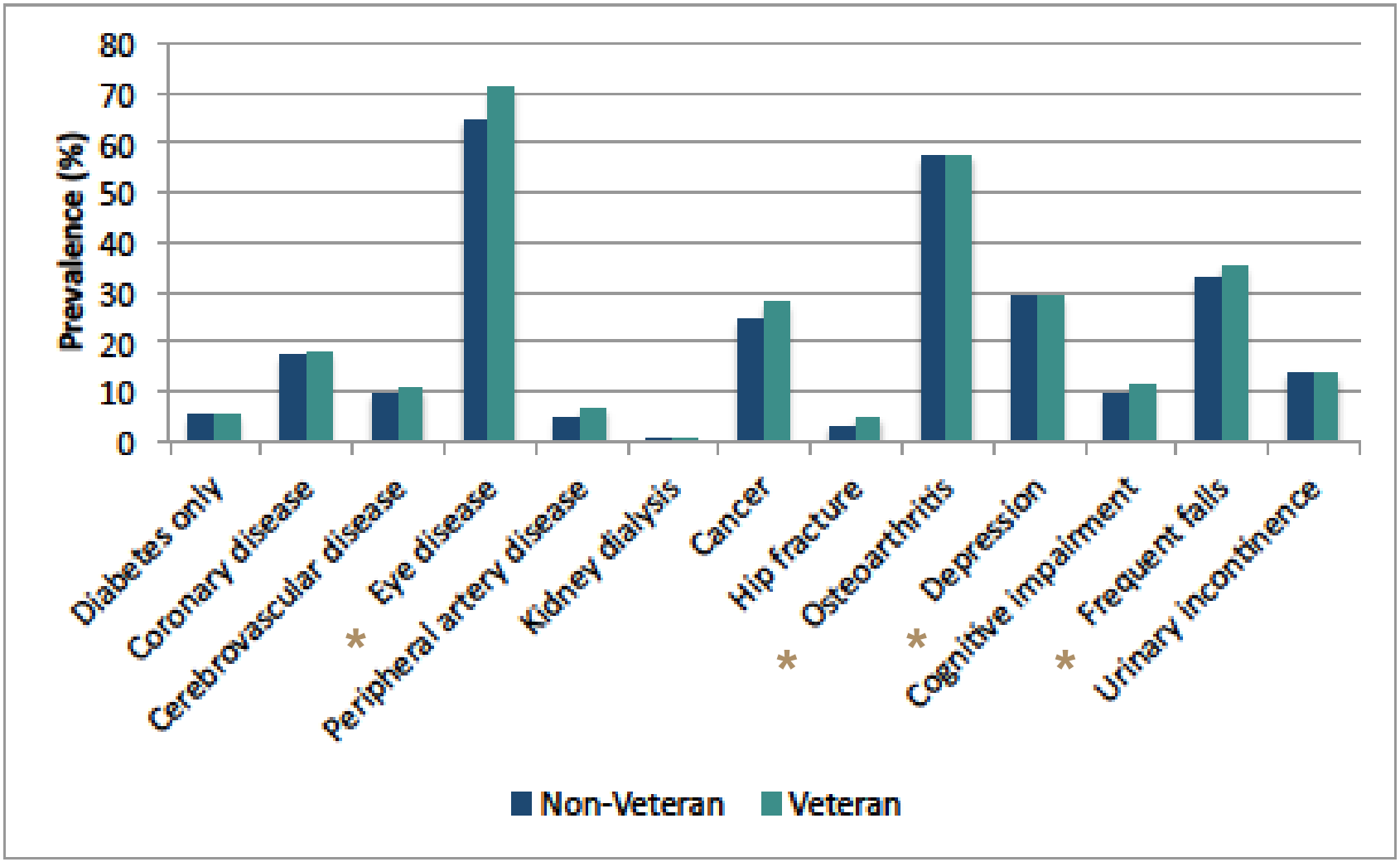
Methods

- WHI participants with self-reported diabetes (baseline or f/u)
- Physical function: most recent RAND SF-36
- Chronic conditions: prior to SF-36; adjudicated* or self-report

