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Association Between Cigarette Smoking and Sleep Outcomes Among Long-Haul Truck Drivers: A Secondary Data Analysis

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appropriate approvals. Artificial intelligence tools (e.g., Grammarly) were used to assist with grammar, clarity, and editing during the preparation of this manuscript.

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Running Head: Sleep Outcomes In Long-Haul Truck Drivers

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Abstract

Objective: To describe smoking prevalence among long-haul truck drivers (LHTDs) and assess differences in sleep quality, quantity, and propensity between smokers and non-smokers.

Methods: Sleep quality was measured using the Pittsburgh Sleep Quality Index, and sleep propensity using the Epworth Sleepiness Scale. Data were analyzed in RStudio using descriptive statistics, Shapiro-Wilk, Levene's Test, Mann-Whitney U Tests, and Cohen's D.

Results: Among 96 LHTDs surveyed, 63 were non-smokers, and 33 were smokers. Smokers reported significantly higher daytime sleepiness scores ($p = .038$, $d = 0.2$), while differences in sleep quality and sleep propensity duration were not statistically significant

Conclusions: Individuals who smoke experienced poorer sleep quality and greater daytime sleepiness. These findings underscore the need for larger studies and targeted interventions to address smoking-related sleep issues in LHTDs.

Keywords: long-haul truck drivers, sleep, smoking, PSQI, ESS, occupational health

Learning Outcomes (LO)

After reading, readers should be able to:

- Describe cigarette smoking prevalence among long-haul truck drivers and its relationship to occupational stressors.
- Differentiate between sleep quality, sleep quantity, and sleep propensity, and explain how each was measured.
- Interpret the statistical findings comparing smokers and nonsmokers.

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Introduction

Long-haul truck drivers (LHTDs) are responsible for delivering essential goods across the United States, yet they face significant health risks. Due to increased occupational demands, LHTDs often experience irregular sleep, contributing to significant psychological and physical stress[1] and increasing the risk of motor vehicle collisions and mortality.[2] Existing literature shows that 44% of truck drivers report never getting good sleep or rarely getting good sleep during their workweek,[2] and depending on delivery schedules and financial incentives, many LHTDs sleep in their cabins for the shortest duration possible.[3] These sleep irregularities not only pose a threat to truck drivers' health but also endanger the safety of both LHTDs and the general public.[2] Smoking is often used as a coping mechanism for stress,[4] as a stimulant to combat fatigue, and to satisfy nicotine dependence.[1] In the largest national health survey of truck drivers to date, the prevalence of smoking among male and female truck drivers (46% and 55%, respectively) in the United States (U.S.) exceeded that of other male and female workers who smoked (21% and 17%, respectively).[4] When combined with irregular sleeping schedules, smoking can further exacerbate health risks, including heart disease, sleep apnea, depression, and obesity.[1]

Smoking has also been associated with poor sleep outcomes. [5,6] Examples of sleep outcomes include sleep quantity (duration), [7,8] sleep quality (refreshing sleep),[7,9] and sleep propensity (daytime sleepiness) [10] These sleep outcomes are especially vital among LHTDs, as sleep is often compromised in this community, significantly affecting alertness, cognitive functioning, and therefore driving performance. [11] Prior research has also linked smoking with reduced sleep quantity and poor sleep quality.[11]

Despite the known sleep issues among LHTDs and the deleterious effect of smoking upon sleep, little is known about the relationships between smoking and sleep quality, quantity, and

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propensity among this group of workers. Understanding these relationships between smoking and sleep among LHTDs is essential to address health concerns and possibly improve their well-being. Therefore, this study examines cigarette smoking prevalence among LHTDs and explores differences in sleep quality, quantity, and propensity between smokers and non-smokers.

Methods

Parent study

This secondary analysis builds on a larger parent study that explored LHTDs' experiences with social isolation, sleep, and healthcare access, and examined associations with depression, post-traumatic stress, medical diagnoses, and medication use.[12] Eligible participants were actively employed truck drivers who self-identified as LHTDs, spent at least 3 days per week away from home, could read and write in English, and were willing to participate in the study. Long-haul truck drivers were recruited using snowball sampling (word-of-mouth) and communication through trucker social media sites. The University of Alabama at Birmingham Institutional Review Board (IRB) approved this study, and participants received $50 compensation for their time. The parent study sample included 96 LHTDs. A cross-sectional design was used, consisting of a Qualtrics-based survey measuring socio-occupational demographics, sleep, social isolation, healthcare access, and mental and physical health indicators. Only quantitative data were used in the current analysis. Initially, survey data from the parent study were imported directly into IBM SPSS; however, for this secondary data analysis, the data were translated into RStudio.

