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DOI:

[10.6018/analesps.482401](https://doi.org/10.6018/analesps.482401)

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Document Version

Publisher's PDF, also known as Version of record

Citation for published version (Harvard):

Junqueira, MADB, Pereira, NM, Diehl , A, Perruci , LG, dos Santos , RA, dos Santos , MA, Pillon, SC & Wagstaff, C 2023, 'Substance use and mental health of Brazilian truck drivers', *Annals of Psychology*, vol. 39, no. 3, pp. 384-394. <https://doi.org/10.6018/analesps.482401>

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Substance use and mental health of Brazilian truck drivers

Marcelle Aparecida de Barros Junqueira^{1,*}, Nayline Martins Pereira², Alessandra Diehl³, Ludmila Gonçalves Perruci³, Ronildo Alves dos Santos³, Manoel Antônio dos Santos⁴, Sandra Cristina Pillon³, and Christopher Wagstaff⁵

¹ Federal University of Uberlândia (UFU), Brazil.

² Institute of Geography – Federal University of Uberlândia (UFU), Brazil.

³ Psychiatric Nursing and Human Science Department, University of São Paulo (USP), Brazil.

⁴ Faculty of Philosophy, Sciences and Letters of Ribeirão Preto, University of São Paulo, Brazil.

⁵ School of Nursing, Institute of Clinical Sciences, College of Medical and Dental Sciences, University of Birmingham, Birmingham, England, UK.

Título: Consumo de sustancias y salud mental de los camioneros brasileños.

Resumen: *Objetivo:* evaluar el uso de sustancias y la salud mental de los camioneros brasileños, y cómo estos impactan en sus comportamientos relacionados con la conducción. *Métodos:* estudio transversal realizado con 235 camioneros en Brasil. *Resultados:* Los conductores que condujeron después de beber eran fumadores, sufrieron agresiones y experimentaron ansiedad. Las fallas en la conducción se asociaron con la conducción después de beber y han sufrido agresiones. Los errores se asociaron con la alteración del sueño y la participación en accidentes que tuvieron víctimas. Las infracciones fueron mayores entre quienes condujeron después de beber, consumieron drogas, tenían ansiedad y problemas de sueño. *Conclusión:* El uso de sustancias, la salud mental, la somnolencia y la violencia están interrelacionados para los camioneros brasileños.

Palabras clave: Accidentes de tránsito. Camioneros. Abuso de sustancias. Salud mental. Trastornos del sueño. Violencia.

Abstract: *Objective:* to evaluate the substance use and mental health of Brazilian truck drivers, how these impact on their driving-related behaviors. *Methods:* cross-sectional study conducted with 235 truck drivers in Brazil. *Results:* The drivers who drove after drinking were smokers, suffered assaults and experienced anxiety. Lapses in driving were associated with driving after drinking and have suffered assaults. Errors were associated with impaired sleep and being involved in accidents that had victims. Violations were greater amongst those who drove after drinking, used drugs, had anxiety and impaired sleep. *Conclusion:* Substance use, mental health, drowsiness and violence are interrelated for Brazilian truck drivers.

Keywords: Traffic accidents. Truck drivers. Substance abuse. Mental health. Sleep disorders. Violence.

Introduction

The professionals who drive trucks represents risk and vulnerability for a range of chronic occupational health conditions, including mental health and psychiatric disorders due to high occupational stress, low access and underutilization of health care and limited social support (Leyton et al., 2019; Shatel et al., 2012; Taube & Carlotto, 2018). This complex situation is a serious public health problem, often ignored and undervalued. Of the most common causes of accidents caused by violations when driving among truck drivers, situations involving daily work were attributed, such as: long distances traveled, achievement of goals, planning difficulties, lack of rest, overconfidence and load, poor maintenance of the vehicle, human recklessness, deficiencies in training, in addition to health conditions, lack of attention, sudden illness, fatigue, sleep and stress, alcohol use and drugs stimulants (Jora et al., 2010; Confederação Nacional de Transportes [CNT], 2019; Leyton et al., 2019).

A major concern lies with this professional responsible for road transport, both cargo and passenger. In this case, the driver is the main responsible for over 60 % of cargo transport and 90 % of the total passengers circulating in Brazil. These professionals make up a crucial occupational stratum in the transport of goods through the extensive road

networks, which have their contribution to economic development (CNT, 2019).

Nevertheless, in the assessment of risk factors associated with the occurrence of road accidents, the human factor was pointed out with emphasis, highlighting the use of alcoholic beverages by drivers as the main responsible for more than half of the deaths in accidents involving victims involving trucks, which occurred on federal highways (CNT, 2019). In this sense, the evidence was well documented (Garbarino et al., 2018; Giroto et al., 2014; Jora et al., 2010; Shattell et al., 2012; Taube & Carlotto, 2018; Pan American Health Organization [PAHO], 2018) showing a behavior related to the worst working conditions and important repercussions on the quality of health of these individuals (Giroto et al., 2014). In addition, to the use of stimulants such as amphetamines (popularly known as "rebites") used to improve performance at work and maintain the alertness of drivers (Leyton et al., 2019), which contribute to 78% of road recklessness, increasing the risk of accidents and the most frequent violation of traffic laws. However, alcohol and tobacco use are still the most frequent way to alleviate suffering and mitigate loneliness, besides being seen as forms of relaxation and socialization (Giroto et al., 2014; Jora et al., 2010).

The use of substances by truckers in Brazil is a widely disseminated behavior, although prevention policies in relation to drinking and driving have been incisive and more punitive in recent years. Prevalence varies widely according to the region and the measurement methodology employed (standardized instruments or self-report).

