

Statistical analysis of psychological and physiological stress in public transport drivers

Análisis estadístico sobre el estrés psicológico y fisiológico en conductores del transporte público

HERNÁNDEZ-ANGEL, Francisca†*, MEDINA-ALVAREZ, Juana Elizabeth and MENDEZ-PEDRAZA, Francisco Javier

Universidad Politécnica de Altamira.

ID 1st Author: *Francisca, Hernández-Angel* / ORC ID: 0000-0003-4394-9817, CVU CONAHCYT ID: 776988

ID 1st Co-author: *Juana Elizabeth, Medina-Alvarez* / ORC ID: 0000-0002-7081-6860, Researcher ID Thomson: M-9320-2018, CVU CONAHCT ID: 404179

ID 2nd Co-author: *Francisco Javier, Mendez-Pedraza* / ORC ID: 0009-0002-7175-2560

DOI: 10.35429/JSR.2023.23.9.19.28

Received January 25, 2023; Accepted June 30, 2023

Abstract

Public transport drivers face various factors that put their health at risk, not only in traffic matters, such as psychological stress, physiological stress, and working conditions. This paper aims to study said variables in public transport (bus) drivers in southern Tamaulipas, through a statistical study that can show the risk conditions for the study participants. To achieve this, a quantitative and descriptive research was carried out, with a convenient voluntary sampling of 77 surveys. Firstly, an exploratory factorial study was conducted on variables mentioned above, where the most reliable items were identified. Subsequently, a mediation analysis was carried through, resulting in the finding that the effect of psychological stress on physiological stress is less when mediated by

Public transportation drivers, Work conditions, Psychological and physiological stress, Mediation analysis

Resumen

Los conductores del transporte público se exponen a diversos factores que ponen en riesgo su salud, no solo en cuestiones de tráfico, también están expuestos al estrés Psicológico, al estrés Fisiológico y a las condiciones laborales. El objetivo del presente trabajo es estudiar dichas variables en los conductores del transporte público (autobuses) del sur de Tamaulipas, por medio de un estudio estadístico que pueda mostrar las condiciones de riesgo en los sujetos de estudio. Para llevar a cabo este objetivo se realizó una investigación de corte cuantitativo y descriptivo, con un muestreo voluntario a conveniencia de 77 encuestas. En primer lugar, se realizó un estudio factorial exploratorio a las tres variables en mención donde se identificaron los ítems más confiables. Posteriormente, se llevó a cabo un estudio de mediación, dando como resultado que el efecto del estrés psicológico en el estrés fisiológico es menor cuando es mediado por las condiciones de trabajo.

Conductores de transporte públicos, Condiciones laborales, Estrés fisiológico y psicológico

Citation: HERNÁNDEZ-ANGEL, Francisca, MEDINA-ALVAREZ, Juana Elizabeth and MENDEZ-PEDRAZA, Francisco Javier. Statistical analysis of psychological and physiological stress in public transport drivers. Journal of Social Researches. 2023. 9-23:19-28.

* Correspondence to Author (E-mail: frany.hernandez@upalt.edu.mx)

† Researcher contributing as first author.

Introduction

The public transportation system is a crucial component in the functioning of modern cities, as it provides essential services to the population, enabling them to commute to various locations for their daily activities and influencing the social and economic dynamics (Narváez et al., 2022). However, the increase in the number of users, traffic congestion, air and noise pollution, rising temperatures, vibrations, inadequate lighting, and a changing and demanding schedule contribute to an elevated stress level in drivers, impacting their health. Despite the aforementioned, workers must meet long working hours, which are often not regulated by a labor contract or may not include social security benefits. During these extended hours, there is not always time allotted for meals or other needs, and drivers may be exposed to various risks (Arias-Meléndez et al., 2022).

Stress has been the object of study for years, within the transactional theory of stress, where it is considered that subjective experiences, negative emotions, are stimulants for their generation, such as fear, anxiety, tension, frustration, anger, among other aspects (Lim et al. 2023).