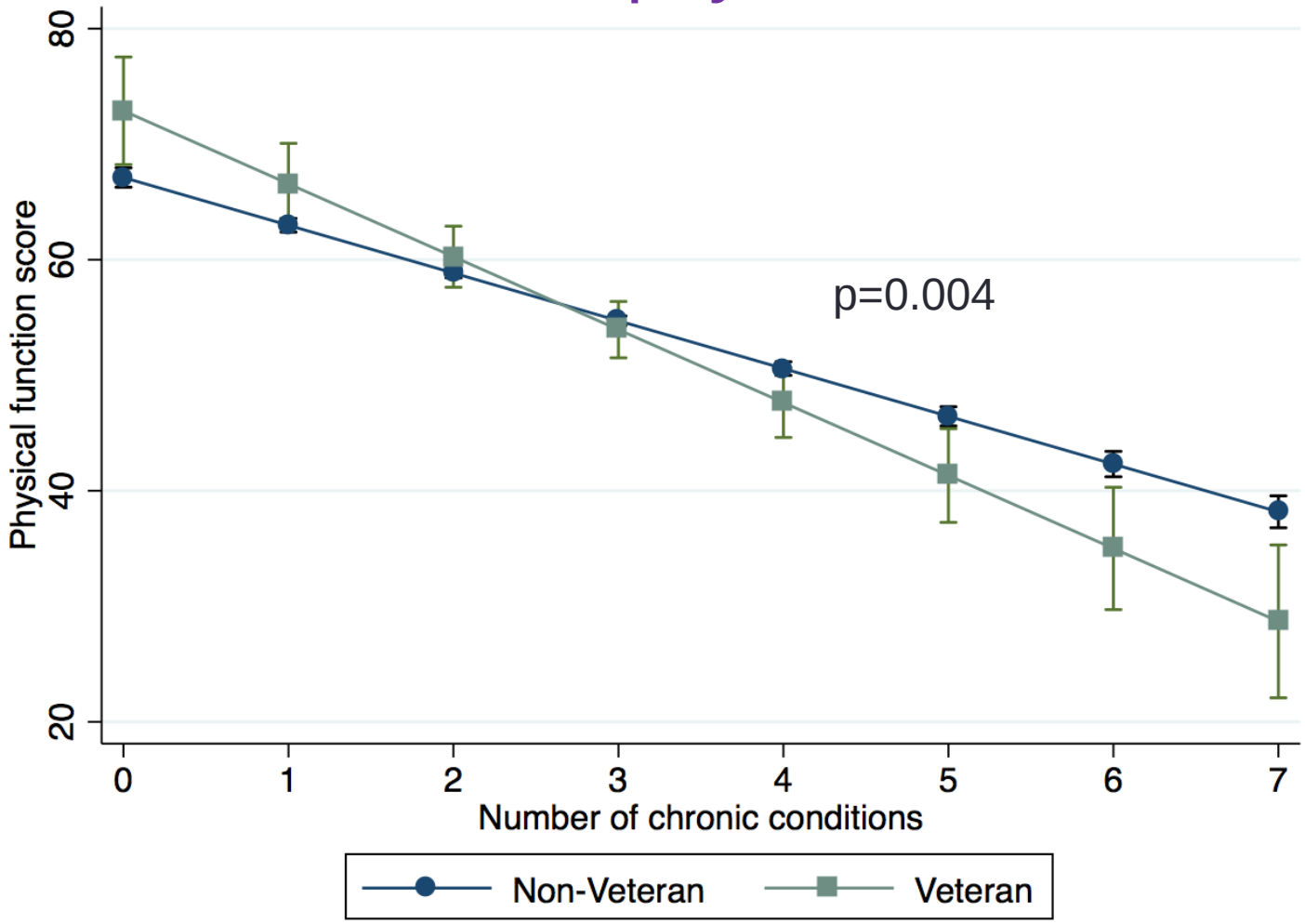
Coronary disease*	Eye disease	Frequent falls (2+)	Hip Fracture*
Cerebrovascular disease*	Dialysis	Urinary incontinence	Depression
Peripheral artery disease	Cancer*	Cognitive impairment	

- *Analyses:*
  - *Poisson regression*: veteran status ➡ total number of chronic conditions
  - *Linear regression:*
    - Total number of conditions ➡ physical function (interaction w/ Veteran status)
    - Each condition ➡ physical function (compared to diabetes alone)

