The Long-Term Impact of Military Service on Health: Evidence from World War II and Korean War Veterans

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Outline

- Motivation
- Research Question
- Approach / Methodology
  - Data
- Key Results
- Remarks on the Paper
- Discussion

01

Motivation

Motivation

"You ask me what we need to win this war. I answer tobacco as much as bullets. Tobacco is as indispensable as the daily ration; we must have thousands of tons without delay."

~ General Pershing

Source: Wikibrief – Smoking in the U.S. military

02

Research Question

Research Question

1. Do veterans experience a higher premature mortality rate than non-veterans?

2. What role does military-induced smoking play in this?

03

Methodology

Approach

- Overview
- Association of veteran status with mortality and causes of death
- Association between military service and smoking
- Summarizing the results
- Disability rate

3.1

Data

Data 1

	year	yob	popmale	total	ischem	lungcan	colon	cerebro	chronic	accid	pneum	suicide	age	vet
	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
1	1968	1920	1121524	0.00854	0.00295	0.000599	0.000149	0.000400	0.000125	0.000765	0.000213	0.000278	48	0.747
2	1969	1920	1116463	0.00919	0.00327	0.000657	0.000144	0.000409	0.000117	0.000827	0.000244	0.000272	49	0.747
3	1970	1920	1160213	0.00965	0.00341	0.000758	0.000175	0.000435	0.000122	0.000754	0.000237	0.000271	50	0.747
4	1971	1920	1157478	0.0102	0.00370	0.000823	0.000187	0.000478	0.000121	0.000758	0.000206	0.000256	51	0.747
5	1972	1920	1148523	0.0111	0.00409	0.000987	0.000200	0.000543	0.000174	0.000714	0.000244	0.000256	52	0.747
6	1973	1920	1140079	0.0116	0.00434	0.00103	0.000242	0.000563	0.000168	0.000721	0.000229	0.000282	53	0.747

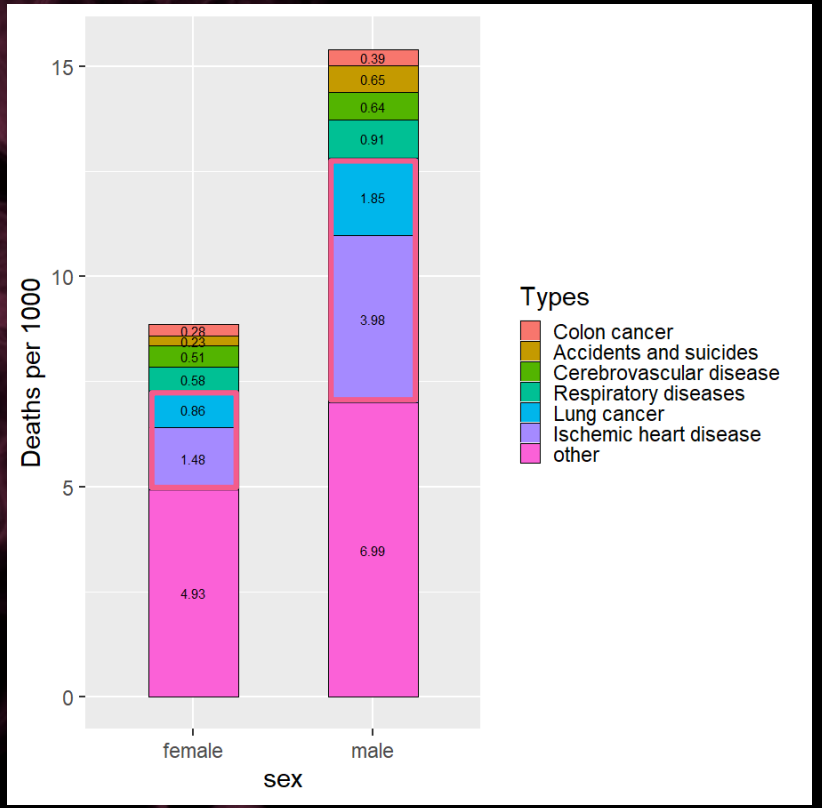
	year	yob	popfemale	total	ischem	lungcan	colon	cerebro	chronic	accid	pneum	suicide	age
	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
1	1968	1920	1193830	0.00473	0.000688	0.000166	0.000148	0.000375	0.0000578	0.000262	0.000131	0.000106	48
2	1969	1920	1193583	0.00505	0.000757	0.000189	0.000168	0.000382	0.0000553	0.000261	0.000126	0.000127	49
3	1970	1920	1242470	0.00522	0.000855	0.000236	0.000159	0.000422	0.0000724	0.000285	0.000136	0.000122	50
4	1971	1920	1244317	0.00528	0.000911	0.000243	0.000197	0.000390	0.0000643	0.000256	0.000117	0.000139	51
5	1972	1920	1240112	0.00583	0.000985	0.000335	0.000192	0.000442	0.0000935	0.000289	0.000121	0.0000919	52
6	1973	1920	1234826	0.00618	0.00117	0.000294	0.000232	0.000462	0.0000624	0.000256	0.000119	0.000121	53

