

Socioeconomic Disparities in Sleep Duration Among Veterans of the US Wars in Iraq and Afghanistan

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We characterized socioeconomic disparities in short sleep duration, which is linked to multiple adverse health outcomes, in a population-based sample of veterans of the US wars in Iraq and Afghanistan who had interacted with the Minneapolis VA Health Care System. Lower reported household assets, lower food security, greater reported discrimination, and lower subjective social status were significantly ($P < .05$) related to less sleep, even after adjusting for demographics, health behaviors, and posttraumatic stress disorder diagnosis. Assisting veterans to navigate social and socioeconomic stressors could promote healthful sleep and overall health. (*Am J Public Health.* 2015;105:e70–e74. doi:10.2105/AJPH.2014.302375)

Inadequate sleep is common, with just more than 1 in 4 adults in the United States reporting that they average 6 or less hours of sleep per night.¹ Short sleep duration (commonly defined as < 6–8 hr per day) has been linked to serious health problems, including injury,^{2–4} cardiovascular disease and associated risk factors,^{5–14} poor mental health,^{15–19} and all-cause mortality.^{20–27} Disparities exist in which Blacks^{28–32} and those who are of lower socioeconomic status (SES)³³ are at increased risk for sleep deficiency. Military members and veterans, especially those who have been deployed, appear to be at greater risk for short sleep duration.^{34–37} This risk may relate to aspects of the deployment cycle such as irregular schedule and shift work, stress, mental health issues such as posttraumatic stress disorder

(PTSD), and injury. Of further concern is that short sleep duration and its risk factors may be part of a mutually reinforcing cycle. Indeed, research has indicated that predeployment short sleep duration may contribute to the development of PTSD.^{38,39}

In this study, we sought to characterize socioeconomic disparities in short sleep duration among veterans who served in the US wars in Iraq or Afghanistan and to test whether, independent of other known risk factors, socioeconomic obstacles, such as having low income or experiencing discrimination, are linked to short sleep duration.

METHODS

We randomly selected 1200 male and 800 female veterans from the US Department of Veterans Affairs (VA) Operation Enduring Freedom–Operation Iraqi Freedom–Operation New Dawn Roster⁴⁰ who had interacted with the Minneapolis VA Health Care System. This roster is a list of all veterans who served in Iraq and Afghanistan since October 2001. They were invited to participate in the mailed Northstar New Generation Survey in summer 2012, and data were linked to VA administrative records. Of the 2000 surveys mailed, 135 were returned due to being sent to bad addresses and were further untrackable, thus we calculated our effective return percentage to be 52% (953 of 1865). Although this response rate is not high enough to eliminate the possibility of selection bias, it exceeds that of most large population-based surveys of Iraq and Afghanistan war veterans.^{41–45} After excluding 14 refusals and other records with missing or nonsensical outcome information, the analytical sample consisted of 867 individuals. Aside from gender, age, and PTSD diagnosis, which came from VA administrative data, all other variables used were self-reports from the Northstar survey. We assessed the main outcome, hours of sleep, with the survey question “How much sleep do you usually get at night on weekdays or workdays?”

We used unadjusted general linear regression to test whether demographic, SES, and discrimination-related variables had significant bivariate associations with sleep duration. Then, for demographic, socioeconomic, and discrimination variables that had significant

bivariate relationships with sleep, we tested socioeconomic predictor variables’ relationships with sleep duration in multivariate models adjusted for factors known to be associated with sleep duration that might have confounded the bivariate associations.

RESULTS

More than 45% of the sample reported an average of 6 hours or less of sleep per night. In unadjusted analyses (Table 1), greater number of deployments, more children in the household, fewer assets, and lower subjective social status relative to the United States or one’s own community were significantly related to fewer hours of sleep. Men, those with lower food security, and veterans who reported being treated worse than either other races or non-veterans also reported fewer hours of sleep ($P < .05$).

In the adjusted multivariate models (Table 2), with the exception of assets and treatment in comparison with other races, all predictors that had significant bivariate overall or trend relationships with sleep duration retained their significant associations ($P < .05$).

We found notable differences between responders and nonresponders. Compared with nonresponders, responders were less likely to have a PTSD diagnosis (14.9% vs 18.4%; $P = .042$), were older (34.9 vs 31.0; $P \leq .001$), and were less likely to be male (55.1% vs 64.2%; $P \leq .001$).