Measures

The self-reported measures in this study included demographic items and sleep health measures. Demographic questions included gender, race, education, marital status, age, years with a Class

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A Commercial Driver's License (CDL), days in an average week, total days on the road, and cigarette smoking status. Days in an average week were assessed with the question 'Typically, how many days in a row are you on the road?' Total days on the road were assessed with the question 'What is the average length of a typical trip you drive at work? (Total days).' Cigarette smoking status was the variable of interest and was determined by asking the following question: "Within the past month, how many packs of cigarettes per day have you smoked?" LHTDs who reported more than 0 were classified as smokers, and those who reported 0 were classified as nonsmokers.

Sleep health measures were also incorporated into this study. Sleep quantity was calculated using participants' self-reported sleep onset and wake times. Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI). This instrument consists of a seven-component scale that generates a composite score ranging from 0 to 21, with higher scores indicating worse sleep quality.[13] Pittsburgh Sleep Quality Index scores of 5 or higher indicate poor-quality sleep. Sleep propensity, or daytime sleepiness, was measured using the Epworth Sleepiness Scale (ESS),[14,15] which assesses the likelihood of sleepiness in eight situations. Each item is rated on a 4-point scale, with total scores ranging from 0 to 24; higher scores indicate more severe daytime sleepiness. Generally, scores of 10 or higher may be associated with sleep disorders, and scores higher than 16 are associated with severe sleep disorders such as narcolepsy, obstructive sleep apnea, and idiopathic hypersomnia.[14]

Statistical analysis

Descriptive statistics (means, standard deviations, and medians) were computed for each sleep measure to summarize differences between smokers and non-smokers. Before group comparisons, the Shapiro-Wilk and Levene's tests were used to assess normality and

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homogeneity of variance. Because several variables did not meet these assumptions, nonparametric Mann-Whitney U (Wilcoxon rank-sum) tests were used to compare each sleep measure. A false discovery rate (FDR) correction using the Benjamini–Hochberg procedure was applied, and q-values are reported instead of unadjusted p-values. Effect sizes for these comparisons were quantified using Cohen's *d* to estimate the magnitude of observed differences beyond statistical significance. All statistical analyses were conducted in RStudio (version 2024.04.2).

Results

Participants' Demographics

Descriptive statistics are summarized in Table 1. Of the 96 LHTDs included in the parent study, 66% of respondents were non-smokers (n = 63) and 33% were smokers (n = 33). Among smokers, the mean number of packs smoked per day in the past month was 1.48 (SD = 0.64), with a median of 1.50 (range: 0.25–3.00). Most respondents were male (86.46%), with 11.46% female and 2.08% not reporting gender. The majority identified as White (81.25%), while 4.17% identified as African American and Hispanic, 2.08% as Native American, 1.04% as Asian, and 5.21% as other race. For education, the largest group of respondents reported having at least a high school diploma or General Education Development (GED) (68.75%), followed by college graduates (20.83%), and graduate education (6.25%). Regarding marital status, 48.96% of respondents were married, 13.54% were single, 12.50% were divorced, 11.46% were partnered, 7.29% were separated, and 2.08% were widowed. The respondents' mean age was 53.94 ± 9.53 years, with a range of 28-72. Respondents also reported holding a CDL license for an average of 21.14 ± 12.43 years, driving 5.65 ± 1.54 days in an average week, and 7.21 ± 9.69 days on the road.

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Comparison of Sleep Health Measures by Smoking Status

When comparing PSQI scores by smoking status, smokers had higher mean scores (8.30 ± 4.52) than nonsmokers (7.64 ± 3.90); however, this difference was not statistically significant (W = 962.0, q = .742). Mean sleep quantity scores were nearly identical between smokers (6.20 ± 1.04) and nonsmokers (6.18 ± 1.48), with no statistically significant difference (W = 997.0, q = .742). In contrast, ESS scores were significantly higher among smokers (7.24 ± 2.90) than among nonsmokers (M = 5.77; W = 501.5, q = .038), although the effect size was small (Cohen's d = 0.2). A summary of the sleep health measures by smoking status is shown in Table 2.