Overview

TABLE 1—SUMMARY STATISTICS FOR MAJOR CAUSES OF DEATH, MEN AND WOMEN BORN 1920–1939

	Men	Women
1. All mortality causes	15.41	8.85
	(10.90)	(6.71)
	100%	*100%*
Cause-specific mortality		
2. Ischemic heart disease	3.98	1.48
	(2.61)	(1.37)
	26%	*17%*
3. Lung cancer	1.85	0.86
	(1.44)	(0.70)
	12%	*10%*
4. Colon cancer	0.39	0.28
	(0.33)	(0.20)
	3%	*3%*
5. Cerebrovascular disease	0.64	0.51
	(0.57)	(0.44)
	4%	*6%*
6. Respiratory diseases	0.91	0.58
(chronic and pneumonia)	(1.04)	(0.66)
	6%	*7%*
7. Accidents and suicides	0.65	0.23
	(0.21)	(0.09)
	4%	*3%*
Fraction veterans	0.66	—
Fraction ever-smokers	0.75	0.50
Observations	579	579

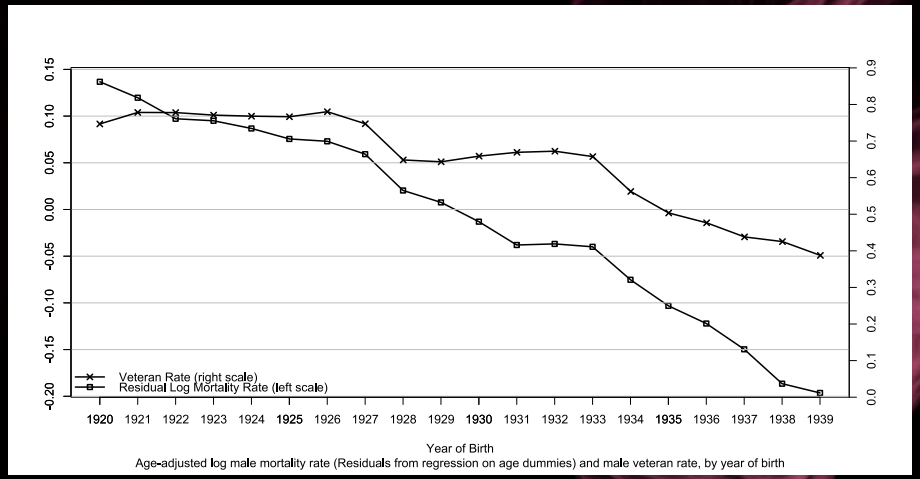
Notes: Standard deviations in parentheses. Entries in italics represent the percentage of all-cause mortality attributable to each specific cause.



K. Bedard, O. Deschênes, *The Long-Term Impact of Military Service on Health: Evidence from World War II and Korean War Veterans*