* Correspondence address [Dirección para correspondencia]:

Marcelle Aparecida de Barros Junqueira. E-mail: marcellebarros@ufu.br

(Article received: 4-6-2021; revised: 26-8-2022; accepted: 2-9-2022)

Among 36 studies that evaluated truck drivers, 28 were conducted in countries of large territorial extension and 23 obtained information through self-report. Prevalence rates of use varied for alcohol (.1- 91.0 %), amphetamines (.2- 82.5%), marijuana (.2 - 29.9 %), cocaine (.1 - 8.3%). Given the serious problems triggered by these substances in truck drivers, the literature is still incipient in this theme (Giroto et al., 2014).

The health conditions of drivers have been explored in the literature in terms of Chronic Non-communicable Diseases (NCDs), such as obesity, diabetes mellitus, cholesterolemia, cardiovascular diseases and sleep-related disorders, risk conditions that can be enhanced by sedentary lifestyle. However, issues related to mental health (depression, anxiety, loneliness and substance use) and its association with driving have been little explored. In general, drivers seem to be less aware of the high health and safety risks when changes in sleep quality, mental health problems, substance use and misuse of prescription drugs to alleviate symptoms of depression, anxiety, stress at work, fatigue and social isolation are present (Garbarino et al., 2018).

Characteristics inherent to the driver such as mental health status were observed, such as the symptoms of depression (Odds Ratio [OR] = 2.4) and anxiety (OR = 2.7), which contribute twice as much to the increased risk of traffic accidents, in addition to the presence of neuroticism traits (Sullman et al., 2017) extroversion and psychopathy (Wang et al., 2018).

The behaviors associated with the human recklessness of the driver in traffic can further aggravate the risk of accidents, such as having a previous history of infractions, excessive speed limits, distraction (OR = 2.6) and non-use of the seat belt (OR = 9.4) (Mashhadi et al., 2018).

Coping strategies to reduce mortality rates and morbidities caused by road accidents are a priority health theme, proposed by the World Health Organization [WHO] in the 2030 agenda, among the goals for eradicating problems related to poverty and promoting a dignified life with quality in health for all. Also, the WHO establishes that it is crucial to understand the human factors around traffic accidents and the associated risks, topics that are still scarce among the agendas of the research agenda (Matida, 2016).

Although important efforts of international and national organizations have been made to improve morbidity and mortality rates resulting from traffic accidents, it must be considered that initiatives that emphasize the relationships between mental health, substance use and driving-related behaviors of professionals directly involved in cargo transport in the Brazilian road system are incipient, a public health issue that should be considered.

Methods

This is a cross-sectional study of a quantitative approach. The study was carried out in a convenience service, located in the municipality of Uberlândia, State of Minas Gerais,

Brazil. The city has 683,247 inhabitants, is in the region called Triângulo Mineiro, an important pole in relation to the economy in general and mainly for Brazilian logistics, being necessary for the flows of products from various segments that connect the modes of transport in the country for its strategic position in the national territory. This is because it is a more central region, which makes the flow of productions easier. The city of Uberlândia has an infrastructure that offers for the entire region and also for Brazil a better circulation of cargo transport by its strategic territorial position, because in addition to being located right in the center of Brazil, the main federal highways pass through the city, connecting the main Brazilian capitals (Araújo, 2019).

Participants

The sample consisted of 235 truck drivers who worked on a federal highway and stopped at the convenience service. To define the sample size, information was previously obtained from the coordinators about the flow of drivers who use the service, within one month. The sample calculation sought to ensure the representativeness of the sample studied. A 95 % confidence interval and an error of 5% were considered for a total of 600 participants. The estimated number of subjects in the sample was between 227 and 250 individuals.

The eligibility criteria were: self-declared professional drivers, aged 18 years or older. Truckers who had less than one year of profession were excluded from the study. A total of 328 drivers were approached, but 51 had less than a year of profession and 42 refused to participate. Data were collected from September to November 2018. Drivers were approached on weekdays and in the afternoon and evening period, to coincide as truckers' stop times.

The researchers were invited to participate in the research and clarified about the objectives and conditions for participation. All participants signed the Informed Consent Form.

Measures

A) *Sociodemographic and professional information*: gender, age, marital status, dangerousness of truck cargo and employment.

B) *Alcohol, Smoking and Substance Involvement Screening Test* (ASSIST): contains eight questions that measure the level of dependence, the first seven referring to the pattern of consumption and problems related to the use of tobacco, alcohol and other drugs, validated in Brazil. The scores of the answers range from 0 to 8 points, the final sum varies between 0 and 39. The final score of the answers classifies the use of each substance as low (0 – 10 for alcohol; 0 – 3 for other drugs), moderate (11 – 26 for alcohol; 4 – 26 for other drugs) or high risk (≥ 27) (Henrique, De Micheli, Lacerda, Lacerda, & Formigoni, 2004).

C) *Epworth Sleepiness Scale* (ESS): a self-administered questionnaire that assesses the probability of falling asleep in eight situations involving daily activities, some of them known to be highly soporific. This instrument was translated and validated in Brazil with good reliability indexes for its use. The ESS evaluates eight sleep situations and in each item is assigned a score from zero to three, which is related to the probability of sleep being induced ranging from 0 (never sleep) to 3 (high chance of napping), with a total score from 0 to 24, and higher scores correlated with increased degrees of sleepiness (Bertolazi et al., 2009).

D) *Depression, Anxiety and Stress Scale* (DASS-21): evaluates the symptoms of depression, anxiety and stress in 21 items, using a Likert scale. Instrument developed by Levibond and Levibond in 2004, and validated for the Brazilian context, Likert scale of 4 points between 0 (does not apply to me) and 3 (applies a lot to me, or most of the time), whose scores are determined by the sum of the scores of the 21 items (Vignola & Tucci, 2014).