Discussion

Although there was no statistically significant difference in sleep quantity between smokers and nonsmokers, it is essential to note that the mean sleep time for this group of LHTDs did not align with sleep quantities recommended for driving safety. That is, participants in the current study reported an average of six hours of sleep, which is below the recommended seven to eight hours for safe driving.[16] This finding further highlights sleep deficits among LHTDs, regardless of smoking status.

Our findings indicate that smokers had higher mean ESS scores compared to nonsmokers (7.24 vs. 5.77), revealing greater daytime sleepiness and an increased risk of falling asleep in passive situations. This finding is consistent with the existing literature, where smokers reported higher daytime sleepiness prevalence when compared to nonsmokers, attributable to nicotine's effect on sleep.[17] Nicotine stimulates the cardiovascular system and the central nervous system by increasing wakefulness;[18] however, as nicotine levels in the body decline throughout the night, sleep becomes fragmented by the withdrawal process, and smokers experience nighttime cigarette cravings and therefore, higher daytime sleepiness risk.[18] This pattern may explain the

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higher ESS scores even though sleep quantity between the two groups was practically identical (6.20 vs. 6.18). However, the ESS scores' mean values in both groups fell below commonly used clinical thresholds for excessive daytime sleepiness, limiting clinical interpretation.

Although smokers also displayed higher PSQI scores compared to nonsmokers (8.30 vs. 7.64), suggesting poorer sleep quality in smokers, this difference was not statistically significant. Such a lack of statistical significance may reflect a limited sample size, which reduces statistical power to detect meaningful differences, or reflect the presence of similar sleep environments for both groups. Mean PSQI scores from both groups exceeded the threshold score for poor sleep, supporting sleep quality as an important occupational factor for LHTDs, rather than a sole smoking component. This is especially important in LHTDs, as sleep quality has been noted to be a more critical influencer on safety and may co-occur with established crash risk factors, compared to sleep quantity.[11]

Among this sample, smoking prevalence was 34%, while lower than the 51% prevalence rates documented in existing national surveys of LHTDs, these rates still exceed those of the general population (19%) at that same time.[19] This difference reveals the continued role of occupational smoking in this population, warranting targeted interventions. The lower smoking prevalence of this sample compared to that of the national surveys may be reflect a decline in smoking trends, sample characteristics, geography, or the need for further investigation with better generalizability.

While the findings from this study offer an additional perspective on the effects of sleep among LHTDs, they should be interpreted with caution given several limitations. First, the relatively small sample size limits statistical power and generalizability. Second, all sleep measures are self–reported, which may introduce recall bias. The study also did not assess smoking intensity

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or duration, limiting the ability to analyze potential dose-response relationships between sleep outcomes and tobacco exposure. Additionally, important confounders strongly linked to both smoking and sleep in LHTDs–age, shift timing, stimulant/alcohol use, and sleep apnea risk–were not adjusted for in this analysis. The observed associations may, in turn, reflect confounding by work organization, stimulant use, or health status, rather than by smoking status alone. The study also did not examine other comorbidities, medication use, the presence of a co-driver, or the time of day during which sleep occurred. Rather than providing causal conclusions, the findings should be viewed as hypothesis-generating and useful for informing future research delving further into the relationship between sleep and smoking status in this occupational context. Future studies using a larger, instrumented sample for repeated measures would provide an opportunity for more robust findings.