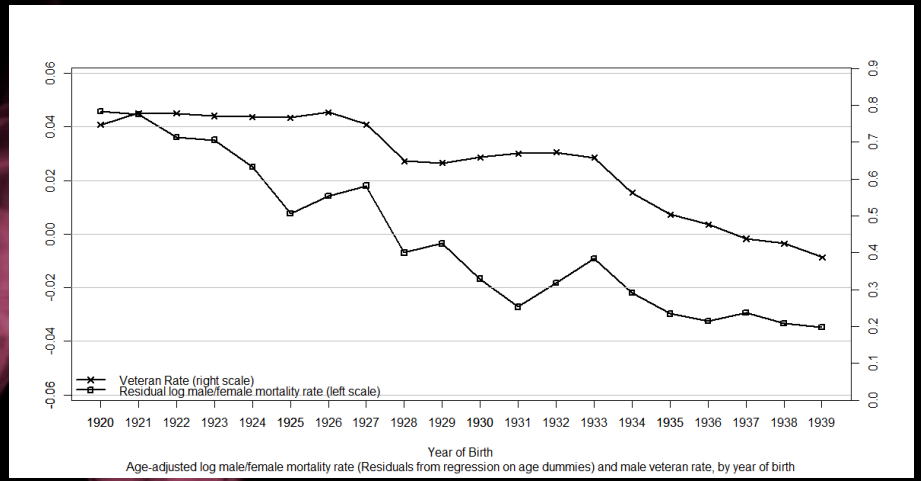
Own illustration

Overview



Own illustration based on K. Bedard, O. Deschênes, *The Long-Term Impact of Military Service on Health: Evidence from World War II and Korean War Veterans*

Correlation: 0.96



Own illustration based on K. Bedard, O. Deschênes, *The Long-Term Impact of Military Service on Health: Evidence from World War II and Korean War Veterans*

Correlation: 0.85

Association of veteran status with mortality and causes of death

$$\log(\overline{M_{ct}}) = \alpha + \beta\bar{V}_c + \delta(c) + \lambda_{t-c} + \varphi_t + u_{ct}$$

$\overline{M_{ct}}$:= mortality rate
$\bar{V}_c$:= male veratan rate
$\delta(c)$:= smooth fuction of year of birth (linear)
λ_{t-c} := unrestriced age effects
φ_t : = unrestricted calendar year effects
u_{ct} := error term

c → cohort, t → year

Association of veteran status with mortality and causes of death

Table 2 - Impact of Veteran Status on Mortality, Male-Only Sample

	Veteran effect				Mean rate	Implied mortality rates[a]	
						Nonvets	Vets
	(1)		(2)		(3)	(4)	(5)
All mortality causes	3.562	(0.97)	3.424	(0.97)	15.406	13.2	16.6
Ischemic hert disease	0.965	(0.27)	0.74	(0.21)	3.979	3.5	4.2
Lung cancer	0.986	(0.18)	1.027	(0.2)	1.851	1.2	2.2
Colon cancer	0.024	(0.04)	0.016	(0.04)	0.388	0.4	0.4
Cerebrovascular diseases	0.043	(0.05)	-0.015	(0.05)	0.642	0.7	0.6
Respiratory diseases	0.255	(0.09)	0.309	(0.11)	0.91	0.7	1
Accidents and suicides	0.233	(0.08)	0.097	(0.05)	0.645	0.6	0.7
Observations	579		579				
Unrestricted age dummies	Yes		Yes				
Linear cohort trend	Yes		Yes				
Unrestricted year dummies	No		Yes				

Notes: The estimated standard errors in parentheses allow for cohort-level clustering. Each regression is weighted by the inverse of the sampling variance of the dependent variable.

[a] Implied mortality rates based on the estimates in column 2

Own illustration based on K. Bedard, O. Deschênes, *The Long-Term Impact of Military Service on Health: Evidence from World War II and Korean War Veterans*

Association of veteran status with mortality and causes of death

$$\log(\overline{M_{sct}}) = \alpha + \beta\overline{V_{sc}} + \omega_s + \delta(c) + \lambda_{st-c} + \varphi_t + u_{sct}$$

$\overline{M_{sct}}$:= mortality rate
$\overline{V_{sc}}$:= veteran rate
ω_s:= dummy for men (=1 if sex == male)
$\delta(c)$:= unrestricted year of birth effects
λ_{st-c} := unrestriced age effects
φ_t : = unrestricted calendar year effects
u_{sct} := error term