E) *Driver Behavior Questionnaire* (DBQ): Instrument composed of 39 items evaluating three domains: (i) Deliberate violation, (ii) Dangerous errors and (iii) Harmless lapses (Veiga, Pasquali & Silva 2009). "If the intent is not appropriate, there is an error and if the action was not intentional a lapse occurred". Traffic violations refer to deliberate actions in the execution of a certain conduct in traffic, contrary to the provisions of current regulations, with potential risk to the safety of oneself and other road users. While errors are identified as flaws in the correct processing of information inherent to safe driving, and they refer more to the driver's cognitive functions. Lapses are related to involuntary deviations committed during vehicle driving activity or memory failures. The occurrence of errors, lapses and violation when driving refers to the last 12 months. Factor analysis study showed the existence of the same factorial structure of the original study, being a domain of errors (13 items, $\alpha = .80$), the factors lapses and violations with 13 items each ($\alpha = .79$) (Veiga, Pasquali & Silva 2009).

F) *Drinking and driving after having consumed high doses of alcoholic beverages* (intoxication): through a direct question about driving after having consumed high doses of alcoholic beverages, a pattern of intoxication, in the last 12 months, with dichotomous response (Yes/No).

G) *Accidents, traumas and violence experienced on the road*: were evaluated by means of three direct questions, such as: "have you ever been robbed while working on the road" "have you ever had an accident with the truck while working on the road", "In the accident there was a victim?", with dichotomous response (Yes/No).

Statistical analysis

For data analysis, a database was developed in the Statistical Program of Social Science (SPSS) version 20, for Windows. Descriptive analyses of categorical variables, with absolute (n) and relative (%) were presented. The bivariate

analysis of the data was performed using Pearson's Chi Square test (χ^2).

In the logistic regression analysis, the following variables were considered as independent variable, a) Driving after drinking a lot, b) Deliberate violation; c) Dangerous errors and, d) Harmless lapses (DBQ).

The covariates differ from each other for each group, in terms of sociodemographic characteristics (age and marital status), type of substance used (alcohol, tobacco, marijuana, amphetamine and any drug) in the last three months and in life, driving behaviors (history of traffic accidents, accidents with victims, assault), symptoms of depression, anxiety, stress (DASS-21) and sleep (ESS), with dichotomous responses.

For the final model, first were obtained the variables that reached statistically significant values of $p < .05$ in the Chi-square test. Subsequently, the Odds Ratio (OR) was calculated for each variable (Deliberate violation, Dangerous errors and Harmless lapses). In the final model, the results were presented using the odds ratio (ORA Odds Ratio Adjusted). The significance level was set at 0.05 for all tests used.

Ethics aspects

The project was approved by the Ethics Committee on Research with Human Beings (CEP) of the Federal University of Uberlândia (UFU), Minas Gerais, Brazil, according to Resolution 466/12 of the National Health Council that provides for research with human beings, Process number 112979/2017, CAAE: 77415317.9.0000.5152.

Results

In the total sample, a predominance of adult drivers (40 - 49 years) 76 (32.3%) who lived with a partner 164 (69.8%) and who professed the Catholic religion 121 (51.5%).

Regarding labour issues, 43 (18.3%) were dangerous cargo truck drivers, 107 (45.5%) self-employed professionals, 75 (31.9%) reported history of assaults at some point in their lives, 69 (29.4%) had been involved in accidents and 28 (60.9%) with victims at the time of the accident.

According to Table 1, the drivers who admitted that they drove after drinking a lot were adults (30 to 39 years) (28.1%, $p = .015$) and lived without a partner ($p = .019$). This characteristic was also observed among drivers who made dangerous mistakes ($p = .019$). This group of drivers was predominant among those who committed harmless lapses ($p = .012$) and deliberate traffic violations ($p = .007$).

In the sample investigated, variables such as religion, type of employment and type of dangerous cargo transport did not differ in the sample when evaluated between driving-related behaviors.

Table 1*Sociodemographic characteristics of drivers and driving behaviors (DBQ), (n=235). Uberlândia, Minas Gerais, Brazil, 2021.*

		Driving-related behaviors [n (%)]							
		Driving after drinking too much		Dangerous errors		Harmless lapses		Deliberate violation	
		Yes	No	Yes	No	Yes	No	Yes	No
Age group (years)†	20 – 29	1 (3.2)	30 (96.8)	11 (35.5)	20 (64.5)	7 (22.6)	24 (77.4)	7 (22.6)	24 (77.4)*
	30 – 39	18 (28.1)	46 (71.9)	36 (56.3)	28 (43.8)	35 (54.7)	29 (45.3)	37 (57.8)	27 (42.2)
	40 – 49	10 (13.2)	66 (86.8)	34 (44.7)	42 (55.3)	30 (40.0)	45 (60.0)	32 (42.1)	44 (57.9)
	> 50	13 (20.3)	51 (79.7)	34 (53.1)	30 (46.9)	33 (52.4)	30 (47.6)	34 (53.1)	30 (46.9)
Marital status†	With partner	19 (26.8)*	52 (73.2)	44 (62.0)*	27 (38.0)	36 (51.4)	34 (48.6)	39 (54.9)	32 (45.1)
	Without partner	23 (14.0)	141 (86.0)	71 (43.3)	93 (56.7)	69 (42.3)	94 (57.7)	71 (43.3)	93 (56.7)
Religion†	Non Catholic	15 (13.2)	99 (86.8)	60 (52.6)	54 (47.4)	45 (39.8)	68 (60.2)	48 (42.1)	66 (57.9)
	Catholic	27 (22.3)	94 (77.7)	55 (45.5)	66 (54.5)	60 (50.0)	60 (50.0)	62 (51.2)	59 (48.8)
Employment†	Employee	26 (20.6)	100 (79.4)	66 (52.4)	60 (47.6)	59 (47.6)	65 (52.4)	58 (46.0)	68 (54.0)
	Professional autonomous	16 (14.7)	93 (85.3)	49 (45.0)	60 (55.0)	46 (42.2)	63 (57.8)	52 (47.7)	57 (52.3)
Dangerous cargo transport †	No	139 (83.2)	28 (16.8)	79 (47.3)	88 (52.7)	72 (43.1)	95 (56.9)	76 (45.5)	91 (54.5)
	Yes	31 (72.1)	12 (27.9)	27 (62.8)	16 (37.2)	21 (50.0)	21 (50.0)	22 (51.2)	21 (48.8)
	Sometimes	23 (92.0)	2 (8.0)	9 (36.0)	16 (64.0)	12 (50.0)	12 (50.0)	12 (48.0)	13 (52.0)
		.093		.076		.636		.797	