The study of stress in drivers is considered of interest because it is a factor that contributes to driver performance and safety. Prolonged stress can cause headaches, fatigue, lack of sleep and other health risks that can cause traffic accidents. It is important to detect these symptoms in order to avoid major long-term health problems (Liu et al. 2023). On the other hand, the psychosomatic aspects refer to a somatic condition with a psychological aspect that, as a consequence, can generate diseases or physical pain, they can also be generated by factors such as genetics, family, cognitive or emotional, including cancer, psychosomatic aspects can be generated. (González and Hernández, (2006).

One of the health risk factors for the participants in the study is stress, both psychological and physical. This factor represents the most significant risk among workers in this field and is manifested in psychological aspects such as intolerance, recklessness, hostility, impatience, and reduced concentration, as well as physical factors such as lack of sleep, weight gain, and intestinal problems.

It also increases their consumption of tobacco and alcohol, behaviors that damage their health. These factors contribute to increased fatigue and the risk of accidents. Another factor that contributing to increased stress is the noise generated by horns and engines, as well as environmental factors such as heat and lighting (Navarrete et al, 2017). When describing these working conditions, we must mention the schedules, as some drivers work up to 12 hours.

The previously stated factors represent a health risk for the drivers, as they have inappropriate eating habits, which can lead to chronic diseases such as hypertension and diabetes mellitus. These conditions can lead to cardiovascular diseases (Veloza, et al. 2019) that put their lives and those of public transport users at risk. Therefore, it is vital to identify the factors that contribute to psychological and physiological stress in public transport drivers, and evaluate their working conditions and how these factors can mediate the stressors mentioned above. Participants in this study will help shed light on these important issues.

Work-related stress

There are various concepts about stress. On the one hand, it can be said that stress is a reaction that the human body has to adversity or demands from the environment and the attempt to find a solution. On the other hand, it is also considered a negative emotional state that, in turn, harms the physiological system and generates changes in perception in individuals that can cause harm to their well-being. (Sandín, 2003).

Stress has several branches, one of them being work-related, linked to individuals' work environments. This type of stress is associated with psychological aspects such as lack of concentration, bad mood, and distractibility, among others, and physiological stress, which leads to headaches, muscle pain, uncontrolled blood pressure, lack of sleep, and other health issues (García-Rubiano y Forero-Aponte, 2018). These factors cause problems not only in the work environment but also in social and family settings, to name a few.

Furthermore, Narváez et al. (2022) suggest that stress can also impact physical well-being by causing gastrointestinal, dermatological, and muscular disorders. Excessive worry, inability to concentrate, difficulty making decisions, confusion, disorientation, and irritability are all signs of an individual experiencing psychological and physiological stress.

In the case of stress caused by traffic situations, it is frequently observed among the study population. However, it is worth noting that individuals experience stress differently and at different times. For example, while one driver may perceive certain situations as a regular part of their daily work, another may find their environment to be frequently stressful and react negatively, even aggressively (González y Hernández, 2013).

As previously mentioned, there are both psychological and physical risk factors for public transport drivers. Physical and mental overwork can increase if working conditions are unfavorable (Sepúlveda et al., 2020). Exposure to noise, vibrations, repetitive tasks, high temperatures, uncomfortable seating, and other factors can result in back, neck, shoulder, leg, or headache discomfort, which can be bothersome and interfere with work (Arias-Meléndez et al., 2022)

Based on what was mentioned earlier, the health of public transport workers is considered fundamental for their personal development. A worker who maintains an optimal state of health and a harmonious environment tends to be more productive, motivated, and satisfied with their work. It is believed that working conditions can have a positive influence in reducing psychological and physiological stress. Therefore, it is relevant to study the mental and physical health, and the working conditions of this group of workers to evaluate and propose solutions that help improve their quality of life. The methodology used to carry out this study is presented below.

Methodology

Population

The population consisted of 996 public transport drivers operating on 46 routes in the metropolitan area of southern Tamaulipas, comprising the municipalities of Altamira, Tampico, and Ciudad Madero, where a convenience sampling of 77 volunteer drivers was conducted. The criteria for participating in the study were: having worked for at least one year on the same transport unit and complying with a workday of at least 8 hours.

