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RESEARCH ARTICLE

Measurement of Physical and Mental Workload in Onlline Ojek Drivers: A Case Study in Serang City

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Abstract
The development of online motorcycle taxi transportation has received a good response in the community. With this application, it makes it easier for people to order motorcycle taxis more practically. Many online motorcycle taxi drivers have complaints while working, one of which is the obligation to meet life's necessities which causes the physical and mental workload to increase. This study aims to measure the physical and mental workload of online motorcycle taxi drivers in Serang City. Data collection was carried out by measuring heart rate with a Polar H10 and filling out the NASA-TLX questionnaire which was distributed to online motorcycle taxi drivers who were willing to be respondents. Data processing starts from measuring heart rate, with an average %CVL value obtained of 40.08%. This value is included in the physical workload category that requires improvement. Mental workload data, calculated through the NASA-TLX method, averaged 74.20, which is classified as high. To alleviate these workloads, it's suggested to incorporate 90-minute break periods, redesign automatic motorcycles with extra footrests, use energy sprays, implement road congestion detection tools, enhance the quality of ride-hailing apps, and minimize exposure to heat stress.

Keywords
Physical and Mental Workload, Heart Rate Variability (HRV), Cardiovascular Load (CVL), NASA-TLX, Borg Scale (CR-10)

INTRODUCTION

In the industrial era 4.0, there has been an increase in the use of online platforms. Digital technology and automation are used to increase efficiency and productivity in the production and manufacturing fields. Machines, systems and devices will collaborate automatically and compete with each other through Industry 4.0. In this industrial era, many companies can optimize production performance, improve product quality, and meet customer needs effectively (Asnawi, 2022). One of the startups that is growing rapidly in Indonesia is the online motorcycle taxi platform where this company makes the trend of ordering motorcycle taxis, delivering goods, delivering food, medicine and other things easier. Based on existing data, online transportation such as online motorcycle taxis, online taxi services, food delivery, and others will increase by 22% in 2022. The transaction value obtained is USD 77 billion (Annur, 2022). In 2014 there were 95,906 cases of motor vehicle accidents (Elwindra & Dokolamo, 2021). As many as 64% of these accidents occurred on motorcycles including online motorcycle taxi drivers.

The general characteristics of online motorcycle taxi drivers are time flexibility, dependence on technology, safety risks, freedom in income, physical fatigue, and high stress levels. Based on research that has been conducted, the characteristics of online motorcycle taxi drivers in Jakarta are gender, age, educational background, driving experience, working hours and income.

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Interviews with 10 online motorcycle taxi drivers highlighted that their challenges include poor physical health, excessive drowsiness, body aches from prolonged sitting, and waist and shoulder pain during busy periods, leading to overall soreness. The need to provide for themselves and their families contributes to stress and mental strain. Other factors include the form of motorized vehicles, extreme weather, loads when there are passengers, and personal targets that must be achieved to meet life's needs, to the point of forgetting to rest, causing the physical condition to be more tired than usual.

The physical fatigue faced by online motorcycle taxi drivers can lead to severe accidents if not addressed promptly. Physical fatigue is caused by several factors including age, nutritional status, work period, workload, sleep time, and work duration (Belia & Handayani, 2018). According to data from Katadata Media Network, the number of traffic accident cases in the period January - 13 September 2022 is 94,600, this number continues to increase by 34.6% from the previous year (Kusnandar, 2022). Not only physical fatigue, mental fatigue is also one of the causes of human error where driver performance decreases when driving (Wahyuning, 2018).

Fatigue and drowsiness in drivers while driving are the main causes of road accidents (Rather et al., 2021). Fatigue can be classified into three main categories: active, passive, and sleep-related fatigue (May & Baldwin, 2009). Active fatigue is caused by strenuous work and the driver temporarily loses the ability to think. Passive fatigue is caused by tiring activities. Fatigue poses a significant risk in the transportation sector, particularly concerning driving performance, which must be addressed to prevent accidents involving tankers. However, previous studies have overlooked the examination of this issue within the oil and gas transportation sector (Nizam et al., 2020). This article suggests that driver distraction, such as cell phone use while driving, can increase the risk of a fatal crash or result in serious injury to teen drivers and their passengers. This study highlights the importance of awareness of driver distraction as a potential risk factor in traffic accidents (Neyens & Boyle, 2008). This article identifies several challenges in ADAS development and implementation, including difficulties in technology integration, system complexity, and the need for better standards. This article also reviews future trends in ADAS, such as the use of more advanced artificial intelligence, the development of more adaptive systems, and integration with autonomous vehicles. This research provides valuable insights for the automotive industry and researchers in developing more effective and safer ADAS in the future.

Several studies on motorcycle driver fatigue have been conducted. The results showed that the level of fatigue was found to be significant in both age categories (productive and adult age categories) (Muslim et al., 2015). In addition, in the adult age category, there is a significant influence between the level of fatigue and the level of concentration in motorcycle drivers. Most of the previous studies (83%) stated that riders perceived physical fatigue and postural discomfort as affecting performance and musculoskeletal symptoms (Ospina-Mateus & Quintana Jiménez, 2019). Several previous studies have not measured fatigue in online motorcycle drivers. This would be the novelty from this research.