DISCUSSION

We found that even after adjustment for a variety of factors including PTSD and number of deployments, various measures of SES remained associated with shorter sleep. This is similar to previous research reporting that those of lower SES were more at risk for short sleep duration.³³

Overall, reports of sleep duration in our study (6.52 hr/night) were similar to what has previously been reported for military and veteran populations of this era. For instance, in the Millennium Cohort Study, participants who had been deployed reported averaging approximately 6.5 hours of sleep.³⁷ However, in contrast to previous research, in this study female veterans reported greater sleep duration.³⁷

TABLE 1—Self-Reported Mean Hours (Unadjusted) of Night Sleep on Weekdays Among Veterans of the US Wars in Iraq and Afghanistan: 2012

Variable	No. ^a	Hours of Sleep, ^b Mean (95% CI)	SD
Overall	867	6.44 (6.43, 6.62)	1.35
Demographics			
Gender*			
Male	479	6.35 (6.23, 6.47)	1.35
Female	388	6.75 (6.62, 6.88)	1.31
Race/ethnicity			
Non-White	77	6.35 (5.02, 6.69)	1.44
White, non-Hispanic	781	6.55 (6.45, 6.64)	1.35
Marital status			
Single	230	6.53 (6.36, 6.71)	1.37
Married or partnered	488	6.54 (6.42, 6.65)	1.26
Divorced, separated, or widowed	148	6.49 (6.24, 6.75)	1.57
No. of children in household*			
0	438	6.66 (6.53, 6.79)	1.34
1	176	6.53 (6.33, 6.72)	1.33
2	139	6.25 (6.02, 6.49)	1.40
≥ 3	85	6.36 (6.12, 6.62)	1.20
No. of deployments*			
1	544	6.57 (6.45, 6.69)	1.40
2	244	6.56 (6.41, 6.71)	1.20
≥ 3	76	6.13 (5.82, 6.44)	1.34
Employment*			
Employed for wages	461	6.47 (6.34, 6.58)	1.12
Self-employed	20	7.00 (6.44, 7.56)	1.19
On active duty	56	6.69 (6.38, 6.99)	1.13
Looking for work	60	6.09 (5.66, 6.52)	1.66
On disability	26	6.23 (5.35, 7.11)	2.17
Caring for a family member or homemaker	18	6.47 (6.02, 6.92)	0.92
Student	93	6.82 (6.53, 7.10)	1.38
Retired	16	7.47 (6.68, 8.26)	1.48
Multiple	110	6.52 (6.24, 6.80)	1.46
Socioeconomic status			
Education			
High school, GED, or less	226	6.37 (6.17, 6.56)	1.47
Associate's	212	6.48 (6.30, 6.67)	1.35
Bachelor's	279	6.60 (6.47, 6.74)	1.17
Graduate	100	6.87 (6.62, 7.12)	1.25
Other	47	6.30 (5.79, 6.80)	1.72
Highest military pay grade ^c			
E1–E3	23	6.41 (5.63, 7.20)	1.82
E4–E6	591	6.49 (6.38, 6.60)	1.37
E7–E9	116	6.46 (6.24, 6.68)	1.19
Any W or O grade	140	6.75 (6.54, 7.00)	1.27

Continued

This study had several limitations. Although Northstar's return percentage (52%) was higher than the major survey studies of the new generation of veterans,^{44,45} responders and nonresponders differed on key variables, which may mean that selection bias influenced the results. In addition, our sample was predominantly White, which may have reduced our ability to detect race or perceived racism-related differences. Finally, because the survey was cross-sectional, we cannot discern whether our predictors are causally related to sleep.

Poverty and perceived discrimination, which can be deep and unrelenting stressors, are potentially powerfully sleep disruptors. In the veteran population, sleep has been recognized as one of the unique health care issues for those who provide care for veterans returning from Iraq and Afghanistan.⁴⁹ Given that sleep is associated with many important health outcomes, these findings suggest that a focus on assisting veterans in navigating and overcoming various social and socioeconomic stressors could enhance not just their well-being but also their sleep and long-term health. ■

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Contributors

R. Widome led the study design, analysis, and article preparation. A. Jensen worked on survey development, administration, and data organization and also contributed to editing the article. S. S. Fu contributed to survey development and article preparation.

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Note. The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs or the US government.

