

RESEARCH

Relationship of fatigue and alcohol consumption in heavy truck drivers**Relación de fatiga y consumo de alcohol en conductores de carga pesada****Relação entre fadiga e consumo de álcool em condutores de caminhões pesados**Laura Alicia García-Perales^{1*} <https://orcid.org/0000-0002-6424-0586>Karla Selene López-García² <https://orcid.org/0000-0002-9462-7140>María Magdalena Alonso-Castillo³ <https://orcid.org/0000-0002-7197-8116>Martha Dalila Méndez-Ruiz⁴ <https://orcid.org/0000-0002-4527-0296>Miguel A. Villegas-Pantoja⁵ <https://orcid.org/0000-0001-9917-8439>

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Abstract

Introduction: Fatigue, a feeling integrated by physical, mental and neurosensorial symptoms of exhaustion, tiredness and lack of energy, can be a conditioning factor that increases the vulnerability of the working population to acquire harmful behaviors such as alcohol consumption, especially in heavy truck drivers. **Objective:** To identify the relationship between fatigue and alcohol consumption in heavy truck drivers in Nuevo Laredo, northern border of Mexico. **Methodology:** Cross-sectional study, with descriptive-correlational design, in a sample of 224 drivers selected by non-probabilistic sampling. Participants who were active at work and who drove fifth-wheel trucks were included, and those who did not complete the questionnaires were excluded. A Sociodemographic Data Questionnaire, the Subjective Symptoms of Fatigue Test and the AUDIT Test were applied. The confidentiality and anonymity of the participants was guaranteed. The data were processed using the SPSS statistical package version 24.0, by means of nonparametric inferential analysis. **Results:** Drivers with low fatigue 87.1% prevailed, and those with risky consumption, that is, 58.0%, which were followed by dependent consumption, that is, 23.2%. A statistically significant positive relationship was identified between driver fatigue and alcohol consumption with $r_s = .230$, $p = .001$. **Conclusions:** The findings indicate that the greater the fatigue, the greater the alcohol consumption in heavy truck drivers, which highlights the need for the design and implementation of effective and timely nursing interventions that contribute to reduce health risk behaviors

Key words: Fatigue; Alcohol abuse; Transportation; Motor vehicles (DeCS).

Resumen

Introducción: La fatiga, sensación integrada por síntomas físicos, mentales y neurosensoriales de agotamiento, cansancio y falta de energía, puede ser un condicionante que incrementa la vulnerabilidad en la población laboralmente activa para adquirir conductas nocivas como el consumo de alcohol, especialmente en conductores de carga pesada. **Objetivo:** Identificar la relación de la fatiga y el consumo de alcohol en conductores de carga pesada de Nuevo Laredo, frontera norte de México. **Metodología:** Estudio transversal, con diseño descriptivo-correlacional, en una muestra de 224 conductores seleccionados mediante muestreo no probabilístico. Se incluyeron participantes laboralmente activos y que condujeran camiones de quinta rueda, y se excluyeron a quienes no cumplieran con el llenado completo de los cuestionarios. Se aplicó una Cédula de Datos Sociodemográficos, la Prueba de Síntomas Subjetivos de Fatiga y la Prueba AUDIT. Se garantizó la confidencialidad y anonimato de los participantes. Los datos fueron procesados a través del paquete estadístico SPSS versión 24.0, mediante análisis inferencial no paramétrico. **Resultados:** Prevalcieron los conductores con fatiga baja 87.1 %, y quienes tenían un consumo riesgoso 58.0 %, y un consumo dependiente 23.2 %. Se identificó una relación positiva estadísticamente significativa entre fatiga y consumo de alcohol de los conductores con $r_s = .230$, $p = .001$. **Conclusiones:** Los hallazgos indican que a mayor fatiga mayor consumo de alcohol en los conductores de carga pesada, lo cual pone en evidencia la necesidad del diseño e implementación de intervenciones eficaces y oportunas de enfermería que contribuyan a disminuir conductas de riesgo para la salud.

Palabras clave: Fatiga; Abuso de alcohol; Transportes; Vehículos a motor (DeCS).