These findings also have implications for occupational health prevention. Given the taxing work environments LHTDs experience, interventions should be aimed at smoking cessation and sleep health. Occupational health professionals, including occupational health nurses with smoking-cessation intervention training, are well-equipped to assist with smoking-cessation and sleep-health education with fatigue-management resources.[20] Existing literature that workplace settings are more effective for integrating smoking cessation programs, engaging more smokers, and attaining better cessation continuation.[20,21] Across the organization, policies that support healthier work environments, adequate rest opportunities, and fatigue reduction may address some of the underlying factors contributing to sleep deficits and smoking behaviors among LHTDs.[22,23]

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Conclusion

Given the demanding work conditions of LHTDs, promoting healthy sleep behaviors is crucial for optimal performance, safety, and overall well-being. Our findings suggest that individuals who smoke experience excessive daytime sleepiness and poorer sleep quality, adding to existing risks for motor vehicle crashes. Moving forward, workplace initiatives should integrate smoking-cessation interventions with sleep-health education. Future research should also investigate the physiological mechanisms by which nicotine affects sleep quantity, quality, and architecture, particularly in safety–sensitive occupational populations such as those in the trucking industry.

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References

1. Kagabo, R., Thiese, M. S., Eden, E., Thatcher, A. C., Gonzalez, M., & Okuyemi, K. (2020b). Truck drivers' cigarette smoking and preferred smoking cessation methods. *Substance Abuse*, *14*, 1178221820949262. https://doi.org/10.1177/1178221820949262
2. Hege, A., Perko, M., Johnson, A., Yu, C. H., Sönmez, S., & Apostolopoulos, Y. (2015). Surveying the Impact of Work Hours and Schedules on Commercial Motor Vehicle Driver Sleep. *Safety and health at work*, *6*(2), 104–113. https://doi.org/10.1016/j.shaw.2015.02.001
3. Federal Motor Carrier Safety Administration. (2015). *Interstate truck driver's guide to hours of service*. U.S. Department of Transportation. https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/Drivers%20Guide%20to%20HOS%202015_508.pdf
4. Birdsey, Jan MPH; Sieber, W. Karl PhD, MS; Chen, Guang X. MD, MSc; Hitchcock, Edward M. PhD, MS; Lincoln, Jennifer E. MSSM; Nakata, Akinori PhD; Robinson, Cynthia F. PhD, MS; Sweeney, Marie H. PhD, MPH. National Survey of US Long-Haul Truck Driver Health and Injury: Health Behaviors. Journal of Occupational and Environmental Medicine 57(2):p 210-216, February 2015. | DOI: 10.1097/JOM.0000000000000338
5. Purani, H., Friedrichsen, S., & Allen, A. M. (2019). Sleep quality in cigarette smokers: Associations with smoking-related outcomes and exercise. *Addictive Behaviors*, *90*, 71-76. https://doi.org/10.1016/j.addbeh.2018.10.023
6. Grigoriou, I., Kotoulas, S.-C., Porpodis, K., Spyratos, D.,Papagiouvanni, I., Tsantos, A.,Michailidou, A., Mourelatos, C., Mouratidou, C., Alevroudis, I., Marneri, A., & Pataka, A.

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(2024). The Interactions between Smoking and Sleep. *Biomedicines*, *12*(8), 1765. https://doi.org/10.3390/biomedicines12081765

7. Kohyama J. (2021). Which Is More Important for Health: Sleep Quantity or Sleep Quality?. *Children (Basel, Switzerland)*, *8*(7), 542. https://doi.org/10.3390/children8070542
8. Pilcher, J. J., & Morris, D. M. (2020). Sleep and Organizational Behavior: Implications for Workplace Productivity and Safety. *Frontiers in psychology*, *11*, 45. https://doi.org/10.3389/fpsyg.2020.00045
9. United States Centers for Disease Control and Prevention, 2024. About Sleep. https://www.cdc.gov/sleep/about/index.html.
10. Sanford, S. D., Lichstein, K. L., Durrence, H. H., Riedel, B. W., Taylor, D. J., & Bush, A. J. (2006). The influence of age, gender, ethnicity, and insomnia on Epworth sleepiness scores: A normative US population. *Sleep Medicine*, *7*(4), 319-326. https://doi.org/10.1016/j.sleep.2006.01.010
11. Lemke, M. K., Apostolopoulos, Y., Hege, A., Sönmez, S., & Wideman, L. (2016). Understanding the role of sleep quality and sleep duration in commercial driving safety. *Accident Analysis and Prevention*, *97*, 79-86. https://doi.org/10.1016/j.aap.2016.08.024
12. Heaton, K., Kham-ai, P., Montgomery, A. (2025). The relationships between sleep, social isolation, and health care access to depression, Post Traumatic Stress, number of medical diagnoses, and medication use among long-haul truck drivers: A cross – sectional study. *Western Journal of Nursing Research*. https://doi.org/10.1177/01939459251362553

