Risk Assessment of Sleep Disorder and Disease Co-Morbidity Across Army Installations from OTSG Health of the Force Report

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Significance

Skeletomuscular injury, height/weight failures, behavioral health problems, and fatigue present significant threats to readiness and lethality. Further, fatigue and sleep disorders not only immediately compromise readiness and lethality, but concurrently increase risks for fatigue-related injuries, metabolic disorders, and psychiatric issues across time. Here, we used the Office of the Surgeon General's (OTSG) annual Health of the Force reports in order to determine which active duty (AD) Army bases OCONUS and CONUS were at highest risk for fatigue and sleep disorders. Second, we aimed to determine if risk category for sleep disorders was predictive of risk for injury, obesity (in accordance with the Army Body Composition Program), and chemical dependence (tobacco/alcohol)

Background

The Health of the Force report intends to provide a snapshot of overall health and readiness of AD personnel.

Data collected and analyzed across AD training bases derived from four sources: (a) Medical Readiness Assessment Tool (obesity, sleep disorders); (b) MHS Data Repository (substance abuse); (c) Corporate Dental Systems (tobacco use); and (d) Defense Medical Surveillance Systems (injury).

Methods/Results

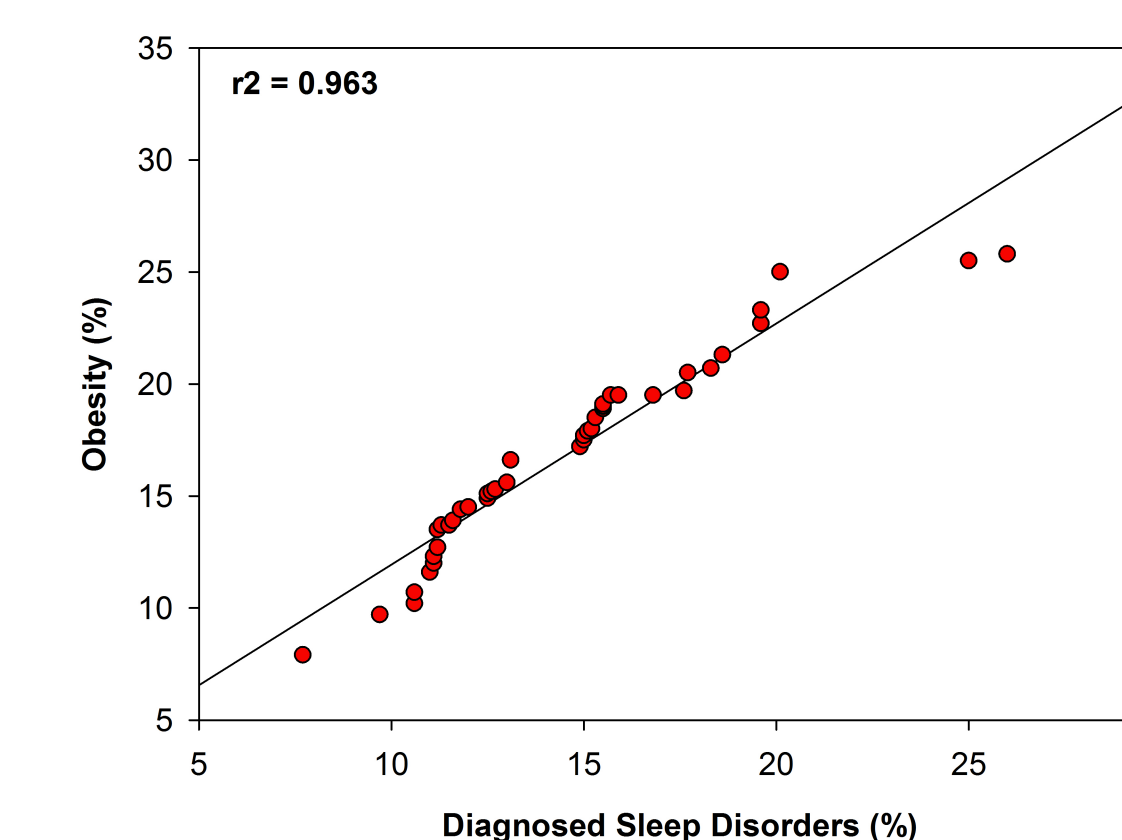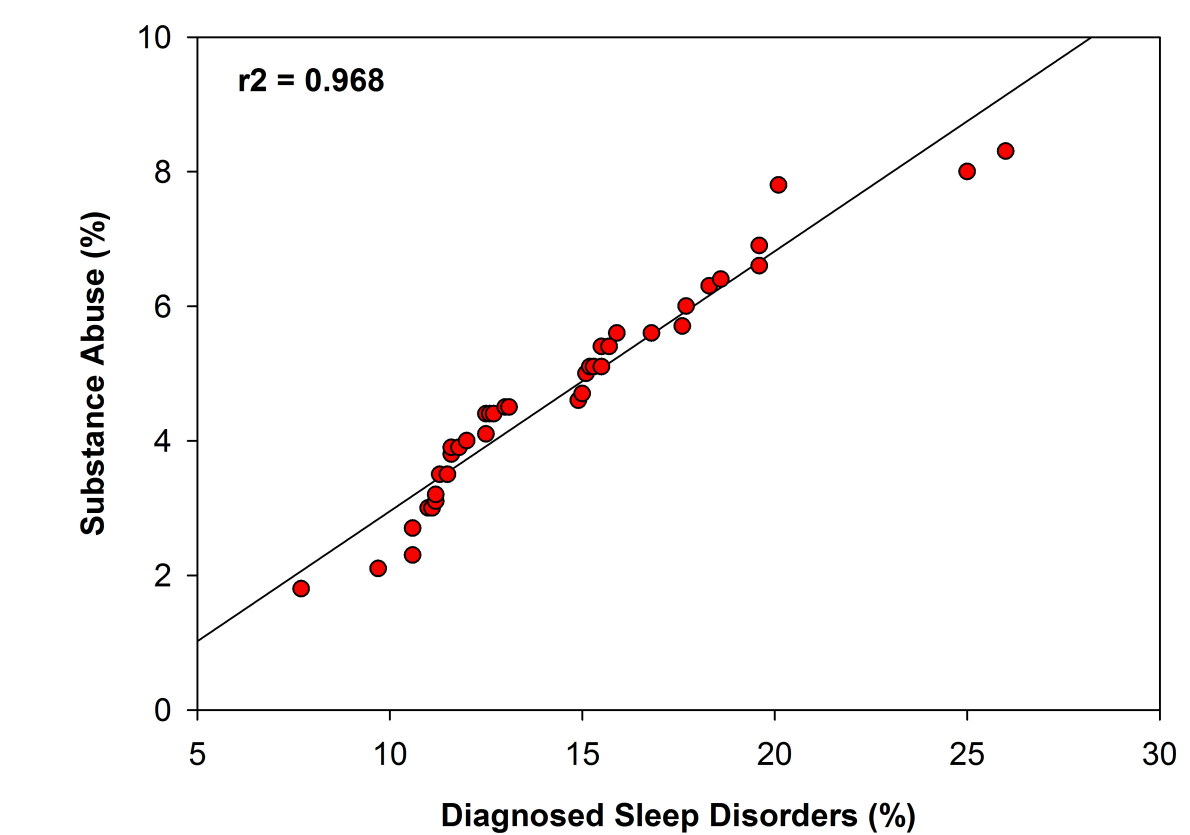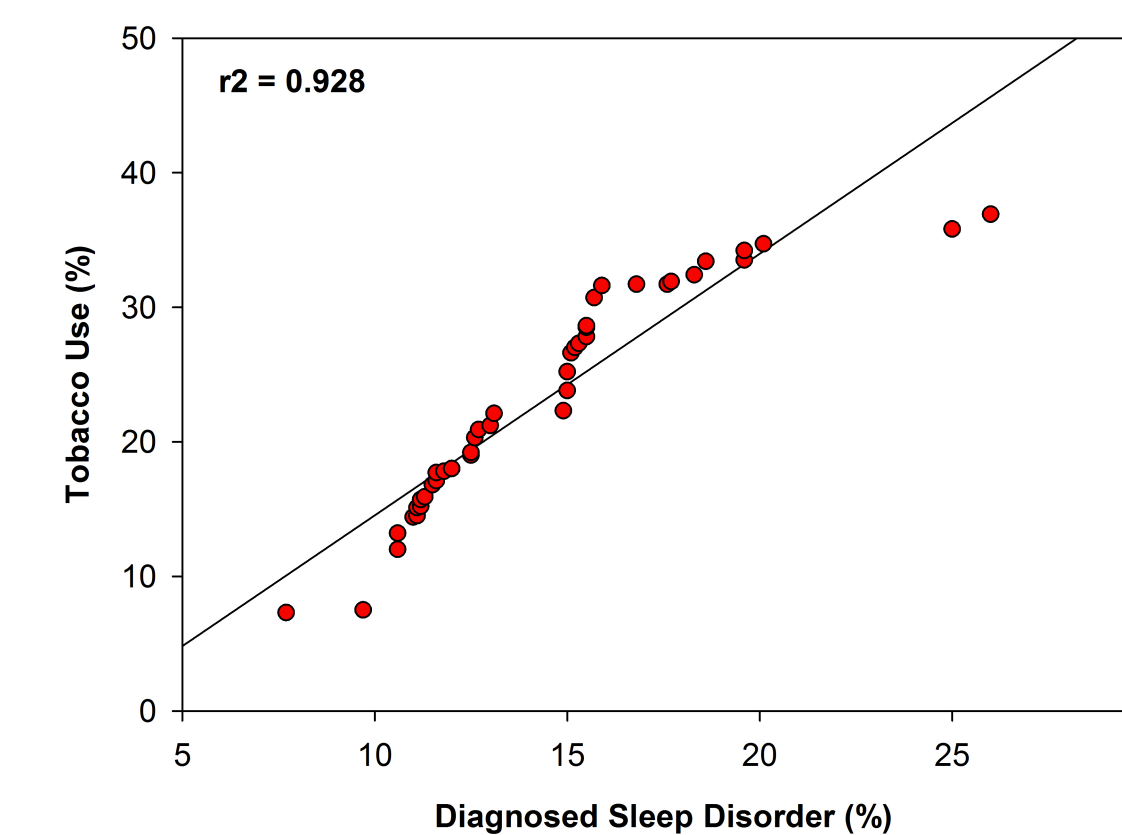|	Sleep Disorders	Substance Abuse	Tobacco Use	Obesity	Injury (per 1,000 cases)
Mean (%)	14.5 (%)	4.7 (%)	23.3 (%)	16.8%	1.4
STDEV	3.9	1.6	8.1	4.3	0.2
National Average (CDC)			**19%**	**29%**	