Abstrato

Introdução: A fadiga, uma sensação integrada por sintomas físicos, mentais e neurosensoriais de exaustão, cansaço e falta de energia, pode ser um factor condicionante que aumenta a vulnerabilidade da população activa à aquisição de comportamentos nocivos, tais como o consumo de álcool, especialmente em condutores de veículos pesados. **Objetivo:** Identificar a relação entre o cansaço e o consumo de álcool em condutores pesados em Nuevo Laredo, na fronteira norte do México. **Metodologia:** Estudo transversal, com um desenho descritivo-correlacional, numa amostra de 224 condutores seleccionados por



amostragem não probabilística. Foram incluídos os participantes que estavam activos no trabalho e que conduziam camiões de quinta-roda, e foram excluídos os que não preenchiam os questionários. Foi administrado um Questionário de Dados Sociodemográficos, o Teste dos Sintomas Subjectivos de Fadiga e o Teste de AUDIT. A confidencialidade e o anonimato dos participantes foram garantida. Os dados foram processados utilizando o pacote estatístico SPSS versão 24.0, por meio de análise inferencial não paramétrica. **Resultados:** Prevaleram os condutores com baixa fadiga 87,1%, e os com consumo de risco, ou seja, 58,0%, a que se seguiu o consumo dependente, ou seja, 23,2%. Uma relação positiva estatisticamente significativa entre a fadiga do condutor e o consumo de álcool foi identificada com $r_s = .230$, $p = .001$. **Conclusões:** Os resultados indicam que quanto maior é a fadiga, maior é o consumo de álcool nos motoristas de pesados, o que realça a necessidade de conceber e implementar intervenções de enfermagem eficazes e atempadas que contribuam para reduzir os comportamentos de risco para a saúde.

Palavras-chave: Fadiga; Abuso de álcool; Transportes; Veículos automotores (DeCS).

Introduction

Alcohol consumption is a serious public health problem worldwide due to the magnitude of consumption and the multiple consequences, among which cardiovascular problems ^(1,2), cancers ⁽³⁾, mental disorders ⁽⁴⁾, as well as social ⁽⁵⁾ and occupational ⁽⁶⁾ problems in the general population ⁽⁷⁾ stand out. However, one of the populations more vulnerable to health risks such as alcohol consumption are workers, especially those engaged in driving, such as heavy truck drivers ^(8, 9). This is probably due to high work demands, such as long working hours, changing shifts, low wages and time pressures for delivery of goods, which may exceed their capabilities and generate both mental and physical strain ⁽¹⁰⁾.

According to statistics on alcohol consumption among drivers in Colombia, 18.8% report risky and harmful alcohol consumption ⁽¹¹⁾ and more than a quarter of the drivers (27.0%) mentioned consumed alcohol during their working day, 88.6% reported having consumed alcohol once in their lifetime, 6.3% in the last 12 months and 4.7% in the last 30 days. A total of 33.3% reported drinking alcohol on a weekly basis and 16.7% every two weeks ⁽¹²⁾. In Mexico, a study ⁽¹³⁾ identified that 14% of cargo drivers reported being under the influence of alcohol during their workday and 8.9% of deaths were attributed to drug use.

In accordance with the foregoing, there is a high prevalence of alcohol consumption in drivers, which may be due to various circumstances where fatigue stands out as a form of escape from the various symptoms of burnout ^(12,14). It should be noted that fatigue is a feeling comprised of physical, mental and neurosensory



symptoms of exhaustion, tiredness, and lack of energy ⁽¹⁵⁾, which becomes a complex phenomenon when driving, since it reduces alertness and awareness levels, increasing the occurrence of road accidents ⁽¹⁶⁾. In this regard, a study conducted on public transport drivers in Colombia reported a significant association ($\chi^2=2.1$, $p=.041$) showing that those who sleep only 1 to 5 hours a day have a higher prevalence of alcohol consumption (57.6 %), compared to those who sleep between 6 to 10 hours (42.5 %) ⁽¹²⁾.

In Mexico, studies on drivers have been characterized mostly by those who drive passenger transportation, which investigate descriptive aspects of prevalence and health-related ailments ⁽¹⁷⁻¹⁹⁾. However, heavy freight transport has different characteristics. For example, an important point to highlight about heavy truck vehicles is their dimensions and the size of the load they carry, which makes them even more dangerous ⁽²⁰⁾. It should be noted that Nuevo Laredo, on Mexico's northern border, is one of the cities most used by heavy freight drivers because it is the main land transit port for trade and commerce and generates significant economic growth due to the high volume of transportation of various products to the United States ⁽²¹⁾. However, there is currently a lack of research related to the topic of interest, because there is a gap in the relevant knowledge to be explored.

Thus, it is considered necessary to know the risk conditions, such as fatigue, associated with alcohol consumption in drivers, so that the nursing professional, among other disciplines in the health area, can adequately meet the needs of this population, as well as increase preventive actions towards risk behaviors in drivers of heavy trucks, which is a population that has been little studied. Therefore, the research question was prepared, that is, what is the relationship between fatigue and alcohol consumption in heavy truck drivers in Nuevo Laredo, city located in the northern border of Mexico? Moreover, it was considered pertinent to enunciate the objectives: a) Describe the level of fatigue in heavy truck drivers; b) determine the prevalence (lifetime, last year, last month, and last seven days) of alcohol consumption; and c) describe the patterns of alcohol consumption (risk, dependent, and harmful) in heavy truck drivers in Nuevo Laredo, city located in the northern border of Mexico.