Unadjusted prevalence of chronic conditions

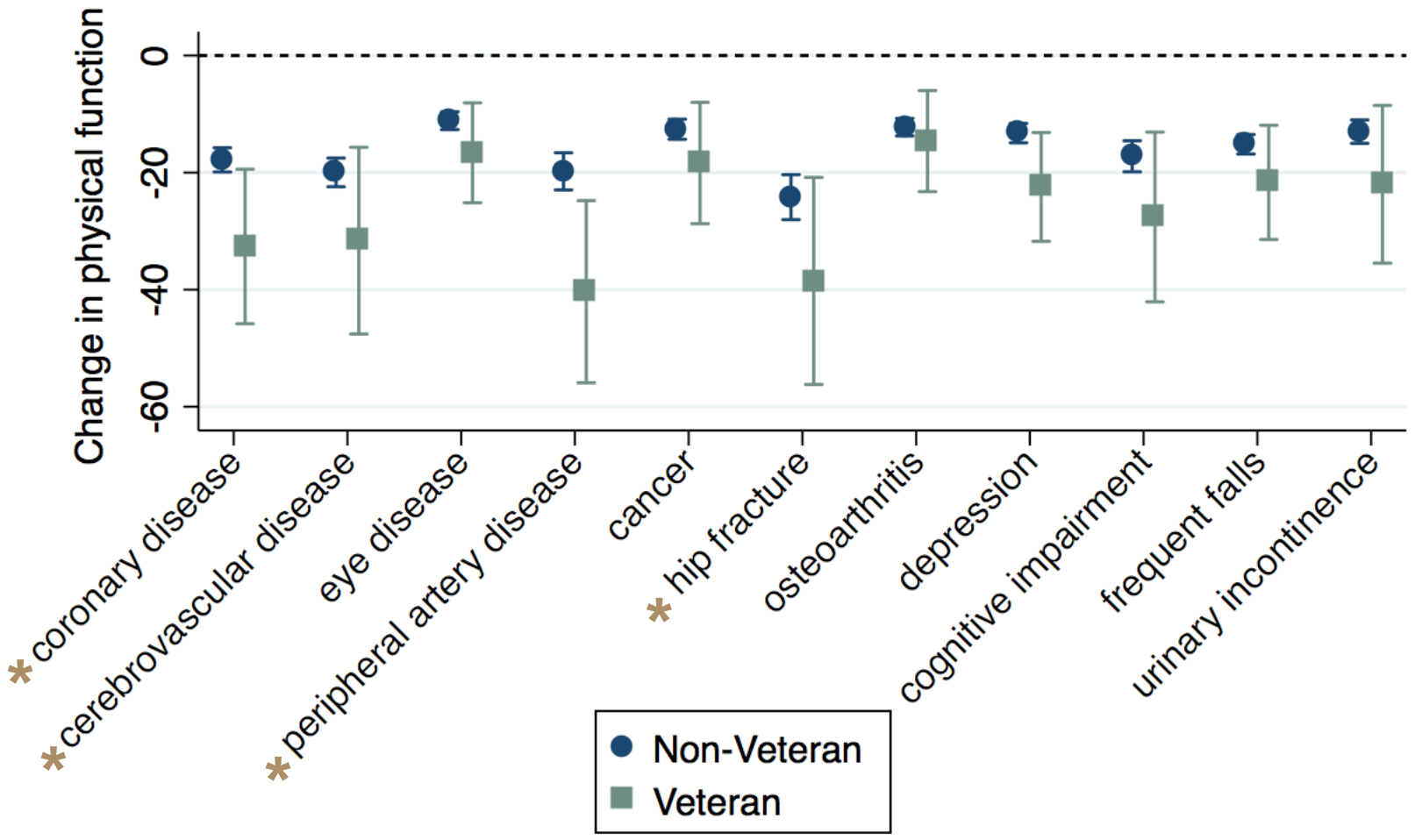


Adjusted association between number of chronic conditions and physical function



Adjusted for baseline age, race, education, smoking status, BMI, physical activity, use of pills for hypertension, use of pills for hypercholesterolemia, follow-up duration, and physical function

Adjusted difference in physical function comparing women with an additional chronic condition to women with diabetes alone



Adjusted for baseline age, race, education, smoking status, BMI, physical activity, use of pills for hypertension, use of pills for hypercholesterolemia, follow-up duration, and physical function

Clinical Implications

- Decreases in physical function clinically meaningful
  - 1 point decrease→6-9% increase in 2-year mortality risk*
- Interventions needed to:
  - Prevent and reduce the impact of these conditions
  - Facilitate coordination of care among women with diabetes
  - Goal: maintain physical function

*Bjorner et al. Value Health 2013;16:993-1000

Research Implications

- Chronic conditions common
- Burden of conditions associated with decreased physical function
  - Larger among Veterans
- Declines associated with each condition more pronounced among Veterans
- Root cause(s)?

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OXFORD

Research Article

Fracture Rates and Bone Density Among Postmenopausal Veteran and Non-Veteran Women From the Women's Health Initiative

Joanne LaFleur, PharmD, MSPH,[1,2,*] Eileen Rillamas-Sun, PhD,[3] Cathleen S. Colón-Emeric, MD, FACP, MHS,[4,5] Kristin A. Knippenberg, MFA,[1,2] Kristine E. Ensrud, MD, MPH, FACP,[6,7] Shelly L. Gray, PharmD, MS,[8] Jane A. Cauley, DrPH,[9] and Andrea Z. LaCroix, PhD[10]

Background

- The proportion of living US Veterans who are female is projected to increase from 10% to 15% by 2030
- Postmenopausal osteoporosis can greatly impact quality of life, particularly in terms of pain, mobility, and activities of daily living (ADLs)
- No studies have directly compared fracture rates between Veteran and non-Veteran women
- Indirectly, one national study of US women Veterans identified lower fracture rates for women Veterans compared to similar, at-risk clinical trial populations