Note: † Qui-square test. p -value < .05*; p < .001**

Overall the sample, 42 (17.9%) drivers said they drove even after drinking too much, almost half of drivers 115 (48.9%) had made dangerous mistakes, 105 (44.7%) lapses and 110 (46.8%) traffic violations in the last 12 months. Regarding driving-related behaviors (BDQ), almost half of drivers made mistakes 115 (48.9%), 105 (44.7%) lapses and 110 (46.8%) violations.

In the total sample, high smoking rates were observed [101 (43.0%) in the last three months and 154 (65.5%) use in life], alcohol use [40 (17%) in the last three months and 102 (43.4%) use in life]. However, the use of amphetamines is observed in a smaller proportion [16 (6.8%) and 78 (33.2%), respectively] and marijuana [5 (2.1%) and 43 (18.3%)], respectively. It was also found that 40.9% (n=96) of the drivers had already used some illicit substance in life and recent use was much lower, only 19 (8.1%) reported using in the last three months.

Alcohol use in life was higher among drivers who drank and subsequently drove [Yes 24 (23.5%) versus No 18 (13.5%), $p = .047$] and among those who made mistakes [Yes (57.8%) versus No 56 (42.1%), $p = .017$].

Smoking (use in the last three months and in life) was associated with all behaviors related to driving, with statistically significant values ($p < .001$ and $p < .05$), respectively. The

use of marijuana (in the last three months) was associated with the making of errors ($p = .021$) and that of amphetamines to lapses ($p = .003$) and violations ($p < .001$).

In addition, drinking and driving have not been associated with the use of illicit drugs, but to behaviors such as dangerous errors ($p < .001$ and $p = .026$), harmless lapses ($p = .004$ and $p = .034$) and violations while driving ($p > .001$ and $p = .003$), in the last three months and in life, respectively, with statistically significant values.

Among the total of drivers, 69 (29.4 %) had a previous history of a traffic accident, 28 (11.9 %) accidents with victims and 75 (31.9 %) mentioned that they were victims of robberies. In the bivariate analysis, more than half of the drivers who violated the rules while driving had a previous history of traffic accidents 40 (58.0 %), with statistically significant values ($p = .027$).

Table 3 observes that more than half of the drivers who had committed violations suffered a traffic accident ($p = .027$). Errors ($p = .020$) and lapses (DBQ) ($p < .001$) were predominant among drivers with a history of accidents with victims. It can still be noted that drivers who drove after drinking too much ($p = .002$) had lapses ($p < .001$) and violations ($p < .001$), with a predominance among those who had a previous history of being assaulted (Table 3).

Table 2
Use of alcohol, tobacco and other drugs (ASSIST) in the last three months and driving behaviors (DBQ). Uberlândia, Minas Gerais, Brazil, 2021 (N = 235).

		Driving-related behaviors [n (%)]							
		Driving after drinking too much		Dangerous errors		Harmless lapses		Deliberate violation	
		Yes	No	Yes	No	Yes	No	Yes	No
Alcohol (in the last 3 month) †	Yes	11 (27.5)	29 (72.5)	21 (52.5)	19 (47.5)	23 (59.0)	16 (41.0)	23(57.5)	17 (42.5)
	No	30 (15.5)	164 (84.5)	94 (48.5)	100 (51.5)	82 (42.3)	112 (57.7)	87(44.8)	107 (55.2)
		.068		.641		.056		.144	
Alcohol (in the life) †	Yes	24 (23.5)	78 (76.5)	59 (57.8)	43 (42.2)	52 (51.5)	49 (48.5)	56 (42.1)	77 (57.9)
	No	18 (13.5)	115 (86.5)	56 (42.1)	77 (57.9)	53 (4.2)	79 (59.8)	54 (52.9)	48 (47.1)
		.047*		.017*		.085		.099	
Tobacco (in the last 3 month) †	Yes	29 (28.7)	72 (71.3)	57 (56.4)	44 (43.6)	62 (62.0)	38 (38.0)	64 (63.4)	37 (36.6)
	No	13 (9.7)	121 (9.3)	58 (43.3)	76 (56.7)	43 (32.3)	90 (67.7)	46 (34.3)	88 (65.7)
		<.001**		.046*		<.001**		<.001**	
Tobacco (in the life) †	Yes	36 (23.4)*	118 (76.6)	93 (6.4)**	61 (39.6)	85 (55.9)	67 (44.1)	17 (21.0)	64 (79.0)
	No	6 (7.4)	75 (92.6)	22 (27.2)	59 (72.8)	20 (24.7)	61 (75.3)	93 (6.4)	61 (39.6)
		.002*		<.001**		<.001**		<.001**	
Cannabis (in the last 3 month) †	Yes	2 (4.0)	3 (6.0)	5 (10.0)	-	2 (4.0)	3 (6.0)	2 (4.0)	3 (6.0)
	No	40 (17.5)	189 (82.5)	110 (48.0)	119 (52.0)	103 (45.4)	124 (54.6)	107(46.7)	122 (53.3)
		.194		.021*		.811		.766	
Cannabis (in the life) †	Yes	12 (27.9)	31 (72.1)	34 (79.1)	9 (2.9)	26 (6.5)	17 (39.5)	29 (67.4)	14 (32.6)
	No	30 (15.6)	162 (84.4)	81 (42.2)	111 (57.8)	79 (41.6)	111 (58.4)	81 (42.2)	111 (57.8)
		.057		.001**		.025*		.003*	
Amphetamine (in the last 3 month) †	Yes	5 (31.2)	11 (68.8)	11 (68.8)	5 (31.2)	13 (81.2)	3 (18.8)	15 (93.8)	1 (6.2)
	No	37 (16.9)	182 (83.1)	115 (52.5)	104 (47.5)	125 (57.6)	92 (42.4)	124(56.6)	95 (43.4)
		.148		.101		.003*		<.001**	
Amphetamine (in the life) †	Yes	6 (7.7)	72 (92.3)	47 (6.3)	31 (39.7)	42 (53.8)	36 (46.2)	48 (61.5)	30 (38.5)
	No	36 (22.9)	121 (77.1)	68 (43.3)	89 (56.7)	63 (4.6)	92 (59.4)	62 (39.5)	95 (6.5)
		.004*		.014*		.056		.001**	
Any kind of il-licit drug (in the life) †	Yes	16 (16.7)	80 (83.3)	63 (65.6)	33 (34.4)	54 (56.3)	42 (43.8)	62 (64.6)	34 (35.4)
	No	26 (18.7)	113 (81.3)	52 (37.4)	87 (62.6)	51 (37.2)	86 (62.8)	48 (34.5)	91 (65.5)
		.688		<.001**		.004*		<.001**	
Any kind of il-licit drug (in the last 3 month) †	Yes	14 (73.7)	5 (26.3)	14 (73.7)	5 (26.3)	13 (68.4)	6 (31.6)	15 (78.9)	4 (21.1)
	No	37 (17.2)	178 (82.8)	101 (47.0)	114 (53.0)	92 (43.2)	121 (56.8)	94 (43.7)	121 (56.3)
		.321		.026*		.034*		.003*	