Methodology

Cross-sectional study with a descriptive, correlational design ⁽²²⁾. In a sample of 224 heavy truck drivers from two transportation companies located in Nuevo Laredo, Tamaulipas, city located in the northern border of Mexico, sample calculated in the statistical package nQuery Advisor version 7.0, power of 95%, significance of .05, correlation of .30 and non-response rate of 10%. Sampling was non-probabilistic, and included active cargo drivers of working age (18 to 65 years), both sexes, who used fifth-wheel trucks for the transport of dry boxes (48 or 53 feet, double trailers), refrigerated, fixed platforms, extendable platforms, and dollies (vehicle carriers), and who were available to fill out a battery of self-applicable instruments detailed below. Participants who used trucks or vehicles for moving, parcels, machinery and auto tanks or pipes, and who did not complete the filling of the instrument, were excluded.

The battery of instruments consisted of a sociodemographic data and alcohol consumption prevalence questionnaire created specifically for this purpose, which collected general information such as age, marital status, schooling, prevalence of consumption classified as once in a lifetime, in the last year, last month, and last seven days. The Subjective Fatigue Symptoms Test ⁽²³⁾, adapted to the Mexican context, measures the magnitudes of fatigue presented by workers and has reported an acceptable Cronbach's alpha reliability of 0.89 ⁽²⁴⁾. It consists of 30 items, with a dichotomous response option (yes and no). It has three subscales: a) drowsiness and heaviness, difficulty in concentrating and projection of physical discomfort. The total scale ranges from 0 to 30 points, where a higher score suggests greater fatigue. An acceptable total reliability of .88 was obtained, in the first subscale .794, second .726, and third .756.

The Alcohol Use Disorders Identification Test (AUDIT), an instrument designed by the WHO, consists of 10 multiple-choice items and allows the identification of alcohol use and abuse. It identifies types of consumption, that is, risky, dependent and harmful. The total scale ranges from 0 to 40 points, where a higher score suggests a higher level of risk for alcohol consumption. Scores lower than 8 are considered



cases of risky consumption, while scores greater than or equal to 8 comprise cases of harmful consumption. An acceptable reliability of .77⁽²⁵⁾ was obtained.

For the collection, the FAEN-D-1626 registration was obtained from the Research and Research Ethics Committees of the Nursing School of the University and the authorization of the directors of the participating companies. The drivers were invited to participate voluntarily and anonymously, and were informed of the objectives and the instructions for filling out the questionnaire, and those who accepted signed the informed consent form. At any time, the protection of the participants' rights, as well as their confidentiality and freedom of participation, was ensured, pursuant to the Regulations of the General Health Law on Health Research, in accordance with Chapter I, Title Two of the Ethical Aspects of Research on Human Beings⁽²⁶⁾.

The statistical process was carried out using the Statistical Package for the Social Sciences (SPSS) version 24.0 for Windows 10. Descriptive statistics (frequencies, proportions, measures of central tendency, and dispersion) and nonparametric inferential statistics (Spearman's correlation coefficient) were used because the variables did not report normality in the distribution of the data, which was identified using the Kolmogórov-Smirnov test with Lilliefors correction.

Results

All the participants were male, with an average age of 41.2 years ($SD=\pm 10.5$), with a prevalence of those who reported having a partner (86.6%) and high school education (57.6%). Likewise, 77.7% were national highway drivers, 46% worked night shifts, drove an average of 16.0 hours per trip with an average of 15.7 years ($SD= \pm 10.76$) of work experience (Table 1).



Table 1. Sociodemographic data of heavy truck drivers, 2021. (n= 224).

Variable	f	%
Sex		
Male	224	100
Marital status		
With a partner	194	86.6
Without a partner	30	13.4
Schooling		
Elementary	36	16.1
Junior high	129	57.6
High school	43	19.2
University	16	7.1
Type of driver		
Transfer (local)	34	15.2
Highway driver (national)	174	77.7
Driver B1(international)	16	7.1
Work shift that suits you		
Day	63	28.1
Evening	21	9.4
Night	103	46.0
Swing shift	37	16.5

Source: Own development.

It was seen that most of the participants showed a low level of fatigue (87.1%) (Table 2).

Table 2. Fatigue level of heavy truck drivers, 2021. (n= 224).