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13. Buysse, D. J., Reynolds, C. F., Charles, F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh sleep quality index: a new instrument for psychiatric practice and research. Psychiatry Research, 28 (2), 193–213
14. Johns, M. W. (1991). "A new method for measuring daytime sleepiness: the Epworth sleepiness scale". *Sleep*, *14*(6), 540–545.
15. Gonçalves, M. T., Malafaia, S., Dos Santos, J. M., Roth, T., & Marques, D. R. (2023). Epworth sleepiness scale: A meta-analytic study on the internal consistency. *Sleep medicine*, *109*, 261-269.
16. National Highway Traffic Safety Administration, n.d. Drowsy Driving. U.S. Department of Transportation. https://www.nhtsa.gov/risky-driving/drowsy-driving
17. Patterson, F., Grandner, M. A., Malone, S. K., Rizzo, A., Davey, A., & Edwards, D. G. (2019). Sleep as a target for optimized response to smoking cessation treatment. *Nicotine & Tobacco Research*, *21*(2), 139–148. https://doi.org/10.1093/ntr/ntx236
18. Singh, N., Wanjari, A., & Sinha, A. H. (2023). Effects of Nicotine on the Central Nervous System and Sleep Quality in Relation to Other Stimulants: A Narrative Review. *Cureus*, *15*(11), e49162. https://doi.org/10.7759/cureus.49162
19. Sieber, W. K., Robinson, C. F., Birdsey, J., Chen, G. X., Hitchcock, E. M., Lincoln, J. E., Nakata, A., & Sweeney, M. H. (2014). Obesity and other risk factors: The national survey of U.S. long-haul truck driver health and injury. *American Journal of Industrial Medicine*, *57*(6), 615–626. https://doi.org/10.1002/ajim.22293
20. Lee, J., Lee, S., Lee, M., & Kang, Y. J. (2021). Occupational health nurses' personal attitudes toward smoking: A cross-sectional study. *Journal of occupational health*, *63*(1), e12221. https://doi.org/10.1002/1348-9585.12221

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21. Thornberry, A., Garcia, T. J., Peck, J., & Sefcik, E. (2020). Occupational health nurses' self-efficacy in smoking cessation interventions: An integrative review of the literature. *Workplace Health & Safety*, *68*(11), 533–543. https://doi.org/10.1177/2165079920925106

22. Redeker, N. S., Caruso, C. C., Hashmi, S. D., Mullington, J. M., Grandner, M., & Morgenthaler, T. I. (2019). Workplace interventions to promote sleep health and an alert, healthy workforce. *Journal of Clinical Sleep Medicine, 15*(4), 649–657. https://doi.org/10.5664/jcsm.7734

23. Pilkington-Cheney, F., & McNicholas, W. T. (2025). Occupational and driving challenges within sleep medicine. *Journal of Sleep Research, 34*(5), e70063. https://doi.org/https://doi.org/10.1111/jsr.70063

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Table 1

Summary statistics of Demographic Characteristics (N=96)

	n (%)		
Gender			
Male	83 (86.46%)		
Female	11 (11.46%)		
missing	2 (2.08%)		
Race			
White	78 (81.25%)		
African American	4 (4.17%)		
Asian	1 (1.04%)		
Hispanic	4 (4.17%)		
Native American	2 (2.08%)		
Other	5 (5.21%)		
Missing	2 (2.08%)		
Education			
Less than 12th grade	1 (1.04%)		
High school diploma or GED	66 (68.75%)		
College graduate	20 (20.83%)		
Graduate School	6 (6.25%)		
Missing	3 (3.13%)		
Marital status			
Married	47 (48.96%)		
Partnered	11 (11.46%)		
Single	13 (13.54%)		
Divorced	12 (12.50%)		
Separated	7 (7.29%)		
Widowed	2 (2.08%)		
Others	2 (2.08%)		
Missing	2 (2.08%)		
	M ± SD	**Minimum**	**Maximum**
Age (n = 94)	53.94 ± 9.53	28.00	72.00
Years with a CDL license	21.14 ±12.43	3.00	48.00
Days in an average week	5.65 ±1.54	0.00	7.00
Total Days on the road (n = 94)	7.21 ± 9.69	1.00	77.00

Note. N = number; % = percentage; M = mean; SD = standard deviation.