Note: † Qui-square test. *p*-value < .05*; *p* < .001**

Table 3
Driving related behaviors (DBQ) (N= 235). Uberlândia, Minas Gerais, Brazil, 2021.

		Driving-related behaviors [n (%)]							
		Driving after drinking too much		Dangerous errors		Harmless lapses		Deliberate violation	
		Yes	No	Yes	No	Yes	No	Yes	No
Traffic accident history †	Yes	13 (18.8)	56 (81.2)	35 (5.7)	34 (49.3)	32 (47.1)	36 (52.9)	40 (58.0)	29 (42.0)
	No	29 (17.5)	137 (82.5)	80 (48.2)	86 (51.8)	73 (44.2)	92 (55.8)	70 (42.2)	96 (57.8)
			.803		.724		.694		.027*
Accidents with victims you've been involved in †	Yes	7 (25.0)	21 (75.0)	16 (57.1)	12 (42.9)	72 (68.6)	33 (31.4)	17 (6.7)	11 (39.3)
	No	3 (16.7)	15 (83.3)	4 (22.2)	14 (77.8)	42 (32.8)	86 (67.2)	6 (33.3)	12 (66.7)
			.504		.020*		<.001**		.070
History of being robbed †	Yes	22 (29.3)	53 (7.7)	37 (49.3)	38 (5.7)	42 (56.8)	32 (43.2)	42 (56.0)	33 (44.0)
	No	20 (12.5)	140 (87.5)	78 (48.8)	82 (51.3)	63 (39.6)	96 (6.4)	68 (42.5)	92 (57.5)
			.002*		.934		.014*		.053
Driving after drinking too much †	Yes	-	-	26 (61.9)	16 (38.1)	30 (75.0)	10 (25.0)	36 (85.7)	6 (14.3)
	No	-	-	89 (46.1)	104 (53.9)	75 (38.9)	118 (61.1)	74 (38.3)	119 (61.7)
				.064		<.001**		<.001**	

Note: † Qui-square test. *p*-value: < .05*; *p* < .001**

The results of Table 4 show the behaviors related to driving, driving after drinking a lot and symptoms of depression, anxiety, stress (DASS) and sleep (ESS). Among the drivers, 84 (35.5) presented impaired sleep pattern (ESS), on-

ly 15 (6.4%) symptoms of depression, 20 (8.5%) stress and 37 (5.7%) anxiety.

Depression and stress (DASS-21) were not associated with driving-related behaviors. Anxiety was associated with

driving after drinking heavily ($p = .002$), lapses ($p = .033$) and violations ($p = .005$). Problems related to drowsiness were associated with making errors ($p > .001$) and violations ($p = .007$) in traffic.

Table 4

Behaviors related to traffic and depression, anxiety, stress (D-ASS-21) and sleep (ESS). Uberlândia, Minas Gerais, Brazil, 2021 ($N = 235$).