Each training base was designated as low (green), moderate (amber), or high (red) risk for each disease state. Using a nonparametric (Wilcoxon's signed ranks) ranked test, we were able to identify Army installations at low risk (green; < 25% percentile relative to mean rank), moderate risk (amber; 25% - 50% percentile relative to mean rank), and high risk (red; > 75% percentile relative to mean rank)

Risk Analysis of Diagnosed Sleep Disorder

There was a high degree of co-morbidity for mean percentage of diagnosed sleep disorder with tobacco use ($p<0.001$; $r^2 = 0.928$; upper left), substance abuse ($p<0.001$; $r^2 = 0.968$; upper right), obesity ($p<0.001$; $r^2 = 0.963$; lower left), and injury index ($p<0.001$; $r^2 = 0.517$; not shown). Mean rank comparisons for sleep disorders vs. tobacco use ($p=0.378$; Wilcoxon's signed rank test), substance abuse ($p=0.591$), obesity ($p=0.306$), and injury index ($p=0.499$) did not differ, **providing further evidence for strong co-morbidity of sleep disorders with unhealthy behaviors and not meeting physical readiness standards.**

Conclusion

The Center for Disease Control (CDC) and several epidemiological studies have determined that Southern regions of the United States are at greatest risk for issues concerning public health (e.g., sleep disorders; Grandner et al. 2014, tobacco use (CDC), obesity (CDC). Our mapping of regional distribution of low, moderate, and high risk Army installations for sleep disorders, tobacco use, obesity as well as substance abuse and injury risk report similar trends for (a) geographically-determined risk; and (b) co-morbidity of disease states/unhealthy behaviors . This is surprising because there is a large degree of inter-individual variability in geographical origin, race/ethnicity, and socioeconomic statuses within a single Army installation. **In general, large infantry and artillery training units located in the Southern United States were at greatest risk for unhealthy behaviors and not meeting physical readiness standards** (**Figure 1**). A few exceptions include Aberdeen Proving Grounds in Northern Maryland and Fort Belvoir in Northern Virginia; separated by 87 miles. Across these 87 miles, however, sit in the Washington DC-Virginia-Maryland triangle; one of the most congested traffic areas in the country. Therefore, it is hypothesized that the psychological and physiological stress of long commutes may contribute to higher morbidity.