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Table 2

Summary of Sleep Health Measures by Smoking Status Among LHTDs (N = 96)

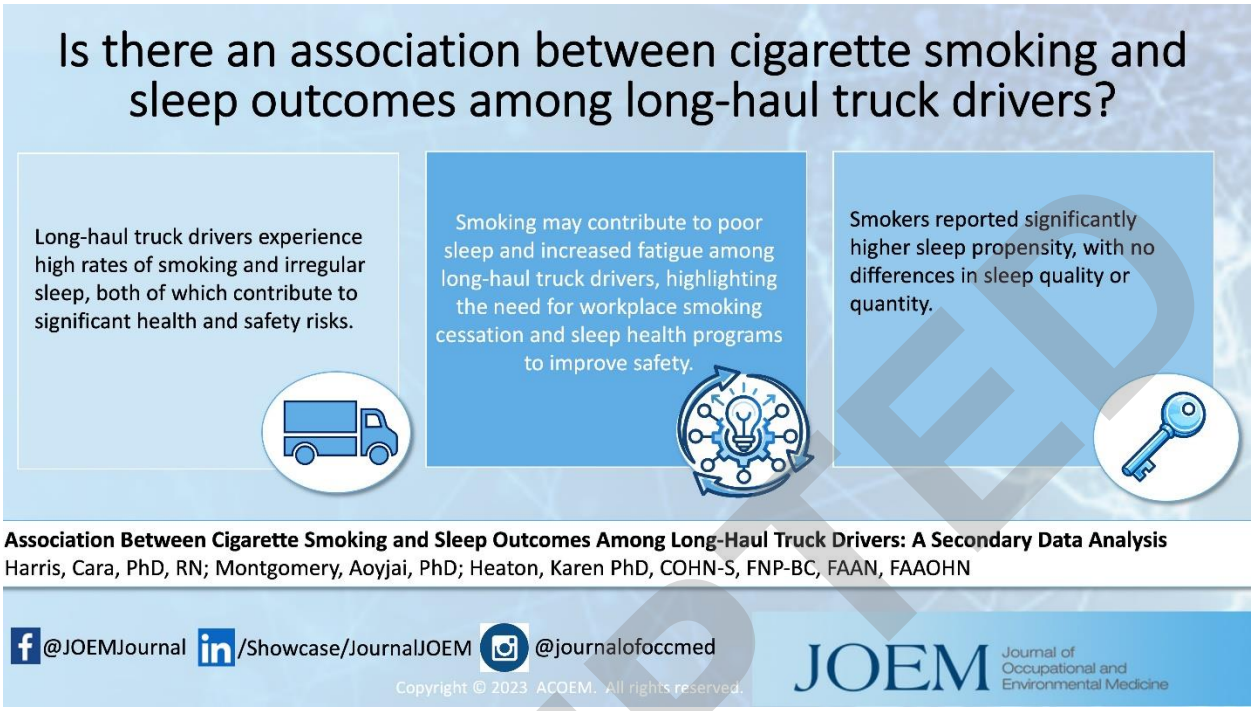
Sleep Measure	Smokers (n = 33)	Nonsmokers (n = 63)	q-value	W-value	Effect size (d)	95% CI	
						Lower	Upper
	M ± SD						
PSQI	8.30 ± 4.52	7.64 ± 3.90	*.742*	962.0	0.16	-0.26	0.59
Sleep Quantity (hours)	6.20 ± 1.04	6.18 ± 1.48	*.742*	997.0	0.02	-0.40	0.44
ESS	7.24 ± 2.90	5.77 ± 3.96	*.038*	501.5	0.20	-0.05	0.87

Note. M = mean; SD = standard deviation; q-value = False discovery rate (FDR)–adjusted p-value; W-value = Wilcoxon rank-sum test value; 95% CI = 95% confidence interval; PSQI = Pittsburgh Sleep Quality Index; ESS = Epworth Sleepiness Scale.

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Graphical abstract



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