Research instrument

The survey used in this study consists of 32 items (Appendix 1), distributed into three categories: 10 items to measure psychological stress, 12 items for physiological stress, and 10 items for the variable of working conditions. This survey is based Melgosa (2006) study, which evaluated lifestyle, environment, symptoms, employment/occupation, and personality. The questions are measured on a Likert scale with four options: never, sometimes, often, and always, which were coded with values from 1 to 4 for statistical analysis.

Type of research

A causal cross-sectional study with quantitative analysis was conducted to determine the effect of variables. The regression model with mediation was used, in which the independent variable (x: psychological stress) positively and significantly explains the dependent variable (y: physiological stress), both directly and indirectly, through the mediator variable (m: working conditions). This analysis was carried out using the statistical software SPSS (Figure 1).

Under this framework, it is proposed that psychological stress directly affects physiological stress. Additionally, it is expected that psychological stress will affect work conditions, which will, in turn, have a positive and significant effect on physiological stress. Nevertheless, the impact of psychological stress on physiological stress, mediated by the work conditions variable, must have a considerable impact.

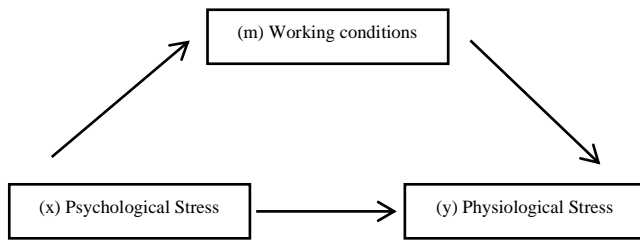


Figure 1 Mediation Model
Source: Own Elaboration

Results

An exploratory factor analysis was conducted to validate the survey items and identify questions that do not contribute to the research. The investigation was conducted independently for each variable and consisted of three phases. In the first phase, items with a value less than 0.5 were identified and removed. In the second phase, a test of data adequacy was conducted to determine the impact of the items on the model. Finally, regression models were performed to determine the statistical model that best explains the relationship between study variables.

Psychological stress

This variable consists of 10 items coded with the initials PS and the number corresponding to the question. There is a good fit in terms of KMO and Bartlett (1.63) with a significance level of 0.000 and a Cronbach's alpha of 0.661. The 10 items explain only 41%, which is low. A factorial analysis will be carried out with the most representative items, and these results can be observed in Table 1.

Variable (items)	Reliability	Cronbach's alpha	Explained variance (%)
Psychological Stress		0.661	41.2
PS1	0.589		
PS2	0.478		
PS3	0.520		
PS4	0.748		
PS5	0.864		
PS6	0.763		
PS7	0.257		
PS8	0.653		
PS9	0.705		
PS10	0.456		

Table 1 Factor analysis matrix on psychological stress.
Source: Own elaboration

Items PS2, PS7, and PS10 scored below 0.5 and were removed. A sample adequacy test was conducted, and the results are presented in Table 2. The significance level was 0.000, and the explained variance increased to 55% with five items. All coefficients were strengthened, and Cronbach's alpha of 0.456 was acceptable. The reliability levels were adjusted, and Cronbach's alpha and explained variance improved. The decision to remove items scoring below 0.5 was considered a good choice.

Variable (items)	Reliability	Cronbach's alpha	Explained variance (%)
Psychological Stress		0.692	45.6
PS1	0.577		
PS3	0.527		
PS4	0.719		
PS5	0.873		
PS6	0.802		
PS8	0.585		
PS9	0.699		

Table 2 Factor analysis matrix on psychological stress applying adequacy test
Source: Own elaboration

Physiological stress

Table 3 shows the items corresponding to the physiological stress variable. It consists of 12 items identified by the letters FS followed by a number representing each question. The significance level is 0.000, Cronbach's Alpha is 0.59, and the explained variance is 33%. Three items, FS3, FS7, and FS8, were removed due to having values below 0.5.