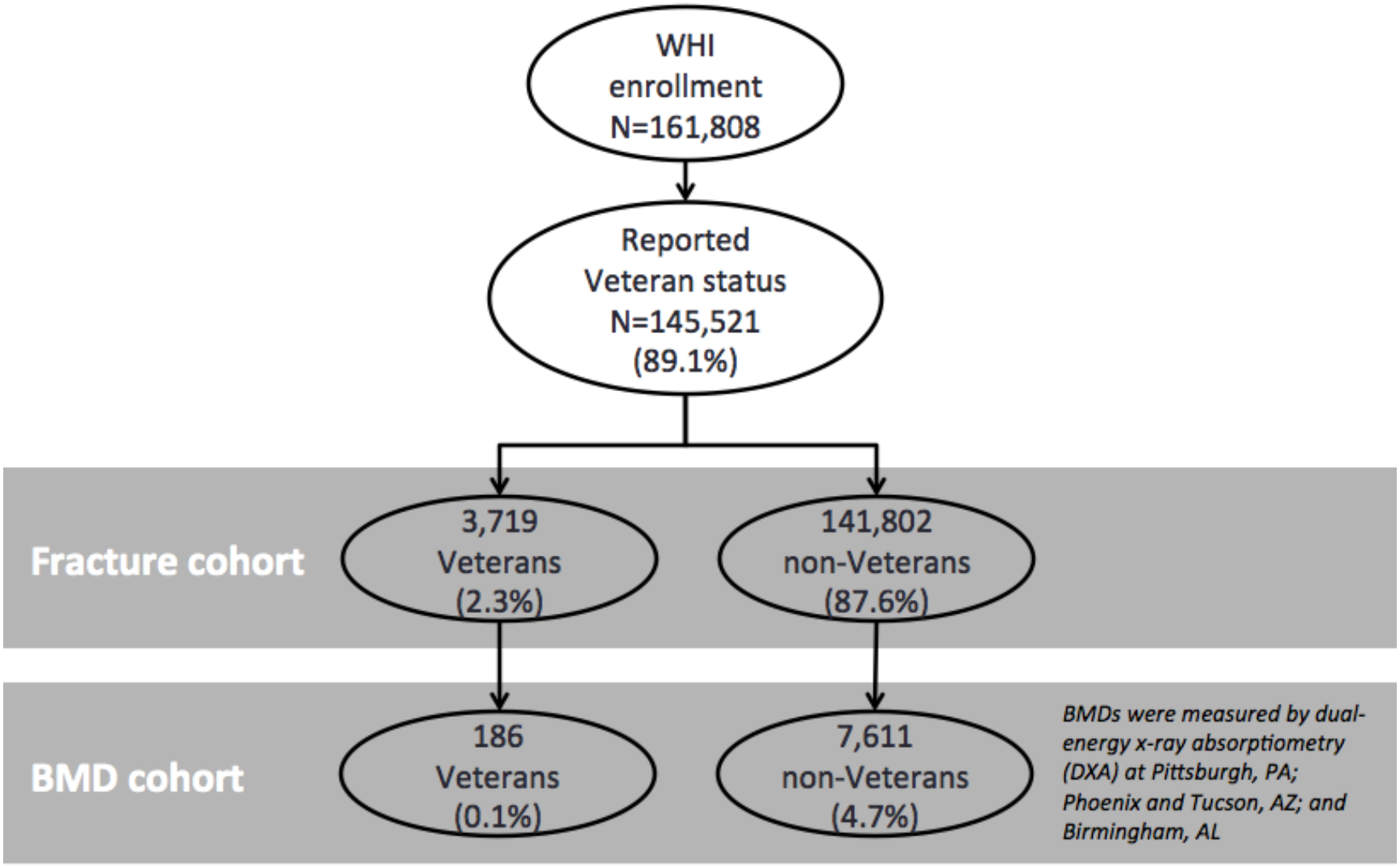
LaFleur et al. Bone. 2015

Objectives

1. Compare crude and adjusted fracture rates between Veteran and non-Veteran women using data from the Women's Health Initiative (WHI) clinical trial (CT) and observational study (OS) cohorts

2. Compare changes in bone mineral density (BMD) levels in the subset of women with BMD measures

Methods


WHI enrollment N=161,808
Reported Veteran status N=145,521 (89.1%)
Fracture cohort
3,719 Veterans (2.3%)
141,802 non-Veterans (87.6%)
BMD cohort
186 Veterans (0.1%)
7,611 non-Veterans (4.7%)
BMDs were measured by dual-energy x-ray absorptiometry (DXA) at Pittsburgh, PA; Phoenix and Tucson, AZ; and Birmingham, AL

Results

Table 3. Cox Proportional Hazards Models (and 95% confidence intervals) for Fracture in Veterans Compared With Non-Veterans Among *N* = 145,521 WHI Participants

	Hip fracture	Central body fractures, including hip	Central body fractures, excluding hip	Upper limb fractures	Lower limb fractures
Minimally adjusted[a]	1.24 (1.08–1.42)	1.16 (1.06–1.27)	1.03 (0.93–1.15)	1.02 (0.93–1.12)	1.03 (0.94–1.13)
Moderately adjusted[b]	1.23 (1.07–1.41)	1.15 (1.05–1.25)	1.01 (0.90–1.12)	1.01 (0.92–1.10)	1.01 (0.91–1.11)
Maximally adjusted[c]	1.24 (1.03–1.49)	1.21 (1.08–1.36)	1.11 (0.97–1.28)	0.93 (0.82–1.06)	1.00 (0.88–1.13)
Adjustment for WHO FRAX risk for hip fracture					
WHO FRAX only	1.53 (1.33–1.75)	1.31 (1.20–1.43)	1.19 (1.07–1.33)	1.04 (0.95–1.14)	0.99 (0.90–1.09)
WHO FRAX and age	1.22 (1.06–1.39)	1.14 (1.05–1.25)	1.01 (0.91–1.13)	1.01 (0.92–1.10)	1.01 (0.92–1.11)
WHO FRAX, age, and race/ethnicity	1.21 (1.06–1.39)	1.14 (1.04–1.24)	1.01 (0.91–1.13)	1.01 (0.92–1.10)	1.01 (0.92–1.11)
Adjustment for WHO FRAX risk for any major fracture					
WHO FRAX only	1.61 (1.41–1.84)	1.37 (1.25–1.49)	1.23 (1.10–1.37)	1.06 (0.97–1.17)	1.01 (0.92–1.11)
WHO FRAX and age	1.22 (1.07–1.40)	1.14 (1.05–1.25)	1.01 (0.91–1.12)	1.01 (0.92–1.10)	1.01 (0.92–1.11)

Notes: BMI = body mass index; BMD = bone mineral density; CVD = cardiovascular disease; WHO FRAX = World Health Organization Fracture Risk Assessment Tool; WHI = Women's Health Initiative.

BMI was used in WHO FRAX instead of BMD.

