

# The Association Between Usual Sleep Duration and Occupational Injury

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## Background

In recent years there has been an increasing interest in the relationship between sleep characteristics and risk of injury, specifically in the occupational setting. While the results from these studies suggest that fatigue and sleep disorders increase the risk of occupational injury (1-5), the use of exact measurements of sleep duration—decreases of which have been shown to increase the risk of injury regardless of occupational setting (6,7)—has been limited. Additionally, previous studies have had limited generalizability due to the use of specific occupational groups (e.g., medical trainees and railroad workers) (3-5). The current study attempts to contribute to the literature by using data from a nationally representative sample by utilizing information regarding a wide variety of demographic, lifestyle, and medical characteristics to provide a more generalizable estimate of the association between sleep duration and occupational injury.

## Methods

### Data Source

- The National Health Interview Survey (NHIS) is a nationally representative survey produced annually by the National Center for Health Statistics. The purpose of the NHIS is to monitor the health of the general, non-institutionalized United States population by collecting information on demographic, socioeconomic and health-related characteristics.

### Study Design, Population, and Variable Definitions

- Design: Cross-sectional study
- Population: 72,784 adults of working age (i.e., 18 to 65) who completed the 2004 to 2007 NHIS.
- For each individual, information was collected regarding demographics (i.e., age, race, gender, and body mass index (BMI)), comorbidities (e.g., history of coronary heart disease, cancer, etc.), and lifestyle factors (i.e., years working at current job, smoking and alcohol use frequency, exercise frequency, and whether the person had a live in partner).
- Occupations were classified as being blue-collar, white-collar, or service sector.
- Sleep duration was self-reported as the number of usual hours of sleep.
- Occupational injury was self-reported as occurring in a work setting during the three months prior to the interview.

## Statistical Analysis

- Logistic regression was used to estimate odds ratios (ORs) and associated 95% confidence intervals (CIs) for the association between sleep duration and occupational injury, adjusted for demographic characteristics, comorbidities, and lifestyle factors.
- A backwards-selection process was used to create the most parsimonious model that included only significant factors (i.e., BMI, sex, age, exercise frequency, smoking status, and alcohol use)
- Trend tests were used to determine whether increasing sleep duration was associated with occupational injury

## Results

**Table II.** Crude (cOR) and adjusted (aOR) odds ratios and associated 95% confidence intervals (95% CI) for the association between usual sleep duration and occupational injury

	% injured	cOR (95% CI)	aOR (95% CI)*	trend-p*
<b>All occupations</b>				
Sleep duration (hours)				
3-5	1.7	1.63 (1.15-2.32)	1.52 (1.07-2.17)	0.0004
6-8	1.1	Ref	Ref	
9+	0.7	0.67 (0.48-0.93)	0.73 (0.52-1.02)	
<b>Blue collar occupations †</b>				
Sleep duration (hours)				
3-5	2.6	1.79 (0.86-3.73)	1.68 (0.78-3.62)	0.02
6-8	1.5	Ref	Ref	
9+	0.8	0.55 (0.30-1.01)	0.60 (0.33-1.09)	
<b>White collar occupations ‡</b>				
Sleep duration (hours)				
3-5	1.1	1.16 (0.87-1.56)	1.16 (0.86-1.58)	0.13
6-8	0.9	Ref	Ref	
9+	0.6	0.65 (0.34-1.25)	0.71 (0.37-1.58)	
<b>Service sector occupations ¶</b>				
Sleep duration (hours)				
3-5	1.9	2.02 (1.14-3.55)	1.85 (1.07-3.19)	0.23
6-8	0.9	Ref	Ref	
9+	0.9	0.91 (0.46-1.81)	1.00 (0.50-1.98)	

\* Adjusted for sex, BMI, age, exercise, smoking status, and alcohol use

† Includes building and grounds cleaning and maintenance; farming, fishing, and forestry, construction and extraction; installation, maintenance, and repair; production; and transportation and material moving occupations.

‡ Includes management; business and financial operations; computer and mathematical; architecture and engineering; life, physical, and social science; legal; healthcare practitioners and technical; healthcare support; sales; and office and administrative support occupations.

¶ Includes community and social service; education, training, and library; arts, design, entertainment, sports, and media; protective service; food preparation and serving related; and personal care and service occupations.

## Discussion

The results from the current study suggest that decreased self-reported usual sleep duration increases risk of occupational injury. This association is similar to associations reported in other, smaller studies. Further studies utilizing measurements of sleep duration in the days prior to the occupational injury may provide better estimates of the association by providing researchers with a more internally valid understanding of how transient shifts in sleep patterns can increase the risk of occupational injury.

### Strengths

- Use of a nationally representative population, thus increasing generalizability
- Large sample size, allowing for the control of multiple factors
- Recall bias not likely – subjects had no knowledge of study hypothesis

### Limitations

- Temporal relationship unclear
- Usual duration of sleep may not be an accurate measure of sleep duration directly prior to the occupational injury
- Limited to occupational injuries occurring in the three months prior to the interview
- Inability to control for other possible confounders such as acute illness (e.g., cold or flu), medications taken prior to injury, or hours worked per shift

## Conclusion

The results of the current study suggest that an average usual sleep duration of 3-5 hours per night increases risk occupational injury, and that interventions such as limiting duration of work shifts so that workers may acquire adequate amounts of sleep may prevent occupational injury. Since usual duration of sleep may not be an accurate measure of sleep patterns prior to the injury, future research utilizing the case-crossover design will help to further evaluate the role of acute disturbances to regular sleep patterns and the occurrence of occupational injuries.

## References

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