Variable (items)	Reliability	Cronbach's alpha	Explained variance (%)
Physiological Stress		0.59	33.37
FS1	0.658		
FS2	0.662		
FS3	0.372		
FS4	0.506		
FS5	0.540		
FS6	0.725		
FS7	0.415		
FS8	0.443		
FS9	0.752		
FS10	0.541		
FS11	0.584		
FS12	0.596		

Table 3 Factor analysis matrix on physiological stress
Source: Own elaboration

After removing the prior mentioned items, a new analysis was conducted by performing an adequacy test on the data. All coefficients were intensified, and the Cronbach's Alpha increased to 0.68, which is considered acceptable. The results are shown in Table 4, where it can be observed that the level of significance is 0.000, and the variance explained increased to 43.89% with 7 remaining items.

Variable (items)	Reliability	Cronbach's alpha	Explained variance (%)
Physiological Stress		0.68	43.89
FS1	0.662		
FS2	0.629		
FS4	0.515		
FS5	0.525		
FS6	0.722		
FS9	0.746		
FS10	0.638		
FS11	0.686		
FS12	0.709		

Table 4 Factor analysis matrix on physiological stress applying adequacy test
Source: Own elaboration

Working conditions

Finally, the items corresponding to the variable work conditions were analyzed, and the results are presented in Table 5. The variable consists of 10 items encoded with the letters WC followed by a number indicating the corresponding question. The significance level is 0.000, Cronbach's Alpha is 0.661, and the explained variance is 27%. The items WC4, WC5, and WC7 were removed from the analysis because they had values lower than 0.5.

Variable (items)	Reliability	Cronbach's alpha	Explained variance (%)
Working Conditions		0.661	27%
WC1	0.611		
WC 2	0.570		
WC 3	0.684		
WC 4	0.235		
WC 5	0.357		
WC 6	0.658		
WC 7	0.412		
WC 8	0.589		
WC 9	0.658		
WC10	0.548		

Table 5 Factor analysis matrix on working conditions
Source: Own elaboration

After estimating the items with values greater than 0.5, an adequacy test was performed on the data, and the results are presented in Table 6. It can be observed that the level of significance is 0.000, and the variance explained increased to 27% with 7 remaining items. All coefficients were intensified, and Cronbach's Alpha increased to 0.611, which is considered acceptable.

Variable (items)	Reliability	Cronbach's alpha	Explained variance (%)
Working Conditions		0.611	27%
WS1	0.624		
WS2	0.518		
WS3	0.635		
WS6	0.678		
WS8	0.525		
WS9	0.611		
WS10	0.533		

Table 6. Factor analysis matrix on working conditions applying adequacy test. Source: Own elaboration

Once the items with higher reliability are identified, all variables are entered into the statistical software SPSS to generate the following mediation regression models. These models are proposed based on Figure 1.

Regression models with mediation.

Model 1

In this model, the following outcomes were obtained by analyzing the physiological stress as an observable variable and the psychological stress as a predictor:

y: Physiological stress

x: Psychological stress

Results:						
R	R ²	MSE	F	df1	df2	P
0.2267	0.1194	0.5936	10.211	1.00	69.00	0.002

The results of the relationship between physiological stress and psychological stress were explanatory and significant. The variable of psychological stress predicts 12% ($R^2 = 0.1194$) of physiological stress. This indicates that feeling tense, sad, and experiencing mood swings can affect physiological stress, manifesting as headaches, gastrointestinal discomfort, and lack of sleep, ultimately leading to diseases such as diabetes.

These results suggest that drivers lack the ability to cope with their psychological stress (Narváez et al. 2022), resulting in collateral damage to their psychosocial well-being and health.

Model 2

The working conditions are analyzed as a dependent variable and psychological stress as an independent variable, and the obtained results are presented below:

y: Working conditions

x: Psychological stress

Results:						
R	R ²	MSE	F	df1	df2	P
0.3395	0.1247	0.6936	11.876	10.00	75.00	0.002

The analysis maintains positive and significant explanatory effects with the “working conditions” variable. According to the results, psychological stress explains 12.5% of working conditions. These findings are consistent with previous studies that established how psychological problems caused by stress negatively affect the worker's environment, causing them to lose control over their job tasks (Rueda y Rojas, 2017). The effects of stress damage the work environment and atmosphere, creating an unsatisfied work environment (Narváez et al, 2022) and making it more complicated and hostile for the worker.