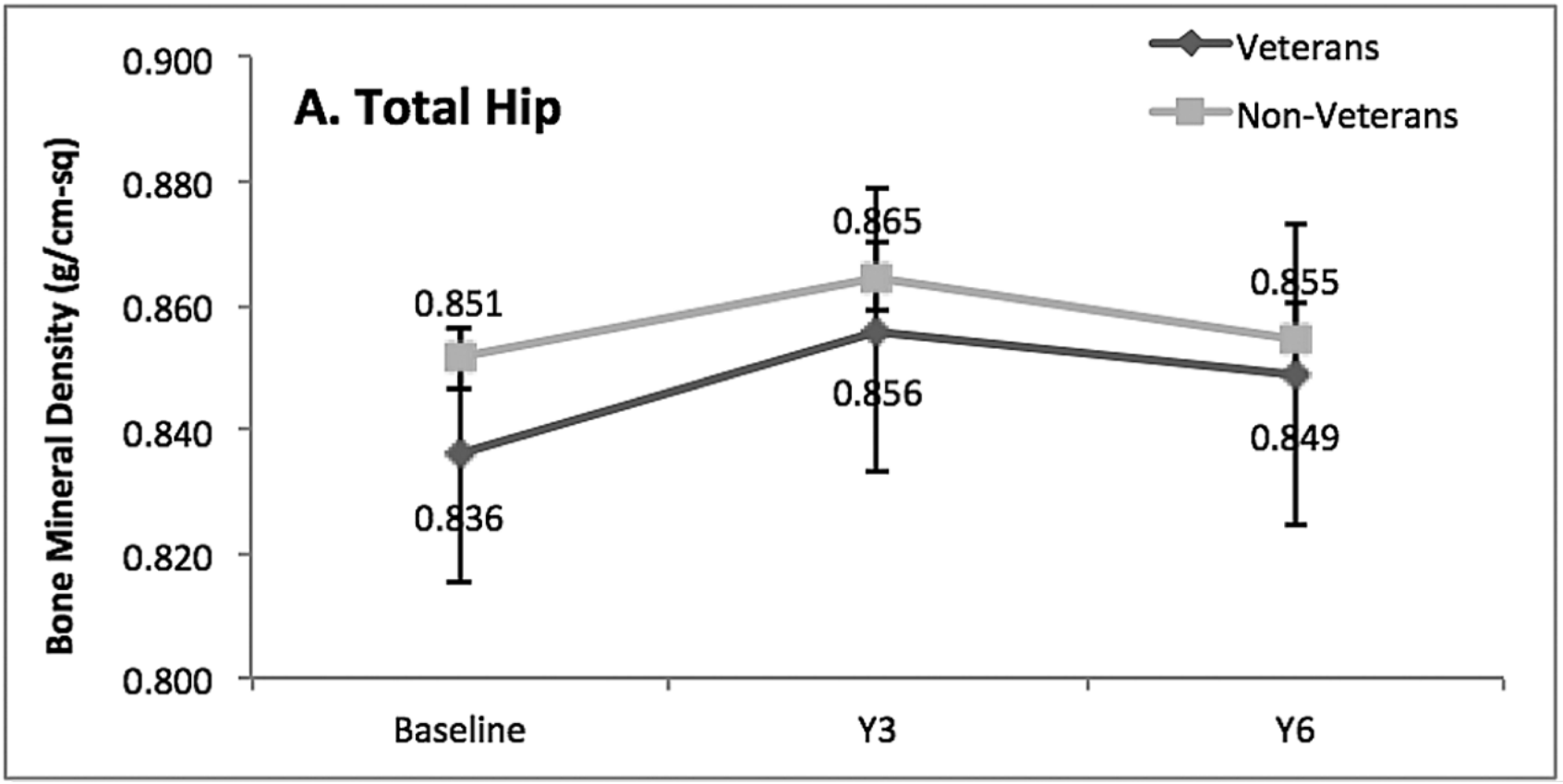
[a]Adjusted for age and race/ethnicity.

[b]Adjusted for age, race/ethnicity, BMI, and history of fracture.

[c]Adjusted for age, race/ethnicity, BMI, history of fracture, smoking status, alcohol use, physical activity, physical function, history of falls, CVD, bilateral oophorectomy, and hysterectomy, depression, parental history of fracture, use of hormone therapy, corticosteroids, and calcium, and WHI study membership.

Results

No significant differences were observed in BMD levels for Veterans compared to non-Veterans over the 6 years of observation.



Discussion

- Veteran status appears to be a marker for other exposures that increase rate of hip fractures but not other osteoporotic fractures
- Although we controlled for baseline frailty, frailty could explain our findings in part, if…
  - Frailty and fall risk may have increased in women Veterans at a greater rate than in non-Veterans as they aged
  - Our measures of frailty (physical activity, self-rated health, prior falls) inadequately controlled for this multidimensional phenotype
- Future work should examine the relationship between frailty, Veteran status, and other unknown risk factors for hip fracture

Clinical Implications

- Programs may be needed to improve screening and treatment of osteoporosis and decrease higher rates of falls and functional decline in older women Veterans to prevent hip fracture.

- Counseling topics might include calcium, Vitamin D intake, and fall prevention measures including wearing proper footwear, removing throw rugs, and installing banisters, shower bars and other protective devices.

- Assess women's bone density and if low, consider prescribing an effective medication for fracture prevention.

Research Implications

- Additional time-varying analysis of functional status and falls in Veteran and non-Veteran women could provide additional insight on hip fracture rates.

- Additional research in frailty in Veteran women is also needed.