Variables	f	%
Fatigue level		
Low fatigue	195	87.1
Moderate fatigue	24	10.7
Severe fatigue	5	2.2

Source: Own development. f = Frequency, % = Percentage

Regarding the prevalence of alcohol consumption, 86.6% of the heavy truck drivers had drunk alcohol at some time in their lives (Table 3).

Moreover, it was seen that the average age of onset of consumption was 17.9 years, drinking an average of 4.9 alcoholic beverages in a typical day where beer was the most consumed beverage (72.8%), followed by liquor (27.2%).



Table 3. Prevalence of alcohol consumption by heavy truck drivers, 2021, n= 224

Prevalence of alcohol consumption	Yes		No		IC 95%	
	f	%	f	%	LI	LS
Sometime in their life	194	86.6	30	13.4	82.0	91.0
In the last year	155	69.2	69	30.8	63.0	75.0
In the last month	111	49.6	113	50.4	43.0	56.0
In the last seven days	59	26.3	165	73.7	21.0	32.0

Source: Own development. f = Frequency, % = Percentage, IC = Confidence Interval of 95%, LI = Lower limit, LS = Higher limit

In describing the alcohol consumption patterns of the heavy truck drivers, it was shown that in 81.3% their alcohol consumption was risky and the consumption of 18.7% was harmful, (Table 4).

Table 4. Patterns of alcohol consumption in heavy truck drivers, 2021, n= 224

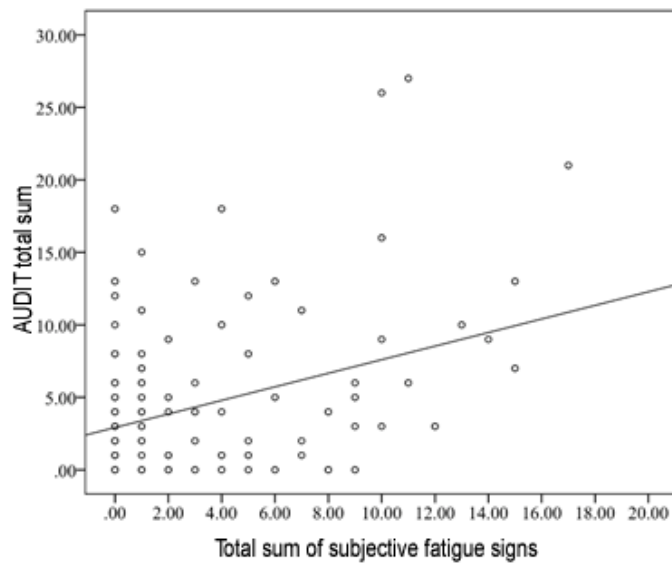
Variable	f	%
Risky consumption	182	81.3
Harmful consumption	42	18.7

Source: Own development. f = Frequency, % = Percentage

Regarding the relationship between fatigue and alcohol consumption in heavy truck drivers in Nuevo Laredo, a statistically significant positive relationship of low intensity was found ($r_s = .230$, $p = .001$, (Figure 1). This indicates that the greater the feeling of fatigue, the greater the involvement with alcohol consumption in heavy truck drivers. Likewise, statistically significant positive relationships were found between the subscales of fatigue, drowsiness and heaviness ($r_s = .185$, $p = .005$), difficulty concentrating ($r_s = .210$, $p = .002$) and projection of physical discomfort ($r_s = .268$, $p = .001$).



Figure 1. Scatter plot between alcohol consumption and fatigue among heavy truck drivers. 2021, n=224



Source: Own development.

Discussion

Based on the objective of identifying the relationship between fatigue and alcohol consumption in heavy truck drivers in Nuevo Laredo, city located in the northern border of Mexico, it was found that the entire population was male, with a predominant age of 41.2 years, married participants with a high school education. These data are in agreement with several authors ^(13, 27, 28) who pointed out that driving is an activity mainly for men, which demands physical and mental effort that requires the driver to develop skills and abilities for its performance. Additionally, this activity is considered a common trade, so it does not require professional academic preparation, only basic education and various driver training courses, depending on the type of vehicle, the product being transported, and the logistical operations ⁽²⁹⁾.

Low fatigue followed by moderate fatigue prevailed. These results are in agreement with a study carried out in Peruvian drivers ⁽³⁰⁾, where it was noted that almost half of the participants showed mild fatigue followed by moderate fatigue. Another study performed in Colombian drivers ⁽³¹⁾, showed similarities in the presence of physical fatigue, including symptoms such as having the desire to lie down, feeling thirsty, tired body and eyesight, and experiencing back pain during the driving activity.