		Driving-related behaviors [n (%)]							
		Driving after drinking too much		Dangerous errors		Harmless lapses		Deliberate violation	
		Yes	No	Yes	No	Yes	No	Yes	No
Depression†	Impaired	2 (13.3)	13(86.7)	7 (46.7)	8 (53.3)	6 (4.0)	9 (6.0)	7 (46.7)	8 (53.3)
	Normal	40 (18.2)	180 (81.8)	108 (49.1)	112 (5.9)	99 (45.4)	119 (54.6)	103(46.8)	117(53.2)
		.635		.856		.684		.991	
Anxiety †	Impaired	13 (35.1)	24 (64.9)	21 (56.8)	16 (43.2)	22 (61.1)*	14 (38.9)	25(67.6)	12 (32.4)
	Normal	28 (14.2)	169 (85.8)	93 (47.2)	104 (52.8)	82 (41.8)	114 (58.2)	84 (42.6)	113(57.4)
		.002*		.286		.033*		.005*	
Stress†	Impaired	4 (2.0)	16 (8.0)	12 (6.0)	8 (4.0)	7 (35.0)	13 (65.0)	8 (4.0)	12 (6.0)
	Normal	38 (17.7)	177 (82.3)	103 (47.9)	112 (52.1)	98 (46.0)	115 (54.0)	102(47.4)	113(52.6)
		.795		.301		.344		.523	
Sleep (ESS)†	Impaired	55 (16.7)	70 (83.3)	55 (65.5)	29 (34.5)	43 (51.2)	41 (48.8)	49 (58.3)	35 (41.7)
	Normal	28 (18.7)	122 (81.3)	59 (39.3)	91 (6.7)	61 (41.2)	87 (58.8)	60 (4.0)	90 (6.0)
		.702		.001**		.142		.007*	

Note: †Chi-square test. p -value $< .05$ *; $p < .001$ **

Multivariate analysis

Drinking and driving

Drivers who drove after drinking a lot presented potential odds ratios among those who lived without a partner (ORA = 2.8 [95% CI 1.3; 6.2], $p = .010$), smokers (last 3 months) (ORA = 3.2 [95% CI 1.3; 7.9], $p = .011$) and with a previous history of being assaulted (ORA = 2.3 [95% CI 1.0; 4.9], $p = .038$). In addition, they were four times more likely among those who manifested anxiety symptoms (ORA = 4.2 [95% CI 1.7; 1.6], $p = .002$).

Driving behaviours

Errors were almost three times more likely among drivers who had impaired sleep (ESS) (ORA 2.8 [95% CI 1.6; 4.9], $p < .001$) and were involved in accidents with victims (ORA 5.8 [95% CI 1.3; 26.3], $p = .021$).

Lapses were almost three times more likely among drivers who drove after drinking heavily (OR 2.8 [95% CI 1.2; 6.5], $p = .019$), twice as likely among those with a history of assault (OR 1.9 [95% CI 1.0; 3.6], $p = .015$). However, younger drivers (20 – 29 years) were 67% less likely to make lapses (OR .33 [95% CI .10; .98], $p = .046$).

History of traffic violations had potential chances among those drivers who drove after drinking heavily (ORA 8.9 [95% CI 3.2; 25.3], $p < .001$), were also three times more likely among those who used any type of drug in life (ORA 3.0 [95% CI 1.5; 6.4], $p = .002$), with symptoms of anxiety (ORA 2.7 [95% CI 1.1; 6.8], $p = .028$) and impaired sleep (ESS) (ORA 2.8 [95% CI 1.4; 5.5], $p = .003$).

Discussion

The present study evaluated the behaviors of truck drivers related to driving, substance use and mental health, a theme still little explored in the literature. The use of substances and the behaviors related to driving by these workers were highlighted among the main public health problems, in view of the serious consequences generated, with high rates of morbidity and mortality on the roads and high economic costs (PAHO, 2018; WHO, 2018). It is notorious that poor health conditions and those resulting from stressful working conditions contribute to the various conditions of poor quality health and mental health, including the use of substances and traffic violations (Shattell et al., 2012).

Drinking, smoking and driving

In the results of the bivariate analysis (Table 1), a sample with homogeneous sociodemographic and work characteristics is noted, but with an important differential in relation to age. In addition, adult drivers (30 to 39 years old) were predominant among those who drove after drinking heavily and among those who committed lapses and violations while driving (Table 1). The results also show that this group of drivers presented peculiar characteristics, such as: they lived alone, were users of substances (alcohol, tobacco, marijuana, amphetamine) and were more likely among those who had made mistakes, lapses and violations while driving.

There is evidence that errors do not decrease with increasing age, unlike violations that decline appreciably (de Winter & Dodou, 2010), so occurs for the use of alcohol (Behnood & Mannering, 2017). However, the use of substances, especially alcohol, has been quite frequent, with great social and health impacts on the lives of truck drivers, potentially associated with accidents and deaths on the

roads, with serious social and health damage. It is estimated that 21 to 30% of car accidents in the general population, especially among young people of productive age, occurred after the consumption of alcoholic beverages (Abreu et al., 2018). An analysis of 36 studies on the subject showed that alcohol use is observed in very young drivers and smokers; in addition, 30% reported amphetamine use, and of these, more than half also reported the use of alcohol and stimulants, in addition to what these drivers reported had little experience in traffic (Bacchieri & Barros, 2011).

Drinking and driving alone constitutes in addition to a risky behavior that potentiates in four times the occurrence of accidents (Leyton et al 2019), a serious violation provided for in the Brazilian Traffic Code that provides for zero tolerance in relation to drinking and driving (Abreu et al., 2018). The effects of alcohol on the body are diverse even in small amounts, seriously impairing critical judgment, attention, memory and reaction time, also leading to decreased reflexes (Rubin, 2013). A study conducted with 684 truck drivers, who circulated on three highways in the state of São Paulo, showed that 6.9% of truck drivers said they had already been fined for driving under the influence of alcohol (Oliveira et al., 2016).

Regarding the habits of alcohol use by truck drivers, not unlike the Brazilian population, 46% had consumed alcohol at some point in their lives. Of this group, 64.5% were active users, in relation to the use of alcoholic beverages in convenience stores on highways, all evaluated drivers reported that they had had legal problems at some point in their lives, after consuming alcohol. However, 80% reported that they rarely drove right after drinking, but 20% continued to drink and drive on the roads, even after having had problems with the law (Junior et al., 2016).

Smoking

A surprising result in the present study was related to smoking (43% current use and 65% use in life), a much higher rate when compared to alcohol use (17% and 43.4%, respectively) (Table 2). It is also noteworthy that, in the multivariate analysis of the present study, smokers (last three months) were three times more likely among those who drove after having drunk a lot and who had anxiety (Table 2).