c → Cohort, t → year, s → sex

Association of veteran status with mortality and causes of death

Table 3 - Impact of Veteran Status on Mortality, male and Female Sample

	Veteran effect				Mean rate	Implied mortality rates[a]	
						Nonvets	Vets
	(1)		(2)		(3)	(4)	(5)
All mortality causes	3.847	(0.44)	3.754	(0.43)	15.406	12.9	16.7
Ischemic hert disease	1.147	(0.1)	0.919	(0.09)	3.979	3.4	4.3
Lung cancer	1.643	(0.22)	1.688	(0.23)	1.851	0.7	2.4
Colon cancer	-0.094	(0.02)	-0.086	(0.02)	0.388	0.4	0.4
Cerebrovascular diseases	-0.054	(0.03)	-0.041	(0.03)	0.642	0.7	0.6
Respiratory diseases	0.809	(0.12)	0.836	(0.13)	0.91	0.4	1.2
Accidents and suicides	-0.092	(0.02)	-0.114	(0.02)	0.645	0.7	0.6
Observations	1158		1158				
Unrestricted sex*age dummies	Yes		Yes				
Unrestricted cohort dummies	Yes		Yes				
Unrestricted year dummies	No		Yes				

Notes: The estimated standard errors in parentheses allow for cohort-level clustering. Each regression is weighted by the inverse of the sampling variance of the dependent variable.

[a] Implied mortality rates based on the estimates in column 2

Own illustration based on K. Bedard, O. Deschênes, *The Long-Term Impact of Military Service on Health: Evidence from World War II and Korean War Veterans*

Association of veteran status with mortality and causes of death

Table 3 - Impact of Veteran Status on Mortality, male and Female Sample

	Veteran effect				Mean rate	Implied mortality rates[a]		Implied mortality rates[a]	
						Nonvets	Vets	Nonvets	Vets
	(1)		(2)		(3)	(4)	(5)	(4)	(5)
All mortality causes	3.847	(0.44)	3.754	(0.43)	15.406	12.9	16.7	13.2	16.6
Ischemic hert disease	1.147	(0.1)	0.919	(0.09)	3.979	3.4	4.3	3.5	4.2
Lung cancer	1.643	(0.22)	1.688	(0.23)	1.851	0.7	2.4	1.2	2.2
Colon cancer	-0.094	(0.02)	-0.086	(0.02)	0.388	0.4	0.4	0.4	0.4
Cerebrovascular diseases	-0.054	(0.03)	-0.041	(0.03)	0.642	0.7	0.6	0.7	0.6
Respiratory diseases	0.809	(0.12)	0.836	(0.13)	0.91	0.4	1.2	0.7	1
Accidents and suicides	-0.092	(0.02)	-0.114	(0.02)	0.645	0.7	0.6	0.6	0.7
Observations	1158		1158						
Unrestricted sex*age dummies	Yes		Yes						
Unrestricted cohort dummies	Yes		Yes						
Unrestricted year dummies	No		Yes						

Notes: The estimated standard errors in parentheses allow for cohort-level clustering. Each regression is weighted by the inverse of the sampling variance of the dependent variable.

[a] Implied mortality rates based on the estimates in column 2

Own illustration based on K. Bedard, O. Deschênes, *The Long-Term Impact of Military Service on Health: Evidence from World War II and Korean War Veterans*

3.2

Data

Current Population Survey (CPS) Tobacco Supplement

1967/68

	division	age	sex	yob	vet	black	married	smoke100	edcat1	edcat2	edcat3	edcat4
	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
1	1	46	2	1921	0	0	0	1	0	1	0	0
2	1	38	1	1929	0	0	1	1	1	0	0	0
3	1	41	2	1926	0	0	1	1	0	1	0	0
4	1	31	1	1936	1	1	1	1	1	0	0	0
5	1	42	1	1925	0	0	1	0	1	0	0	0
6	1	36	2	1931	0	0	1	1	1	0	0	0

1990s (1992, 1993, 1995, 1996, 1998, 1999)

	division	age	sex	smoke100	vet	black	married	yob	edcat1	edcat2	edcat3	edcat4
	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
1	9	62	2	1	0	0	0	1931	0	1	0	0
2	9	65	2	0	0	0	0	1928	1	0	0	0
3	9	70	1	1	1	0	0	1923	0	1	0	0
4	9	59	1	1	1	0	1	1934	0	0	1	0
5	9	54	2	0	0	0	1	1939	0	0	1	0
6	9	70	1	0	1	0	1	1923	1	0	0	0