Although in the present study, the fatigue assessment highlighted the presence of mild fatigue, which does not affect the worker's health, less than a quarter of the drivers presented moderate fatigue. This level can cause damage to the worker's health, as well as jeopardize the transport operation ^(30,31). It is worth noting that most of the participants drove an average of 16.0 hours per trip, which could increase the symptoms of drowsiness, heaviness and difficulty concentrating, thus increasing the rate of accidents and risky behaviors ⁽³²⁾.

Likewise, alcohol consumption at some time in life prevailed, while consumption in the last year was second. These results match a study of transport drivers in Peru ⁽³³⁾, which showed that almost all the participants had drunk alcoholic drinks at some time in their lives, followed by consumption in the last year in the second place. The results of alcohol consumption reported exceeded the national average ⁽³⁴⁾ and could be due to the long working hours, the reduced number of hours to sleep, or being away from the family, as a way of coping with such situations. Furthermore, although alcohol is a Central Nervous System (CNS) depressant drug, it initially produces euphoric and stimulation effects, which could be mistaken for a stimulant drug, so drivers consider it necessary to cope with their long working hours ^(34, 35).

Risky consumption prevailed among drivers, followed by harmful alcohol consumption. These findings coincide with those reported in a study conducted among drivers of a transportation company in Colombia ⁽³⁶⁾, where half of the participants showed risky consumption and a smaller number reported harmful consumption. These findings allow us to identify an alarming public health problem in this group of workers, making it necessary to strengthen nursing prevention and intervention actions to reduce harmful health behaviors, such as alcohol consumption.

Finally, it was found that the higher the overall fatigue score, as well as the subscales of drowsiness and heaviness, difficulty concentrating, and projection of physical discomfort, the higher the alcohol consumption in heavy-duty drivers. It should be noted that all correlation coefficients identified were of low intensity, but statistically significant ⁽³⁷⁾. In this regard, a study conducted on drivers in Thailand ⁽³⁸⁾ showed



that more than half of the drivers always consumed beverages to control fatigue while on duty. As mentioned above, alcohol is a CNS depressant, which, along with fatigue, reduces the capacity for coordination, adequate decision making and reaction to a dangerous driving situation, which increases the probability of road accidents, generating invaluable human, economic and environmental losses ⁽³⁹⁾. The low intensity of the coefficients may be due to various factors, but emphasis is placed on the accuracy of the self-report provided by the participants. This is due to the fact that the instruments used depend on the participant's memory and perception. According to the authors of this study, it was identified that participants may underestimate their perception of fatigue, mainly because they are used to; a similar situation could occur in the self-report of addictive substances ⁽⁴⁰⁾.

However, the following limitations should be noted. The present study was cross-sectional, so the results should be interpreted with caution, without making inferences of causality. Also, because heavy truck drivers are a population with limited free time to respond to surveys, their responses could imply a certain bias. In the same vein, other research adds that the lack of regular working hours could have implications for the appreciation of fatigue ⁽¹⁶⁾. Finally, one option to improve the understanding of the phenomenon of fatigue and alcohol consumption could be to resort to qualitative approaches, or by means of a triangulation framework ⁽⁴¹⁾ where possible sources of bias (e.g., work shift) are controlled through the study design and statistical covariates.

Conclusions

According to the results obtained, it was concluded that there was a statistically significant positive association between the study variables, indicating that the greater the fatigue, the greater the alcohol consumption among heavy truck drivers in Nuevo Laredo, a city located in the northern border of Mexico. Likewise, most of the sample showed a low to moderate level of fatigue. Regarding alcohol consumption, drivers who had drunk alcohol at least once in their life and in the last year, and those who showed a risky consumption, prevailed.



The above justifies the need to investigate fatigue levels in heavy truck drivers, in whom high prevalence of alcohol has been reported. Likewise, the findings invite collaboration in networks to investigate risks such as fatigue and alcohol consumption, so that knowledge is produced to guide future nursing interventions to reduce risk behaviors among heavy truck drivers, taking into account that this population is of utmost importance for the economic growth of our country and that they have a strong impact on public health.

Conflict of interest

The authors stated that they have no conflicts of interest.