Smoking is part of the daily work of many drivers, and can be the result of situations experienced in the long stressful hours at the wheel and the work tensions (Junior et al., 2016). Tobacco use characterizes a solitary, though unhealthy behavior. Unlike the use of alcohol, which has direct implications in the driving of the vehicle, it causes damage in the medium and long term in the health conditions of drivers, who already suffer from some comorbid diseases and low access to health services (Ozoh et al., 2017; Useche et al., 2018).

It is also perceived that smoking rates are very high when compared to those of the population of the Southeast Re-

gion of Brazil 26.4% (95%CI 22.5 - 3.2) (Bastos, 2017). Smoking rates by truck drivers reach expressive levels, 36% of lifetime use and 51.6% of current use. As for smokers, half had moderate to severe levels of dependence, using 20 cigarettes per day, and 33.3% between 15 and 20 cigarettes per day (Junior et al., 2016; Ozoh et al., 2017; Useche et al., 2018).

These results are important for the planning of brief intervention strategies in relation to smoking, considering that the motivations of individuals to maintain this behavior are multidimensional and often modifiable. In the case of truck drivers, nicotine use is related to their potential psychic stimulation, which favors the feeling of being more alert to drive for longer and with less susceptibility to fatigue. Nicotine also causes inappetence and, consequently, produces a reduction in tension and anxiety, which is felt as pleasant relaxation, considering that the work routine does not provide moments for stress relief. In addition, it should be considered the mechanism of automatism/habit, since the cigarette is easily accessible in the truck cab all the time.

Substance use by drivers

In the present sample, the results showed the current and lifetime use of amphetamines (6.8% and 33.2%) and marijuana (2.1% and 18.3%), respectively, among truckers. The use of substances by professional drivers of freight transport on highways is a global phenomenon (Ainy & Soori, 2019; Behnood & Mannering, 2017; Bragazzi et al., 2018; Mahajan et al., 2019; Rosso et al., 2016), with emphasis on the use of alcohol, tobacco, amphetamines and, currently, illicit drugs, which has been commonly observed in evident growth in this population (Junior et al., 2016; Leyton et al., 2019).

As for the commitment of violations while driving, of 684 truck drivers on highways in São Paulo 73.5% had committed some traffic violation while driving in the last month (Oliveira et al., 2016). Poor driving behaviors in traffic can initially be understood from unfavorable mental health conditions, including symptoms of depression, anxiety, insomnia and substance abuse by drivers (Abdoli et al., 2015).

Marijuana use affects the abilities of sense perception, which are crucial when driving. Although it is the illicit substance most commonly used by young people, marijuana use has been increasingly observed in truck drivers. Research has shown the negative effects of use in this public, including increased truck imbalance on the highway (zigzag), damage in reaction time and change in attention while driving (National Institute of Drug Abuse [NIDA], 2020). The combined use of alcohol and marijuana leaves the attention of drivers even more impaired, causing more imbalances of the vehicle on the road. Another study related the use of opioids and drowsiness, showing impairments in the psychic state, especially in the functions of thought and judgment. In addition, being under the influence of opioids while driving can double the risk of getting involved in accidents (NIDA, 2020).

Finally, the use of amphetamines and other stimulants may contribute to the triggering of seizures, psychotic break, cardiac arrhythmias, and respiratory problems. Depending on the time these injuries occur, they can have fatal consequences for the driver and other vehicles or pedestrians involved (NIDA, 2020).

A survey conducted in the State of Minas Gerais, Brazil showed that 18% of other drugs use in their lives, all of them were recent use, highlighting that driver used alcohol, tobacco and other substances simultaneously (86.8%) and tobacco and other drugs (13.2%). Regarding perceptions of risk exposure, in terms of drug use and driving violation behaviors, 55% of drivers mentioned that sometimes exposed themselves to high speed, 45% always expose themselves to high speed, considering that all those who were users did not care whether or not they were exposing their lives and that of others to risk (Junior et al., 2016).

A study showed that in 34.4% of the toxicology analysis of 2638 Australian drivers killed in road accidents there was some kind of psychoactive substance. Among the most commonly detected legal medications consumed under prescription were antidepressants (7.9%), benzodiazepines (7.0%), opiates/opioids (6.6%) and sedative antihistamines (1.1%) (Drummer & Yap, 2016). These findings may be an important indicator of substance use by truck drivers, which may be related to the presence of suffering and/or mental disorders and difficulties in facing stressful situations.

Accidents, traumas and violence

Another important finding refers to previous exposure to traumatic and/or violent events experienced by drivers, such as traffic accidents, including those that resulted in victims – and having been the victim of assault; the chances are considerably increased among drivers who drove after drinking heavily and making mistakes, lapses and violations while driving (Table 3). In this sense, those drivers who had increased chances of a history of traffic accidents with victims (OR = 5.8) were likely to make mistakes. Errors in driving alone commonly occur due to attention failures, inexperience or momentary situations, which can cause violations of rules that are strongly associated with accidents (Souza & Munoz, 2002).

The daily violence experienced by truck drivers has been described in different contexts (PAHO, 2018; WHO, 2018). For many professionals, the meaning of "health" may be linked to the ability to stay alive and safe during long and exhausting working hours, either due to the inherent risk of accidents or the violence to which they are exposed in the daily life of the roads, such as the threats of assault (Sastri, 2016). Constant stress in the face of situations of violence experienced due to the type of work can contribute to adverse outcomes in the mental health of drivers, aggravated by the high level of social isolation.