TABLE 1—Continued

Income, \$			
< 5000	50	6.40 (6.03, 6.63)	1.85
5000–11 999	68	6.29 (5.87, 6.93)	1.46
12 000–15 999	59	6.45 (5.93, 6.64)	1.42
16 000–24 999	91	6.65 (6.08, 6.82)	1.33
25 000–34 999	104	6.41 (6.38, 6.93)	1.46
35 000–49 999	167	6.57 (6.13, 6.70)	1.31
50 000–74 999	160	6.50 (6.37, 6.77)	1.14
75 000–99 999	57	6.75 (6.47, 7.02)	1.04
≥ 100 000	58	6.59 (6.24, 6.94)	1.31
Assets, \$ ^{d,*}			
< 500	112	6.08 (6.08, 6.39)	1.63
500–4999	178	6.35 (6.15, 6.56)	1.37
5000–9999	90	6.65 (6.38, 6.92)	1.28
10 000–19 999	104	6.63 (6.41, 6.86)	1.15
20 000–49 999	121	6.74 (6.50, 6.99)	1.35
50 000–99 999	85	6.65 (6.39, 6.92)	1.20
≥ 100 000	102	6.67 (6.43, 6.92)	1.20
Don't know	58	6.50 (6.15, 6.85)	1.33
Subjective social status (US) ^{e,*}			
1 or 2	60	5.79 (5.36, 6.21)	1.63
3	102	6.27 (5.97, 6.57)	1.51
4	133	6.49 (6.23, 6.74)	1.42
5	153	6.53 (6.32, 6.74)	1.31
6	178	6.60 (6.42, 6.77)	1.19
7	138	6.70 (6.50, 6.91)	1.21
8, 9, or 10	100	6.90 (6.68, 7.14)	1.14
Subjective social status (community) ^{e,*}			
1 or 2	96	5.96 (5.64, 6.28)	1.56
3	81	6.22 (5.89, 6.56)	1.51
4	107	6.51 (6.25, 6.78)	1.39
5	151	6.44 (6.22, 6.67)	1.39
6	147	6.71 (6.52, 6.90)	1.15
7	128	6.73 (6.52, 6.93)	1.17
8, 9 or 10	154	6.79 (6.59, 6.98)	1.20
Food security ^{f,*}			
High or marginal food security	632	6.68 (6.58, 6.78)	1.24
Low food security	127	6.23 (5.97, 6.51)	1.52
Very low food security	105	5.96 (5.68, 6.24)	1.44
Employment ^{g,*}			
Employed for wages	463	6.47 (6.36, 6.58)	1.21
Self-employed	20	7.00 (6.44, 7.56)	1.19
On active duty	56	6.69 (6.38, 6.99)	1.13
Looking for work or unemployed	60	6.09 (5.66, 6.52)	1.66
On disability or unable to work	26	6.23 (5.35, 7.11)	2.17
Caring for family or homemaker	18	6.47 (6.02, 6.93)	0.92
Student	93	6.82 (6.53, 7.10)	1.38
Retired	16	7.47 (6.68, 8.26)	1.48
Multiple	111	6.51 (6.24, 6.79)	1.46

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Human Participant Protection

All procedures for this research were reviewed and approved by the Minneapolis VA Medical Center's institutional review board.

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TABLE 1—Continued

Discrimination			
Past year, how treated compared with nonveterans?*			
Worse than	77	5.86 (5.54, 6.18)	1.41
Same as	428	6.62 (6.51, 6.73)	1.19
Better than	99	6.44 (6.19, 6.70)	1.27
Don't know or not sure	151	6.66 (6.41, 6.91)	1.53
Past year, how treated compared with opposite sex?			
Worse than	120	6.52 (6.26, 6.78)	1.43
Same as	562	6.55 (6.45, 6.66)	1.24
Better than	20	6.83 (6.23, 7.42)	1.27
Don't know or not sure	146	6.33 (6.06, 6.59)	1.61
Past year, how treated compared with other races?*			
Worse than	31	5.73 (5.16, 6.30)	1.55
Same as	526	6.57 (6.46, 6.68)	1.25
Better than	50	6.71 (6.45, 6.98)	0.92
Worse than some, better than others	32	6.43 (5.88, 6.99)	1.54
Only encountered same	68	6.71 (6.41, 7.01)	1.21
Don't know or not sure	149	6.38 (6.11, 6.65)	1.67

Note. CI = confidence interval; GED = general educational development.

^aSome demographic and behavioral category totals do not add up to 867 because of nonresponse.

^bAssessed by "How much sleep do you usually get at night on weekdays or workdays?"