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References

1. Ikehara S, Iso H. Alcohol consumption and risks of hypertension and cardiovascular disease in Japanese men and women. *Hypertens Res* [Internet]. 2020 [quoted Nov 16, 2022];43(6):477-481. Available at: <https://doi.org/10.1038/s41440-020-0417-1>
2. Fan AZ, Ruan WJ, Chou AP. Re-examining the relationship between alcohol consumption and coronary heart disease with a new lens. *Prev Med* [Internet]. 2019 [quoted Nov 16, 2022];118:336-343. Available at: <https://doi.org/10.1016/j.ypmed.2018.11.022>
3. He F, Sha Y, Wang B. Relationship between alcohol consumption and the risks of liver cancer, esophageal cancer, and gastric cancer in China: Meta-analysis based on case-control studies. *Med* [Internet]. 2021 [quoted Nov 16, 2022];100(33):e26982. Available at: <https://doi.org/10.1097/MD.00000000000026982>
4. Castillo-Carniglia A, Keyes KM, Hasin DS, Cerdá M. Psychiatric comorbidities in alcohol use disorder. *Lancet Psychiatry* [Internet]. 2019 [quoted Nov 16, 2022];6(12):1068-1080. Available at: [https://doi.org/10.1016/S2215-0366\(19\)30222-6](https://doi.org/10.1016/S2215-0366(19)30222-6)
5. Duke AA, Smith KMZ, Oberleitner LM, Westphal A, McKee SA. Alcohol, drugs, and violence: A meta-meta-analysis. *Psychology of Violence* [Internet]. 2018 [quoted Nov 16, 2022];8(2):238-249. Available at: <http://dx.doi.org/10.1037/vio0000106>
6. Güilgüiruca M, Quiñones M, Zuñiga C. Demandas laborales y consumo de alcohol: el rol del grupo de trabajo. *Cad. Saúde Pública* [Internet]. 2020 [quoted Nov 17, 2022];36(10):e00128419. Available at: <https://doi.org/10.1590/0102-311X00128419>
7. Organización Mundial de la Salud. Alcohol. Centro de prensa [Internet]. Ginebra; 2022 [Updated May 9, 2022; quoted Nov 12, 2022]. Available at: <https://www.who.int/es/news-room/fact-sheets/detail/alcohol>
8. Aquino JM, Gomes de Medeiros SE, Ribeiro GB, Ferreira e Pereira EB, Brandão NW, Gomes TM. Condiciones de trabajo en conductores de autobús: de servicio público a fuente de riesgo. *Index Enferm* [Internet]. 2017 [quoted Nov 14, 2022];26(1-2):34-38. Available at: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1132-12962017000100008&lng=es.



9. Krishnamoorthy Y, Sarveswaran G, Sakthivel M. Prevalence of hypertension among professional drivers: Evidence from 2000 to 2017. A systematic review and meta-analysis. *J Postgrad Med* [Internet]. 2020 [quoted Nov 15, 2022];66(2):81-89. Available at: https://doi.org/10.4103/jpgm.JPGM_297_19
10. Longman D, Shaw C, Varela-Mato V, Sherry A, Ruettinger K, Sayyah M, et al. Time in nature associated with decreased fatigue in UK truck drivers. *Int. J. Environ. Res. Public Health* [Internet]. 2021 [quoted Nov 14, 2022];18(6):1-17. Available at: <https://doi.org/10.3390/ijerph18063158>
11. Calvache-Dorado RE, Carranza-Abello EN, Quintana-Moreno IP, Sierra-Castellanos Y. Consumo de alcohol y tabaco y su relación con variables sociodemográficas-ocupacionales en conductores de transporte público urbano. *Cuad Hispanoam Psicol* [Internet]. 2022 [quoted Nov 15, 2022];2:1-18. Available at: <https://doi.org/10.18270/chps.v2021i2.3868>
12. Calderón G, Castaño G. Factores de riesgo para el consumo de psicoactivos en conductores de buses en Medellín. *Katharsis* [Internet]. 2013 [quoted Sep 13, 2019];15:153-172. Available at: <https://revistas.iue.edu.co/index.php/katharsis/article/view/243>
13. Berrones SL, Cano OP, Sánchez PD, Martínez FJ. Lesiones, enfermedades y accidentes de trabajo de los conductores del autotransporte de carga en México. *Acta Univ* [Internet]. 2018 [quoted Oct 28, 2019];28(3):47-55. Available at: <https://doi.org/10.15174/au.2018.1946>
14. Richter K, Peter L, Rodenbeck A, Wess HG, Riedel-Heller SG, Hillemacher T. Shiftwork and alcohol consumption: A systematic review of the literature. *Eur Addict Res* [Internet]. 2020 [quoted Nov 16, 2022];27(1):1-7. Available at: <https://doi.org/10.1159/000507573>
15. Lock AM, Bonetti DL, Campbell ADK. The psychological and physiological health effects of fatigue. *Occup. Med* [Internet]. 2018 [quoted Nov 15, 2022];68(8):502-511. Available at: <https://doi.org/10.1093/occmed/kqy109>
16. Kwon S, Kim H, Kim GS, Cho E. Fatigue and poor sleep are associated with driving risk among Korean occupational drivers. *J Transp Health* [Internet]. 2019 [quoted Nov 15, 2022];14:100572. Available at: <https://doi.org/10.1016/j.jth.2019.100572>
17. Berrones SL. Working conditions of microbus drivers in Mexico City as a risk factor in road safety. *Procedia Soc Behav Sci* [Internet]. 2014 [quoted Nov 8, 2019];160:188-194. Available at: <https://doi.org/10.1016/j.sbspro.2014.12.130>
18. Pogliaghi L. Entre el control y la libertad: configuraciones de trabajo, identidad y acción colectiva de los taxistas de la Ciudad de México. [Tesis doctoral]. Iztapalapa, D.F.: Universidad Autónoma Metropolitana; 2012 [quoted Sep 18, 2020]. Available at: <http://www2.izt.uam.mx/sotraem/NovedadesEditoriales/TesisDoctoradoLety.pdf>
19. Mesta LF, Hernández E. Carga de trabajo y salud mental en choferes de una empresa manufacturera en el Estado de México. *RIST* [Internet]. 2019 [quoted Nov 16, 2022];2:73-74. Available at: <https://doi.org/10.13140/RG.2.2.13427.07200>
20. Páez MH, Abarca E, González N, Mendoza A. Estudio para predecir la fatiga en conductores del servicio público federal. *Publicación técnica* [Internet]. Instituto Mexicano del Transporte; Querétaro; 2019 [quoted Oct 28, 2019];548. Available at: <https://imt.mx/archivos/Publicaciones/PublicacionTecnica/pt548.pdf>
21. Organización Internacional del Trabajo. Directrices sobre la promoción del trabajo decente y la seguridad vial en el sector del transporte. OIT [Internet]. Ginebra; 2019 [Updated Apr 24, 2020; quoted Nov 12, 2022]. Available at: https://www.ilo.org/sector/activities/sectoral-meetings/WCMS_742637/lang--es/index.htm
22. Grove SK, Gray JR. Investigación en enfermería. Desarrollo de la práctica enfermera basada en la evidencia. 7a ed. Barcelona: Elsevier; 2019. p. 448-458
23. Yoshitake H. Three characteristic patterns of subjective fatigue symptoms. *Ergon* [Internet]. 2007 [quoted Oct 16, 2019];21(3):231-233. Available at: <https://doi.org/10.1080/00140137808931718>