Model 3

The physiological stress was studied as the observable variable and the working conditions as the explanatory variable, resulting in the following model:

y: Physiological Stress

x: Working Conditions

Results:						
R	R ²	MSE	F	df1	df2	P
0.3395	0.0984	0.5412	10.587	10.00	63.00	0.001

The study found that working conditions have a positive and significant effect on physiological stress, although this relationship is less explanatory than the previous models, with a relationship of only 10%. However, previous literature indicates that factors such as work hours, duration of commutes, and perceived conflict related to handling cash can impact physiological stress (Bravo y Nazar, 2015). Therefore, it is important to maintain a safe work environment to reduce and prevent stress-related illnesses.

Model 4

y: Physiological stress

m: Working conditions

x: Psychological stress

Results:						
R	R ²	MSE	F	df1	df2	P
0.5205	0.2709	0.7488	13.7491	20.00	84.00	0.000

Finally, physiological stress is studied as the observable variable, psychological stress as the explanatory variable, and working conditions as the mediator variable, with a predictive effect of 27%, higher than the previous models. Working conditions act as a catalyst for both psychological and physiological stress, and its significance is intensified with the inclusion of this variable. This indicates that the drivers' perception of their stress level is influenced by their work environment and conditions.

The literature indicates that working conditions have a direct impact on both physical and mental health. For example, working more than 10-hour shifts and having to comply with this schedule leads to less rest, less sleep, and not being able to have adequate meal breaks, resulting in emotional and health imbalances. These effects are not only harmful to the driver but also pose a risk to the safety of the transportation system (Ledesma et al., 2017).

It is deemed significant to uphold better labor conditions to safeguard physical and mental health. The summarized results of moderated regressions are illustrated in Figure 2 below.

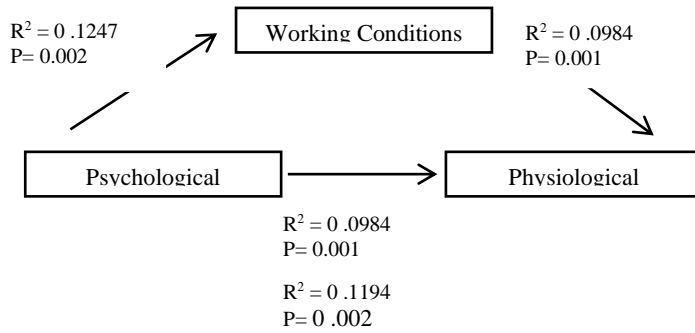


Figure 2 Results of the statistical mediation models
Source: Own elaboration

Conclusions

As mentioned in the literature, there is evidence that public transport drivers have unfavorable conditions in their work environment and surroundings, which represent a physical and psychological risk due to stress. The perceptions gathered in this study reveal that they feel exhausted, overwhelmed, and tired, suffer from nutritional imbalances, and experience headaches, as well as leg and back pain. These ailments can increase if working conditions are inadequate, such as being exposed to high temperatures for hours, noise exposure, or uncomfortable seating, for example.

The presented statistical results lead to the conclusion that the work environment has a significant mediating effect, which means that if the environment is not adequate, psychological and physiological stress may increase or, conversely, decrease, affecting the health of the workers. For instance, if the driver feels overwhelmed, worried, with gastrointestinal discomfort, and is working in a high-temperature environment and sitting for at least eight hours in a non-ergonomic seat, causing back pain, their health will deteriorate. On the other hand, if the work conditions are optimal, both psychological and physiological discomfort may decrease.

In contrast, it should be noted that the results of this study cannot be generalized to other geographic areas based on the sample of public drivers studied. This study is considered to be primarily caused by the working conditions in which the study participants labor. A particular condition of this geographic area is the extreme heat to which the subjects are exposed, especially during July and August.

Finally, it is vital to take corrective and preventive measures to protect both the physical and mental health of the public transport operators, as well as to improve their working conditions. It is significant to establish policies, training programs, and awareness-raising campaigns to educate about the negative effects of an unhealthy diet, smoking, and alcohol consumption, as well as the identification of psychosocial risks that may be prioritized, such as family relationships.

In future research, it would be possible to analyze the illnesses they suffer from, their diet, and the physical conditions in which they work and establish a link between the level of stress and working conditions.