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OXFORD

Research Article

Association of Pain With Physical Function, Depressive Symptoms, Fatigue, and Sleep Quality Among Veteran and non-Veteran Postmenopausal Women

Kushang V. Patel, PhD, MPH,[1,2,*] Barbara B. Cochrane, PhD, RN,[3,4] Dennis C. Turk, PhD,[1] Lori A. Bastian, MD, MPH,[5,6] Sally G. Haskell, MD, MPH,[7,8,9] Nancy F. Woods, PhD, RN,[3,10] Oleg Zaslavsky, PhD, RN,[10] Robert B. Wallace, MD, MSc,[11] and Robert D. Kerns, PhD[12,13,14]

Background

- Chronic pain is common among older adults
  - Higher prevalence in older women than in older men
- Musculoskeletal injuries related to military service might contribute to long-term risk of chronic pain
- Painful musculoskeletal conditions are commonly diagnosed among Veterans
- Relatively few studies have directly compared the experience or impacts of pain in Veterans and non-Veterans, particularly in women

Objectives

- To determine whether the prevalence of pain, both severity and interference with activity, varies according to military service history in the WHI
- To characterize the impact of pain among older Veteran and non-Veteran women
  - Physical functioning
  - Depression
  - Fatigue
  - Insomnia

Methods

- Baseline analytic sample = 144,956 women
  - 16,683 missing information on military service or did not report their level of pain
- Exposure: 2 pain questions from RAND 36 survey
- Outcomes:
  - Physical function (RAND 36 Health Survey)
  - Depressive symptoms (CES-D)
  - Fatigue (RAND 36 Health Survey)
  - Sleep quality (WHI Insomnia Rating Scale)
- Outcomes were measured at baseline, Year 3 of follow-up, and in 2011-2012 (13-18 years of follow-up) in the observational study

Results

Baseline pain characteristics according to Veterans status in the Women's Health Initiative (N=144,643)

Pain characteristics	Veterans (n=3,687)	Non-Veterans (n=140,956)	Unadjusted *p* value	Age-adjusted *p* value
Pain Severity, n (%)				
None	786 (21.3)	31032 (22.0)		
Very Mild	1350 (36.6)	52304 (37.1)		
Mild	781 (21.2)	29074 (20.6)		
Moderate	656 (17.8)	23865 (16.9)		
Severe	111 (3.0)	4594 (3.3)	0.43	0.91
Pain Interference, n (%)				
Not at all	2181 (59.2)	85446 (60.6)		
A little bit	887 (24.1)	33316 (23.6)		
Moderately	401 (10.9)	14016 (9.9)		
Quite a bit	175 (4.8)	6673 (4.7)		
Extremely	43 (1.2)	1505 (1.1)	0.29	0.79
RAND36 Bodily Pain score, Mean (SD)	73.8 (23.4)	74.5 (23.4)	0.11	0.79

Pain Severity: *"During the past 4 weeks, how much bodily pain have you had?"*

Pain Interference: "*During the past 4 weeks, how much did pain interfere with your normal work (both outside your home and at home)?"*

Results

Table 2. Baseline Associations of Pain Interference With Physical Function, Depressive Symptoms, Fatigue, and Sleep Quality Among Veteran and Non-Veteran Participants in the Women's Health Initiative

Outcomes	Moderate-to-extreme pain interference	Not at all-to-a little bit of pain interference	Adjusted mean difference between pain interference groups[a] (95% CI)	*p* Value
	Unadjusted mean ± *SD*	Unadjusted mean ± *SD*		
Veterans				
Physical function	55.3 ± 23.9	83.1 ± 17.2	−20.2 (−21.8, −18.7)	<.001
Depressive symptoms	0.08 ± 0.20	0.03 ± 0.10	0.05 (−0.04, 0.06)	<.001
Fatigue	47.1 ± 18.9	66.7 ± 17.1	−15.2 (−16.9, −13.6)	<.001
Sleep quality	9.0 ± 4.9	6.2 ± 4.3	2.2 (1.8, 2.6)	<.001
Non-Veterans				
Physical function	57.6 ± 24.3	85.5 ± 15.7	−20.1 (−20.3, −19.8)	<.001
Depressive symptoms	0.10 ± 0.20	0.03 ± 0.11	0.051 (0.049, 0.053)	<.001
Fatigue	46.4 ± 19.6	66.6 ± 17.5	−15.5 (−15.7, −15.2)	<.001
Sleep quality	8.7 ± 4.8	6.3 ± 4.3	1.9 (1.8, 2.0)	<.001

Notes: CI = confidence interval; SD = standard deviation.

[a]All eight models were adjusted for age, ethnicity, marital status, education, family income, smoking history, body mass index, physical activity, alcohol intake, hormone therapy use, arthritis, cancer diabetes, hypertension, angina, heart failure, myocardial infarction, and stroke.