24. Barrientos T, Martínez S, Méndez I. Validez de constructo, confiabilidad y punto de corte de la prueba de síntomas subjetivos de fatiga en trabajadores mexicanos. *Salud Publica Mex* [Internet]. 2004 [quoted Oct 19, 2019];46(6):516-523. Available at: <https://www.redalyc.org/articulo.oa?id=10646604>
25. Moral MV, Bringas C, Ovejero A, Morales Luz, Rodríguez FJ. Emergencia sociosanitaria en consumo de riesgo de alcohol y síntomas de dependencia en jóvenes. *Salud Drogas* [Internet]. 2017 [quoted Nov 16, 2022];17(2):91-99. Available at: <https://www.redalyc.org/pdf/839/83952052009.pdf>
26. Cámara de Diputados del H. Congreso de la Unión. Reglamento de la ley general de salud en materia de investigación para la salud. Secretaría de Servicios Parlamentarios [Internet]. México: 2014 [quoted Sep 21, 2019]. Available at: http://sitios.dif.gob.mx/normateca/wp-content/Archivos/Normateca/DispGrales/ReglamentoLeyGeneralSalud_MaterialInvestigacion_Ago2014.pdf
27. García-Díaz V, Fernández-Feito A, Arias L, Lana A. Consumo de tabaco y alcohol según la jornada laboral en España. *Gac Sanit* [Internet]. 2015 [quoted Sep 12, 2019];29(5):364-369. Available at: <https://doi.org/10.1016/j.gaceta.2015.04.014>
28. Leyton V, Sinagawa DM, Oliveira KC, Schmitz W, Andreuccetti G, De Martinis BS, et al. Amphetamine, cocaine and cannabinoids use among truck drivers on the roads in the state of Sao Paulo, Brazil. *Forensic Sci Int* [Internet]. 2012 [quoted Sep 30, 2019];215(1-3):25-27. Available at: <https://doi.org/10.1016/j.forsciint.2011.03.032>
29. Tse JL, Flin R, Mearns K. Bus driver well-being review: 50 years of research. *Transp Res Part F Traffic Psychol Behav* [Internet]. 2006 [quoted Aug 28, 2019];9(2):89-114. Available at: <https://doi.org/10.1016/j.trf.2005.10.002>
30. Meza CB, Umiña MJ, Sotelo BG. Propuesta para evaluar y controlar la fatiga laboral en conductores de carga pesada en la empresa de transportes ACOINSA. [Tesis licenciatura] Perú; Universidad Tecnológica del Perú; 2019 [quoted Sep 18, 2020]. Available at: https://repositorio.utp.edu.pe/bitstream/handle/20.500.12867/1835/Beatriz%20Meza_Jeison%20Umi%C3%B1a_Tesis_Trabajo%20de%20Suficiencia%20Profesional_2019.pdf?sequence=1&isAllowed=y
31. Garzón J, Muñoz J. Diseño de estrategias organizacionales para el control de la fatiga y del consumo de alcohol para la prevención de accidentes vehiculares en una empresa de transporte terrestre de mercancías peligrosas. [Tesis especialidad] Colombia; Corporación Universitaria Minuto de Dios; 2019 [quoted Sep 18, 2020]. Available at: <https://repository.uniminuto.edu/handle/10656/8124>
32. Araújo M, Marqueze EC, Kantermann T, Skene D, Moreno C. When does stress end? Evidence of a prolonged stress reaction in shiftworking truck drivers. *Chronobiol Int* [Internet]. 2011 [quoted Dec 2, 2019];28(9):810-818. Available at: <https://doi.org/10.3109/07420528.2011.613136>
33. Maldonado V, Zavaleta A, Salas M. Consumo de drogas ilegales y alcohol en conductores de servicio de transporte público del cono norte de Lima Metropolitana-Perú. *Revista Peruana de Drogodependencias* [Internet]. 2006 [quoted Jan 9, 2020];4(1):9-36. Available at: https://www.researchgate.net/publication/276917577_CONSUMO_DE_DROGAS_ILEGALES_Y_ALCOHOL_EN_CONDUCTORES_DE_SERVICIO_DE_TRANSPORTE_PUBLICO_DEL_CONO_NORTE_DE_LIMA_METROPOLITANA-PERU
34. Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, Instituto Nacional de Salud Pública, Comisión Nacional Contra las Adicciones. Encuesta nacional de consumo de drogas, alcohol y tabaco 2016-2017: reporte de alcohol. Secretaría de Salud [Internet]. Ciudad de México; 2017 [quoted Sep 6, 2019]. Available at: <https://www.gob.mx/salud%7Cconadic/acciones-y-programas/encuesta-nacional-de-consumo-de-drogas-alcohol-y-tabaco-encodat-2016-2017-136758>
35. Organización Panamericana de la Salud. Informe sobre la situación regional sobre el alcohol y la salud en las Américas. OPS [Internet]. Washington; 2015 [quoted Sep 6, 2019]. Available at: <https://www.paho.org/hq/dmdocuments/2015/alcohol-Informe-salud-americas-2015.pdf>