Association between military service and smoking

$$Smoke_{ict} = \alpha + \beta V_{ic} + \boldsymbol{X}_{ict}\boldsymbol{\delta} + \lambda_{t-c} + u_{ict}$$

$Smoke_{ict}$:= dummy variable (= 1, if person i in cohort c reports ever being a smoker in year t)

V_{ic} := Veteran status dummy

$\boldsymbol{X}_{ict}$:= vector of personal characteristics

λ_{t-c} := unrestricted age effects

u_{ict} := error term

c → cohort, t → year, i → person

Association between military service and smoking

Table 5-Impact of Veteran Status on Smoking Behavior

	OLS: men only		TSLS:men and women		TSLS:men only	
	(1)		(2)		(3)	
1967/68	0.078	(0.005)	0.276	(0.03)	0.237	(0.14)
1990	0.126	(0.004)	0.346	(0.02)	0.301	(0.03)

Notes: Eicker-White standard errors are reported in parentheses.

Own illustration based on K. Bedard, O. Deschênes,*The Long-Term Impact of Military Service on Health: Evidence from World War II and Korean War Veterans*

Summarizing the results

Table 6 - Percentage of Veteran Mortality Effect Explained by Military Induced Smoking

	Deaths rate per 1000 (Table 1)	% Deaths caused by smoking	Death rate per 1000 smokers due to smoking	Additional deaths per 1000 due to veteran smoking	% Veteran effect due to smoking (Table 2)	% Veteran effect due to smoking (Table 3)
	(1)	(2)	(3)	(4)	(5)	(6)
Ischemic heart disease	3.98	40	2.12	0.586	79	64
Lung cancer	1.85	87	2.15	0.593	58	35

Own illustration based on K. Bedard, O. Deschênes, *The Long-Term Impact of Military Service on Health: Evidence from World War II and Korean War Veterans*

$$(3) = \frac{(1) * (2)}{750}$$

$$(5) = \frac{(4)}{Table2[(2)]}$$

$$(4) = (3) * Table5[(3)]$$

$$(6) = \frac{5}{Table3[(2)]}$$

04

Key Results

Key Results

Table 2/3:

- Higher mortality of veterans in the 1920–1939 cohorts than non-veterans
  → can be attributed mainly to two causes: ischemic heart diseases and lung cancer

Table 5:

- Probability of smoking is 23.7 to 34.6 percentage points higher due to military service than without

Table 6:

35%–79% of the excess mortality of Korean War and WWII veterans from coronary heart disease and lung cancer is attributable to military-induced smoking

Disability rate: Table 8:

- Veterans have a 3.2–9.5 percentage point higher probability of being work-limited or unable to work

Remarks on the Paper

- Partly different rounding or minimally different values than in my analysis (Table 5: OLS estimation)

Paper:

OLS: men only	
(1)	(2)
0.080	0.123
(0.005)	(0.004)

Own regression:

OLS: men only	
(1)	
0.078	(0.005)
0.126	(0.004)

- No error propagation
- Difference-in-differences estimation: assumption that women and men differ only in veteran status

05

Discussion

Discussion

In your opinion, are there further effects that have been left unconsidered here?

06

References

References

- Wikibrief – Smoking in the U.S. military, 03/06/2023
- Kelly Bedard, Olivier Deschênes *The Long-Term Impact of Military service on Health: Evidence from Worls War II and Korean War Veterans* (March 2006), The American Economic Review

07

Appendix

More...

On smoking in the military:
https://de.wikibrief.org/wiki/Smoking_in_the_United_States_military

But where does the close link between the U.S. military and tobacco actually come from?

- To answer this, one has to go back to World War I, when cigarette consumption among U.S. military personnel increased dramatically
- This came about because the tobacco industry promoted cigarettes as a way to psychologically escape current circumstances -> boosting troop morale
- During World War II, tobacco consumption was further promoted by the tobacco industry distributing free cigarettes to the military
- As more and more health risks emerged, the U.S. Department of Defense tried to reduce the smoking rate in the military through various campaigns and policies, but without much success.
- Young soldiers were an ideal target group for the tobacco industry: if they became addicted to tobacco during their military service, they would keep buying tobacco products after service as well
- So the tobacco lobby devised several strategies to circumvent the Department of Defense policies and win the soldiers' approval
- And even today there are relatively more smokers among military personnel than in the civilian population