Results

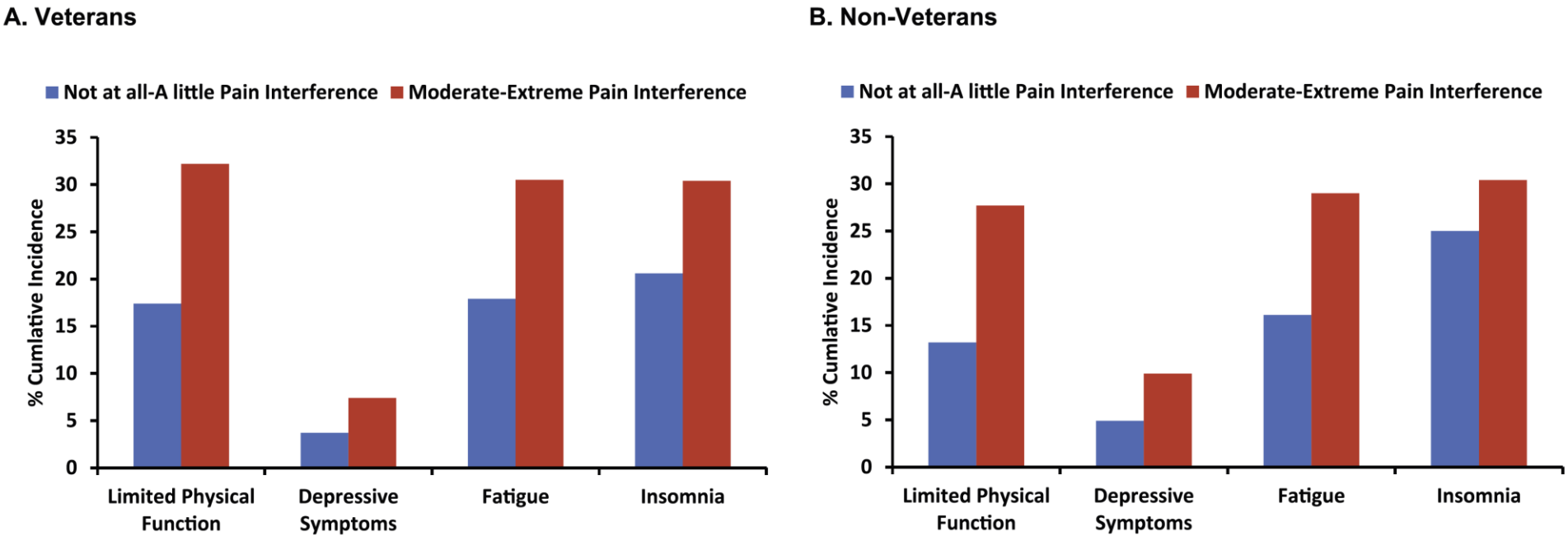

Figure 2. Percent cumulative incidence of limited physical function, depressive symptoms, fatigue, and insomnia according to pain interference among Veteran (**A**) and non-Veteran (**B**) participants in the Women's Health Initiative Observational Study.

Results

Table 4. Incidence of Limited Physical Function, Depressive Symptoms, Fatigue, and Insomnia According to Pain Interference Among Veteran and Non-Veteran Participants in the Women's Health Initiative Observational Study

	Limited physical function	Depressive symptoms	Fatigue	Insomnia
	Risk ratio (95% CI)	Risk ratio (95% CI)	Risk ratio (95% CI)	Risk ratio (95% CI)
Veterans				
Not at all-to-a little bit of pain	1.00	1.00	1.00	1.00
Moderate-to-extreme pain	1.79 (1.37–2.33)	1.77 (1.05–2.99)	1.48 (1.08–2.03)	1.64 (1.21–2.22)
p Value	<.001	.032	.016	.001
Non-Veterans				
Not at all-to-a little bit of pain	1.00	1.00	1.00	1.00
Moderate-to-extreme pain	1.78 (1.69–1.86)	1.82 (1.68–1.97)	1.61 (1.52–1.69)	1.35 (1.29–1.42)
p Value	<.001	<.001	<.001	<.001

Notes: CI = confidence interval.

All eight models were performed in study participants who did not have the outcome at baseline and adjusted for age, ethnicity, marital status, education, family income, smoking history, body mass index, physical activity, alcohol intake, hormone therapy use, arthritis, cancer diabetes, hypertension, angina, heart failure, myocardial infarction, and stroke.

Clinical Implications

- Moderate-to-severe pain is common among postmenopausal women Veterans
- Women with pain have a clinically significant reduction in physical function and a high burden of depressive symptoms, fatigue, and insomnia
- As the population of women Veterans ages and the number of women exposed to physically demanding jobs and combat operations grows, there will be increased need for health care services that address not only pain but also the disabling symptoms that are often comorbid with pain

Research Implications

- National health surveys conducted by CDC and other agencies should include more detailed military occupational exposure assessments
- Further observational research on chronic pain and aging among women Veterans from more recent combat operations is needed
- Development and evaluation of multimodal treatment strategies that integrate pharmacologic and non-pharmacologic therapies is needed

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OXFORD

Research Article

Differences in Active and Passive Smoking Exposures and Lung Cancer Incidence Between Veterans and Non-Veterans in the Women's Health Initiative

Lori A. Bastian, MD, MPH,[*,1,2] Kristen E. Gray, PhD, MS,[3,4] Eric DeRycke, MPH,[1] Shireen Mirza, MD,[1,5] Jennifer M. Gierisch, PhD, MPH,[6,7] Sally G. Haskell, MD, MS,[8,9,10] Kathryn M. Magruder, PhD,[11,12] Heather A. Wakelee, MD,[13] Ange Wang, BSE,[14] Gloria Y. F. Ho, PhD, MPH,[15] and Andrea Z. LaCroix, PhD[16]

Background

- Lung cancer is the second most common cancer in women and smoking is by far the major risk factor for lung cancer.
- Women Veterans may have higher rates of both active and passive tobacco exposure than their civilian counterparts, thereby increasing their risk for lung cancer.
- **Purpose of the Study:** To compare differences in active and passive smoking exposure and lung cancer incidence among women Veterans and non-Veterans using prospective data from the Women's Health Initiative.

Study Design

- Sample. WHI participants with self-reported smoking status at baseline and incident lung cancer at follow-up.
- Active smoke exposure. WHI computed smoking status (never, former, current) and pack years of smoking.
- Passive smoke exposure. WHI collected information on passive smoking among the OS women only. We created a variable reflecting any passive smoke exposure (child, adult, and/or workplace).
- Lung cancer. Lung cancer was determined based on physician adjudicated report for all WHI participants.