36. Molina CF, Suárez AM, Arango CM. Nivel de riesgo de consumo de alcohol en trabajadores de una empresa de servicio de transporte público urbano de la Ciudad de Medellín. *Rev. Fac. Nac. Salud Pública* [Internet]. 2011 [quoted Oct 25, 2019];29(4):411-418. Available at: <https://www.redalyc.org/articulo.oa?id=12021522007>
37. Cohen J. *Statistical power analysis for the behavioral sciences*. 2nd ed. Hillsdale (NJ): Lawrence Erlbaum Associates; 1988. Pp. 75-98.
38. Phatrabuddha N, Yingratanasuk T, Rotwannasin P, Jaidee W, Krajaiklang N. Assessment of sleep deprivation and fatigue among chemical transportation drivers in Chonburi, Thailand. *Saf Health Work* [Internet]. 2018 [quoted Feb 12, 2020];9(2):159-63. Available at: <https://doi.org/10.1016/j.shaw.2017.06.014>
39. Secretaría de Salud. Informe sobre la situación de la seguridad vial México 2020. Gobierno de México [Internet]. 2020 [Updated Jul 11, 2022; quoted Nov 23, 2022]. Available at: https://www.gob.mx/cms/uploads/attachment/file/741479/Informe_SV_2020_Autorizado.pdf
40. Van den Berg J, Adeyemo S, Roberts MB, Bock BC, Stein LA, Martin RA, et al. Comparing the validity of self-report and urinalysis for substance use among former inmates in the northeastern United States. *Subst Use Misuse* [Internet]. 2018 [quoted Nov 16, 2022];53(10):1756-1761. Available at: <https://doi.org/10.1080/10826084.2018.1432646>
41. Hammerton G, Munafò MR. Causal inference with observational data: the need for triangulation of evidence. *Psychol Med* [Internet]. 2021 [quoted Nov 16, 2022];51(4):563-578. Available at: <https://doi.org/10.1017/S0033291720005127>

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