^cE1–E9 are enlisted ranks; W and O are officer ranks.

^dAssessed by "Suppose you needed money quickly, and you cashed in all of your (and your spouse's) checking and savings accounts, and any stocks and bonds. If you added up what you would get, about how much would this amount to?"

^eAssessed by MacArthur Scale of Subjective Social Status, which asks respondents to indicate where on a 10-rung ladder they see their own status ranking relative to others in the United States and within their own community.⁴⁶

^fFood security was ascertained using the US Household Food Security Module: Six Item Short Form.^{47,48}

^gAssessed by "During the past 6 months, what were you doing on most days?"

**P* < .05, for trend (for ordered or continuous variables) or differences (for nonordered categorical variables) in mean reported hours of sleep.

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TABLE 2—Adjusted Self-Reported Mean Hours of Night Sleep on Weekdays Among Veterans of the US Wars in Iraq and Afghanistan: 2012

Variable	No.	Hours of Sleep, ^a Mean (95% CI)	SD
Food security ^{b,*}			
High or marginal food security	591	6.64 (6.54, 6.75)	1.24
Low food security	119	6.29 (6.06, 6.52)	1.55
Very low food security	95	6.21 (5.94, 6.48)	1.44
Assets, \$ ^c			
< 500	100	6.39 (6.13, 6.65)	1.63
500–4999	164	6.36 (6.16, 6.55)	1.38
5000–9999	86	6.66 (6.38, 6.93)	1.30
10 000–19 999	96	6.60 (6.33, 6.85)	1.16
20 000–49 999	112	6.74 (6.50, 6.98)	1.34
50 000–99 999	79	6.51 (6.22, 6.79)	1.22
≥ 100 000	95	6.65 (6.38, 6.91)	1.22
Don't know	52	6.46 (6.11, 6.81)	1.34
Subjective social status (US) ^{d,*}			
1 or 2	54	6.17 (5.81, 6.52)	1.63
3	95	6.24 (5.98, 6.51)	1.53
4	127	6.54 (6.32, 6.77)	1.42
5	139	6.50 (6.29, 6.72)	1.33
6	167	6.58 (6.38, 6.77)	1.20
7	127	6.72 (6.49, 6.95)	1.23
8, 9, or 10	91	6.83 (6.56, 7.10)	1.06
Subjective social status (community) ^{d,*}			
1 or 2	89	6.11 (5.84, 6.38)	1.56
3	75	6.26 (5.96, 6.55)	1.51
4	94	6.56 (6.30, 6.82)	1.40
5	149	6.41 (6.20, 6.61)	1.39
6	137	6.71 (6.50, 6.93)	1.16
7	119	6.74 (6.51, 6.97)	1.19
8, 9 or 10	142	6.77 (6.55, 6.98)	1.17
Past year, how treated compared with nonveterans? [*]			
Worse than	74	6.09 (5.80, 6.39)	1.27
Same as	401	6.57 (6.45, 6.70)	1.54
Better than	91	6.41 (6.15, 6.68)	1.18
Don't know or not sure	130	6.71 (6.49, 6.92)	1.41
Past year, how treated compared with other races?			
Worse than	27	6.07 (5.57, 6.57)	0.93
Same as	497	6.52 (6.41, 6.64)	1.69
Better than	46	6.67 (6.30, 7.05)	1.20
Worse than some, better than others	31	6.52 (6.05, 6.98)	1.26
Only encountered same	64	6.80 (6.48, 7.12)	1.62
Don't know or not sure	134	6.48 (6.25, 6.71)	1.54

Note. CI = confidence interval. Adjusted for gender, age, age², employment, number of children in household, number of deployments, posttraumatic stress disorder diagnosis, binge drinking, and current tobacco use.

^aAssessed by "How much sleep do you usually get at night on weekdays or workdays?"

^bFood security was ascertained using the US Household Food Security Module: Six Item Short Form.^{47,48}

^cAssessed by "Suppose you needed money quickly, and you cashed in all of your (and your spouse's) checking and savings accounts, and any stocks and bonds. If you added up what you would get, about how much would this amount to?"

^dAssessed by MacArthur Scale of Subjective Social Status, which asks respondents to indicate where on a 10-rung ladder they see their own status ranking relative to others in the United States and within their own community.⁴⁶

* $P < .0$, for trend (for ordered or continuous variables) or for differences (for nonordered categorical variables) in mean reported hours of sleep.