On the other hand, it is possible to infer that the errors, lapses and violations committed while driving can be the re-

sult of impersonal violence experienced by these professionals, also with regard to that caused indirectly, such as the pressure of the employer to deliver goods in a short period of time, which causes the driver to ignore the rules and regulations of safety in traffic and at work (Gray & Lindsay, 2019). In this sense, the safety climate would be a significant predictor for the behavior of drivers, so those who experienced a negative safety climate reported that they most frequently committed violations while driving (Sullman et al., 2017).

Traffic accidents can have deleterious and lasting physical and mental consequences for survivors, including professional drivers. Accidents can trigger anxiety and phobia in response to exposure to the experience of trauma or the fact of witnessing the traumatic situation, which may result in post-traumatic stress disorder (PTSD). This disorder, when untreated, can increase morbidity throughout life, generating functional impairment and declining quality of life in terms of health, productivity and social interaction; may also be associated with comorbidities such as depression and substance use (Alenko et al., 2019).

Almost half of Italian drivers who experienced situations of violence had developed severe symptoms of PTSD and 27% had comorbid conditions such as alcohol abuse or dependence. In addition, drivers who use alcohol suffered more severe impacts on social relationships and individual functioning, with greater severity of sleep-related problems, especially when they had witnessed accidents with fatal victims (Fekadu et al., 2019).

Mental disorders

In the present sample, drivers who drove after drinking had more anxiety symptoms (Table 4). Evidence suggests the existence of neurobiological systems superimposed in promoting the emergence of negative affects in alcohol abuse. Since the 1990s, there has been an increase in studies that have highlighted that alcohol consumption related to stress has its roots in the search for tension reduction, based on psychophysiological and neurobiological mechanisms involved in the response and regulation of the body to stress and alcohol abuse (Anker, 2019).

In the present study, drivers with a previous history of accidents were twice as likely to develop anxiety. The double diagnosis - alcohol abuse and mood and anxiety disorders - was observed in 50% of the individuals who received treatment for alcoholism (Alavi, 2017; Anker, 2019). The truckers' work environment involves stereotypes, such as the myth of independence, emotional control, which favor the emergence of symptoms of altered mood. In Australia, the prevalence of common mental disorders among truck drivers was 6.1%, with a prevalence of depression (13.6%) and anxiety (7.9%). Research showed that 23.4% of the drivers approached had anxiety symptoms (moderate to severe), with a high prevalence of substance abuse associated with anxiety (Singh et al., 2019). In addition, the experience of conflicting

situations and tension at work were an association with mental health, as well as the involvement in traffic accidents and penalty for fines (Useche et al., 2018). From a psychological point of view, behaviors such as drinking to have the courage to face problems is a powerful prognosis for the development of current and future alcohol-related problems.

Sleep problems

In the sample investigated, problems related to drowsiness (Table 4) were observed in both statistical analyses, with almost three times more chances among those who made mistakes (OR = 2.8) and violations (OR = 2.8) when driving. The working conditions of truck drivers related to poor nights sleeping contribute to the intensification of fatigue, the lack of attention enhancing drowsiness when driving and the responses of reactions on the steering wheel, contributing to the various types of accidents on the highways and potentiates other mental and physical health conditions (Leyton et al., 2019; Turkarslan et al., 2020).

Among the drivers who had obstructive sleep apnea, 17.3% reported poor sleep quality and 8.9% excessive sleepiness and daytime sleepiness. Associations were observed with double risks between psychological distress and obstructive apnea (OR = 1.67), poor sleep quality (OR = 2.58) and excessive daytime sleepiness (OR = 1.65) (Guglielmi et al., 2018).

Of the mental health issues, the problem is that the more truckers are dissatisfied with the quality of their sleep, the more symptoms of daily fatigue can present and, consequently, more errors, slips, violations and inattention while driving can commit. In addition, it seems that the more scrapped the truck, the more drivers suffer from fatigue and therefore again, the more likely they are to make mistakes, slips, violations and inattention (Naderi et al., 2018), cyclic pattern can be repeated, as daytime sleepiness is often subdued by load drivers (Filomeno et al., 2019) and the possibility of increasing economic gains and productivity causes these drivers to work for more consecutive hours daily, committing more violations and violating rest patterns that directly affect sleep quality and everyday life routine (Mahajan et al., 2019).

To better compromise this situation, in an attempt to remain alert and attentive, drivers often abuse tobacco, alcohol, coffee and a number of other substances. These substances are often misused to compensate for symptoms of

depression, anxiety, fatigue, and the effects of stress at work and social isolation. The combined use of multiple substances and dependence further increase the chances of adopting unsafe and inappropriate driving behaviors (Guglielmi et al., 2018).

Limitations of the study

The present investigation presents limitations that should be considered, among them, the fact that it was performed only with drivers who made voluntary stop at a convenience service of a highway. This may have fueled a selection bias, that is, a trend that many drivers went through the post without being evaluated, thus underestimating the findings. Besides, the sample may be representing a typical response pattern for a loco-regional reality. Another limitation to be considered is that the study used a cross-sectional design, which does not allow inferences about the direction of causality. Thus, the results obtained should be interpreted with caution. It is necessary to expand the collection of research, including other samples and methodological designs, in order to evaluate follow-up, including qualitative approaches.

Implications for preventive practice

The recognition of symptoms, such as anxiety and substance use, is a fundamental step for the prevention of comorbid disorders, which can lead not only to increased incapacitation for work and poor quality of life, but also to increased use of medical care services (Singh et al., 2019).

The cycle of relationships intertwined in the scope of mental health and behaviors related to driving is increasingly complex, which imposes the need to investigate the variables that influence the conduct of truck drivers. It is perceived that factors such as substance use, mental health, drowsiness and violence related to driving behavior among professionals should be better evaluated in order to dimension possibilities to implement traffic safety measures and programmatic actions to promote the health of drivers in the face of this enormous challenge.

Conflict of interest.- The authors of this article declare no conflict of interest.

Financial support.- No funding.

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