Appendix 1

Survey

Dear driver:

The purpose of this instrument is to collect direct and valuable information regarding your working conditions and work environment. The information gathered will be used for a scientific study, and the results will serve as a basis for future research to benefit your health. Thus, you must answer all questions with complete freedom and honesty.

The information you provide will be kept entirely CONFIDENTIAL, so please do not write your name or any other information that may reveal your identity.

Please mark with an "X" the answers that you consider appropriate, and respond accordingly

THANK YOU FOR YOUR COOPERATION

GENERAL INFORMATION

1. Education level
Elementary..... Middle school..... High school..... Professional..... Other. Which one.....
2. Age
3. How long have you worked as a public transport bus operator?
1 to 3 years... 4 to 6 years. . 7 to 9 years. .
More than 10 years.

HERNÁNDEZ-ANGEL, Francisca, MEDINA-ALVAREZ, Juana Elizabeth and MENDEZ PEDRAZA, Francisco Javier. Statistical analysis of psychological and physiological stress in public transport drivers. Journal of Social Researches. 2023

4. Work Schedule:

 – Shifts: Daytime... Nighttime....
 Overtime.....

5. Time you have been driving this vehicle
 Less than a year..... 1 to 2 years

 2 to 4 years More than 4 years

Psychological stress

The following questions aim to understand how you have felt during the last month at work. Please answer all the questions by marking the response that best corresponds to your current work state.

	Never	Sometimes	Often	Always
1.- Have you had trouble sleeping due to worries?	1	2	3	4
2.- Have you constantly felt tense?	1	2	3	4
3.- Have you been able to concentrate effectively on your work?	1	2	3	4
4.- Have you felt that you are capable of handling daily life matters?	1	2	3	4
5.- Have you been able to face your problems?	1	2	3	4
6.- Have you felt capable of making decisions?	1	2	3	4
7.- Have you felt that you cannot solve your difficulties?	1	2	3	4
8.- Have you been reasonably happy, considering all the circumstances?	1	2	3	4
9.- Have you been able to enjoy your daily life activities?	1	2	3	4
10.- Have you felt sad and depressed?	1	2	3	4

Physiological stress

Next, you are asked to indicate how often you have experienced the following symptoms or discomfort in the last month. Please mark the column that best indicates how you felt.

Please answer the questions.

	Never	Sometimes	Often	Always
1.-Difficulty falling asleep.	1	2	3	4
2.-Difficulty staying asleep.	1	2	3	4
3.-Headaches.	1	2	3	4
4.-Loss of appetite.	1	2	3	4
5.-Increased appetite.	1	2	3	4
6.-You get tired easily.	1	2	3	4
7.-Stomach or digestive discomfort.	1	2	3	4
8.-It is hard for you to get up in the morning.	1	2	3	4
9.-Less capacity for work.	1	2	3	4
10.-You feel like you are choking or shortness of breath.	1	2	3	4
11.-Pain in the region of the neck, shoulders, or arms.	1	2	3	4
12.-Back or waist pain.	1	2	3	4

Working conditions

Indicate how often the following aspects of your work cause you discomfort or stress. Please mark the column that best describes your situation.

	Never	Sometimes	Often	Always
1.-Having to satisfy or answer to many people.	1	2	3	4
2.-Noise levels allow you to achieve the concentration required for your work	1	2	3	4
3.-The temperature of your workplace is comfortable	1	2	3	4
4.- Work clothing allows you to feel comfortable	1	2	3	4
5.-You consider your working hours adequate.	1	2	3	4
6.-You are comfortable with handling cash.	1	2	3	4
7.-Work is rushed by time and deadlines.	1	2	3	4
8.- The seat you use is considered comfortable by you	1	2	3	4
9.-Conflicts with coworkers.	1	2	3	4
10.- Conflicts with direct bosses or supervisors.	1	2	3	4

References

Arias-Meléndez, C., Comte-González, P., Donoso-Núñez, A., Gómez-Castro, G., Luengo-Martínez, C., y Morales-Ojeda, I. (2022). Condiciones de trabajo y estado de salud en conductores de transporte público: una revisión sistemática. *Medicina y Seguridad del Trabajo*, 67(265), 278–297. <https://doi.org/10.4321/s0465-546x2021000400004>