Methodology

Instrumental variable estimator (TSLS)

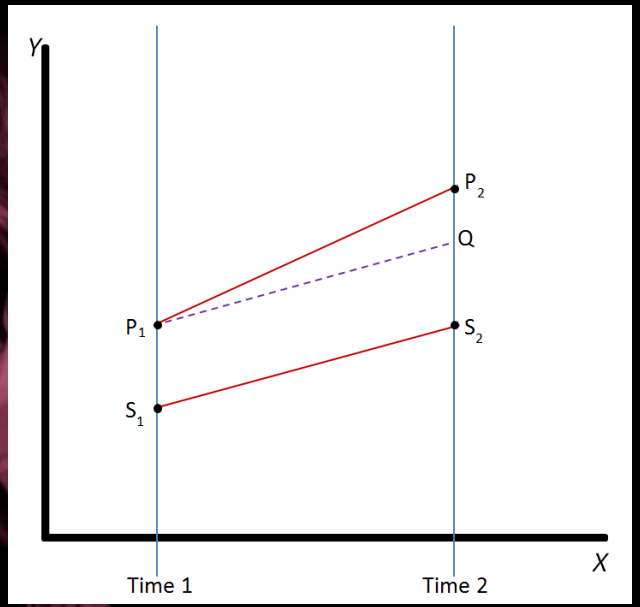
$$y = \alpha_0 + \alpha_1 x + \varepsilon \qquad cor(x, \varepsilon) \neq 0$$

- 1st stage: $\hat{x} = \hat{\beta}_0 + \hat{\beta}_1 z$
- 2nd stage: $y = \alpha_0 + \alpha_1 \hat{x} + \varepsilon$
- Conditions for z:

$cor(z, x) \neq 0$

$cor(z, \varepsilon) = 0$

Difference-in-differences approach



Source: Wikipedia – Difference-in-differences approach

TABLE 4—IMPACT OF VETERAN STATUS ON MORTALITY, BY AGE GROUP

	Veteran effect men only			Veteran effect men and women			Male mortality rate (per 1000)		
	40–54 (1)	55–64 (2)	65–75 (3)	40–54 (4)	55–64 (5)	65–75 (6)	40–54 (7)	55–64 (8)	65–75 (9)
1. All mortality causes	1.998	2.971	8.414	0.589	4.831	15.079	6.627	15.948	33.040
	(0.42)	(0.86)	(3.73)	(0.06)	(0.37)	(2.43)			
Cause-specific mortality									
2. Ischemic heart disease	0.535	0.864	1.316	0.262	1.143	1.760	2.003	4.190	7.953
	(0.12)	(0.23)	(1.06)	(0.03)	(0.12)	(0.55)			
3. Lung cancer	0.355	0.800	2.216	0.568	1.811	4.497	0.603	2.121	4.141
	(0.08)	(0.24)	(0.54)	(0.07)	(0.22)	(0.75)			
4. Colon cancer	0.001	−0.019	0.197	−0.036	−0.094	−0.079	0.125	0.415	0.919
	(0.02)	(0.05)	(0.17)	(0.01)	(0.02)	(0.10)			
5. Cerebrovascular disease	0.011	−0.055	0.434	−0.036	−0.049	0.380	0.263	0.590	1.551
	(0.03)	(0.06)	(0.16)	(0.01)	(0.01)	(0.12)			
6. Respiratory diseases	0.132	0.244	0.184	0.127	0.789	2.872	0.203	0.798	2.633
(chronic and pneumonia)	(0.03)	(0.05)	(0.45)	(0.01)	(0.08)	(0.68)			
7. Accidents and suicides	0.087	0.129	0.048	−0.200	−0.062	0.409	0.711	0.529	0.689
	(0.08)	(0.06)	(0.13)	(0.02)	(0.03)	(0.13)			
Observations	264	194	121	528	388	242			
Unrestricted age dummies	Yes	Yes	Yes	Yes	Yes	Yes			
Unrestricted cohort dummies	No	No	No	Yes	Yes	Yes			
Linear cohort trend	Yes	Yes	Yes	No	No	No			
Unrestricted year dummies	Yes	Yes	Yes	Yes	Yes	Yes			

Notes: The estimated standard errors in parentheses allow for cohort-level clustering. Each regression is weighted by the inverse of the sampling variance of the dependent variable.