Data Analyses

- Compare active and passive smoking exposure between Veterans and non-Veterans: multinomial regression
- Estimate differences in lung cancer incidence rates between Veterans and non-Veterans adjusting for smoking exposures: Cox proportional hazards models

Active Smoke Exposure: Pack Years

Differences in active smoke exposure between Veterans and non-Veterans								
	Non-Veteran		Veteran			95% CI		
	N	Mean (SD)	N	Mean (SD)	Diff	LB	UB	p-value
Pack years of smoking								
Among all women	79,767	9.88 (18.54)	2,126	13.10 (21.53)	2.54	1.68	3.40	<0.001
Among former or current smokers	38,135	20.67 (22.26)	1,143	24.36 (24.25)	2.12	0.78	3.46	0.002

Passive Smoke Exposures

Differences in passive smoke exposure between Veterans and non-Veterans								
	Non-Veterans		Veterans			95% CI		
Any Exposure	N	%	N	%	RR	LB	UB	p-value
Any passive exposure	77,149	94.2	2,077	95.3	1.01	1.00	1.02	0.01
Childhood exposure	51,609	63.9	1,318	61.1	1.00	0.97	1.04	0.82
Adult home exposure	59,964	73.3	1,651	75.9	1.00	0.98	1.03	0.70
Workplace exposure	60,906	74.4	1,760	80.9	1.09	1.07	1.11	<0.001

Lung Cancer Rates

Difference in lung cancer rates between Veterans and non-Veterans								
	Non-Veterans		Veterans			95% CI		
Model	Total N	Lung cancer	Total N	Lung cancer	HR	LB	UB	p-value
Age adjusted	140,952	2,766	3,695	98	1.24	1.01	1.52	0.04
Age and smoking adjusted	136,045	2,657	3,525	95	1.06	0.86	1.30	0.59
Age, smoking, and region adjusted	136,045	2,657	3,525	95	1.05	0.86	1.29	0.63
Age, smoking, region, race, income, education, and study arm adjusted	126,027	2,472	3,308	91	1.07	0.87	1.33	0.51

Summary of Findings

- After adjustment, Veterans had 2.54 additional pack years of smoking compared to non-Veterans (95% CI 1.68, 3.40).
- Veterans also had a 1% increase in risk of any passive smoking exposure (95% CI 1.00, 1.02) and a 9% increase in risk of any workplace exposure (95% CI 1.07, 1.11) compared to non-Veterans.
- After adjustment for age and smoking exposures, Veterans did not have a higher risk of lung cancer compared to non-Veterans (RR= 1.06 95% CI 0.86, 1.30).

Clinical Implications

- To our knowledge, this is the first report to evaluate whether military service affects risk of lung cancer in women Veterans.
- Although women Veterans had higher tobacco use and exposures to passive smoking, they did not have a higher adjusted risk for lung cancer compared to non-Veterans.
- These findings may have important implications for caring for older women Veterans. Both VA and non-VA clinicians who care for Veterans need to be aware that older women Veterans have more exposures to risk factors for lung cancer.

Enjoy all the articles on Women Veterans in the WHI

http://gerontologist.oxfordjournals.org/content/56/Suppl_1.toc
http://gerontologist.oxfordjournals.org/content/56/1/115.full.pdf+html

Cyber Seminar 1 - February 22, 2016	
Reiber G, LaCroix A.	Overview
LaCroix A et-al.	Using the Women's Health Initiative to Answer Key Questions
Weitlauf J, et-al.	Who are the Women Veterans?
Bastian L, et-al.	Research Results

Cyber Seminars 2, 3

Healthy Aging – Session 2 – February 24, 2016
Lacroix A, et-al. Aging Well Among Women Veterans Compared to Non-Veterans in the Women's Health Initiative
Washington D, et-al. Trajectories in Physical Activity and Sedentary Behavior among Women Veterans in the Women's Health Initiative
Padula C, Weitlauf J, et-al. Longitudinal Cognitive Trajectories of Women Veterans from the Women's Health Initiative Memory Study
Diseases and Conditions – Session 3 – February 29, 2016
Gray K, et-al. Association between chronic conditions and physical function among Veteran and non-Veteran women with diabetes
LaFleur J, et-al. Fracture rates and bone density among postmenopausal Veteran and non-Veteran women from the Women's Health Initiative
Patel K , et-al. Association of Pain with Functional Outcomes, Fatigue, and Sleep Quality among Veterans and non-Veterans: Findings from the WHI
Bastian L, et-al. Differences in Active and Passive Smoking Exposures and Lung Cancer Incidence between Veterans and non-Veterans in the WHI

Cyber Seminars 4, 5

Menopause Related Findings – Session 4 – March 2, 2016
Katon J, et-al. Vasomotor Symptoms and Quality of Life Among Veteran and Non-Veteran Postmenopausal Women
Rissling M, et-al. Sleep Disturbance, Diabetes and Cardiovascular Disease in Postmenopausal Women Veterans
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Emails for investigators presenting today:
Kristen.Gray2@va.gov
Joanne.Lafleur@pharm.utah.edu
kvpatel@uw.edu
Lori.Bastian@va.gov

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Analysts:
Kristen Gray, PhD
Eileen Rillamas-Sun, PhD

Administrative Support
Erica Ma

Questions?