Bravo, C., y Nazar, G. (2015). Riesgo psicosocial en el trabajo y salud en conductores de locomoción colectiva urbana en Chile. *Salud de los Trabajadores*, 23(2), 105–114. https://ve.scielo.org/scielo.php?pid=S1315-01382015000200004&script=sci_arttext

García-Rubiano Monica y Forero-Aponte C. (2018). Estrés laboral y contrato psicológico como elementos Labor stress and psychological contract as relational elements of organizational change Introducción. *Diversitas: Perspectivas en Psicología*, 14(1), 149–162. <https://doi.org/10.15332/s1794-9998.2018.0001.11>

González, M., René, R., y Hernández, L. (2013). Estrés cotidiano en trabajadores del volante Workers daily stress in the wheel. *Summa Psicológica UST*, 10(1), 85-90. <https://doi.org/10.18774/448x.2013.10.39>

González Ramírez, M. T., & Hernández, R. L. (2006). Síntomas psicósomáticos y teoría transaccional del estrés. *Ansiedad y estrés*, 12(1). [chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.monica-gonzalez.com/2006%20teoria%20transaccional%20sx.pdf](https://www.monica-gonzalez.com/2006%20teoria%20transaccional%20sx.pdf)

Ledesma, R. D., Poó, F. M., Úngaro, J., López, S. S., Cirese, A. P., Enev, A., ... & Tosi, J. D. (2017). Trabajo y salud en conductores de taxis. *Ciencia & trabajo*, 19(59), 113-119.

Lim, T., Thompson, J., Tian, L. y Beck, B. (2023). Un modelo transaccional de estrés y afrontamiento aplicado a las experiencias subjetivas de ciclistas. Investigación sobre el transporte Parte F: Psicología y comportamiento del tráfico, 96, 155-170. <https://doi.org/10.1016/j.trf.2023.05.013>.

Liu, K., Jiao, Y., Du, C., Zhang, X., Chen, X., Xu, F. y Jiang, C. (2023). Detección del estrés del conductor mediante análisis HRV a muy corto plazo en condiciones de conducción del mundo real. *Entropía*, 25 (2), 194. <https://doi.org/10.3390/e25020194>

Narváez Chaves, A. D., Basante Pantoja, Y. M., Zambrano Guerrero, C. A., Hernández Narváez, E. de L., y Salas Ibarra, M. E. (2022). Nivel de riesgo de estrés en conductores del sector transporte público. *Psicología y Salud*, 32(2), 351–362.

<https://doi.org/10.25009/pys.v32i2.2755>

Navarrete Espinoza, E., Feliu Saavedra, N., y Bahamondes Valenzuela, G. (2017). Influencia de la Carga Organizacional y Trastornos del Sueño en la Accidentabilidad de Conductores de Camiones. *Ciencia y trabajo*, 19(59), 67–75.

<https://doi.org/10.4067/s0718-24492017000200067>

Rueda, L. R. B., & Rojas, A. I. G. (2017). Working conditions and psychosocial risks in public transport drivers. *Revista Cubana de Salud y Trabajo*, 18(2), 48-56.

<https://www.medigraphic.com/cgi-bin/new/resumenI.cgi?IDARTICULO=76877>

Sandín, B. (2003). El estrés : un análisis basado en el papel de los factores sociales. *International Journal of Clinical and Health Psychology*, 3, 141–157.

<https://www.redalyc.org/articulo.oa?id=33730109>

Sepúlveda Guerra, E. B., Valenzuela Suazo, S. V., y Rodríguez Campo, V. A. (2020). Condiciones laborales, salud y calidad de vida en conductores. *Revista Cuidarte*.

<https://doi.org/10.15649/cuidarte.1083>

Veloza, L., Jiménez, C., Qui, D., Polanía, F., y Rodríguez-trivi, L. C. P. C. Y. (2019). Variabilidad de la frecuencia cardiaca como factor predictor de las enfermedades cardiovasculares. *Revista Colombiana de Cardiología*, 26(4), 205–210.

<https://doi.org/10.1016/j.rccar.2019.01.006>