Disability rate

TABLE 7—VETERAN-NONVETERAN COMPARISONS, 1980–1990 U.S. CENSUS OF POPULATION

	1980			1990		
	Vets	Nonvets	Difference	Vets	Nonvets	Difference
Disability outcomes						
Work-limiting	0.14	0.15	−0.01*	0.21	0.22	−0.01*
Work-preventing	0.06	0.08	−0.02*	0.13	0.15	−0.02*
Socioeconomic characteristics						
Age	50.56	47.62	2.94*	60.25	57.05	3.20*
Fraction black	0.07	0.15	−0.08*	0.07	0.14	−0.79*
Born in the south	0.33	0.43	−0.10*	0.33	0.41	−0.11*
Fraction high-school graduates	0.36	0.30	0.06*	0.31	0.26	0.05*
Fraction college graduates	0.21	0.17	0.04*	0.22	0.18	0.04*
Currently married	0.85	0.80	0.05*	0.82	0.77	0.05*
Labor force participation	0.91	0.88	0.03*	0.68	0.74	−0.06*
Labor force participation, work-limited	0.54	0.46	0.08*	0.36	0.35	0.01*
Annual wages	27,839	23,308	4,531*	20,384	21,970	−1,585*
Annual income	34,320	28,579	5,741*	33,323	30,399	2,923*
Observations	640,820	361,776	—	611,235	316,774	—

* Indicates that the veteran-nonveteran differences are statistically significant at the 5-percent level.

K. Bedard, O. Deschênes, *The Long-Term Impact of Military Service on Health: Evidence from World War II and Korean War Veterans*

Invalidenrate

$$y_{ict} = \alpha + \beta V_{ic} + \boldsymbol{X}_{ict}\boldsymbol{\delta} + u_{ict}$$

y_{ict} := Indicator for the disability
V_{ic} := Veteran status dummy
$\boldsymbol{X}_{ict}$:= vector of oberservable predictors of health (including a quartic profile in age)
u_{ict} := error term

c → cohort, t → year, i → person

Disability rate

TABLE 8—IMPACT OF VETERAN STATUS ON DISABILITY

	Work-limiting	Work-preventing
Men only		
1. Mean outcome	0.178	0.102
2. OLS veteran (1 = yes)	−0.010	−0.012
	(0.001)	(0.000)
Observations	1,930,605	1,930,605
Men and Women		
3. TSLS: veteran (1 = yes)	0.095	0.032
	(0.003)	(0.002)
4. *F*-Statistics on excluded IV [*p*-value]	8,832.0	8,832.0
	[0.001]	[0.001]
Quartic in age	Yes	Yes
Observations	4,048,052	4,048,052

Note: Eicker-White standard errors are reported in parentheses.

K. Bedard, O. Deschênes, *The Long-Term Impact of Military Service on Health: Evidence from World War II and Korean War Veterans*

Discussion

Conclusion:

- 35%–79% of the excess mortality of Korean War and WWII veterans from coronary heart disease and lung cancer is attributable to military-induced smoking

Question:

How could the 35–79% range be narrowed in order to make a more precise statement?

Discussion

Across the different estimations there are indeed relatively large changes in the results. How could the estimations be improved in order to make a more precise statement?

Table 5-Impact of Veteran Status on Smoking Behavior

	OLS: men only	TSLS:men and women	TSLS:men only
	(1)	(2)	(3)
1967/68	0.078 (0.005)	0.276 (0.03)	0.237 (0.14)
1990	0.126 (0.004)	0.346 (0.02)	0.301 (0.03)

Notes: Eicker-White standard errors are reported in parentheses.

Table 6 - Percentage of Veteran Mortality Effect Explained by Military Induced Smoking

	Deaths rate per 1000 (Table 1)	% Deaths caused by smoking	Death rate per 1000 smokers due to smoking	Additional deaths per 1000 due to veteran smoking	% Veteran effect due to smoking (Table 2)	% Veteran effect due to smoking (Table 3)
	(1)	(2)	(3)	(4)	(5)	(6)
Ischemic heart disease	3.98	40	2.12	0.586	79	64
Lung cancer	1.85	87	2.15	0.593	58	35