Based on research conducted by Bramantyo and Pramono (2021), it is known that work in the external physical environment such as temperature, noise and lighting will be at risk of experiencing fatigue while working. In this research, it was found that there was an unsafe work environment, namely in the production section where the level of work fatigue that occurred was in the low to medium category. Where the results obtained 81.81% experienced mild levels of fatigue and 18.18% experienced moderate levels of fatigue on PT production floor work. Marabunta Works Ceperindo (Bramantyo & Pramono, 2021).

Based on the background above, this research was conducted to measure physical and mental workload problems in online motorcycle taxi drivers using the NASA-TLX measurement method and the Borg Scale. This aims to design a work system that effectively reduces the driver's level of physical and mental fatigue and increases their performance (Septiansyah et al., 2021). It's expected this research can help optimize the physical and mental health of online motorcycle taxi drivers.

MATERIALS AND METHODS

Research Model

The initial steps taken in the research were field observation and literature study. Field

observations were carried out directly to determine the physical and mental fatigue factors experienced by online motorcycle taxi drivers in Serang City. The observation location is located around SMPN 15 Serang City and under the McDonald's crossing bridge in Serang City. After the factors that cause fatigue at work were found, the next step was data collection for 10 online motorcycle taxi drivers. The data taken comes from heart rate when doing work and filling out the NASA-TLX questionnaire. The questionnaire contains data on measuring mental workload by giving a rating on a scale of 1-100 and a comparison between the two mental load indicators where the choice falls on the one that feels most dominant when working.

Data Collection Tools

Personal information form, personal interview, and mental data workload measurement questionnaire with NASA-TLX as data collection tools.

Personal Information Form

Participants were asked to fill in a 7-item personal information form about personal characteristics (age, cogniteal disease, smoking habit, exercise habit, caffein consumption, and food consumed).

After collecting data from heart rate and filling out the questionnaire, the next step is calculating heart rate using the Heart Rate Variability (HRV) method using Kubios software and Cardiovascular Load (CVL) to determine the percentage of perceived workload. To collect heart rate data, use the Polar Heart Rate (Polar H10) tool which is measured for 90 minutes while doing work. Physical workload was also assessed using the Borg Scale (CR-10) subjectively on the intensity of fatigue during physical activity. This scale is commonly used for exercise research, physical fitness testing, and other physical activity monitoring. The steps taken by researchers to obtain all research needs include conducting a literature study containing theories that support research in processing data. The theories used are obtained from books, references, research articles, news and other sources. Where this theory is related to the method used in this research, namely NASA-TLX and the Borg Scale method (CR-10). After the literature study is carried out, the next step is field observation of the object to be researched, namely online motorcycle taxi drivers who carry passengers, deliver goods and deliver food to obtain information about existing problems.

The data taken was a questionnaire distributed to 10 respondents during working hours. Data was obtained from online motorcycle taxi drivers who received orders from customers ordering trips or ordering food. The demographic data can be seen in Table 1. Online motorcycle taxi drivers smoke an average of 3 cigarettes per day. In addition, 60% consume caffeine. Exercise habit is 16 minutes per week.

Table 1. Training program

Weeks	Training Name	Number Of Training (week)	Training Duration (minutes)	Resting Time	Heart rate interval (beats/min)		
					Low 120-140 beats/min	Medium 140-160 beats/min	High 160-180 beats/min
1. week	Compliance training	2-3	15-20	3-5 min/30 sec	*		
2.week		2-3	15-20	3-5 min/30 sec	*		
3. week		2-3	15-20	3-5 min/30 sec	*		
4. week		2-3	30-40	3-7 min/30 sec	*	*	
5. week	Zumba exercise program	3	30-40	3-7 min/30 sec	*	*	
6. week		3	30-40	3-7 min/30 sec	*	*	
7.week		3	50-60	3-10 min/30-60 sec	*	*	*
8.week		3	50-60	3-10 min/30-60 sec	*	*	*

*1st, 2nd and 3rd week of 8 weeks exercise duration = 20 min. Zumba exercise
*3rd, 4th and 5th week of 8 weeks exercise duration = 40 min. Zumba exercise
***7th and 8th week of 8 weeks exercise time = 60 min. Zumba exercise**

RESULTS

Heart rate variability data was obtained from calculations using the Polar H10 device which was connected to the Polar Flow application. After the data is collected from using the Polar H10 tool, the data is then extracted into a CSV file which will produce a Microsoft Excel file output. Before being entered into the Kubios software, the existing file format is converted to text (MS-DOS). Table 2 is an example of a data processing graph for RMSSD, pNN50, LF, HF, and LF/HF from an online motorcycle taxi driver. The data included in the calculation above is an example from respondent 1. Starting from determining the maximum pulse rate obtained from subtracting the maximum pulse value for men and age with a result of 177 beats/minute.

Where respondent 1 is 43 years old with a working pulse of 114 bpm, and a resting pulse of 61 bpm, which produces a %CVL value of 45.7%. From all the calculations that have been done. The average CVL percentage obtained is 40.08%. Based on the average results obtained, this value falls into the category of requiring improvement, even though it is not urgent. This physical fatigue can be tested further using the NASA-TLX questionnaire by considering the mental workload experienced by the respondent for more precise results.

After the physical workload calculation is complete, the next calculation is mental workload using the NASA-TLX method. The six indicators used are mental demand (MD), physical demand (PD), temporal demand (TD), performance (OP), effort (EF), and frustration (FR). In this method the calculation starts with the aspect comparison value and ends with the category of value level obtained. After carrying out comparative calculations of 15 pairs of indicators, the next step is to calculate the product value.

Table 1. Score LF/HF

Variable	Units	VLF	LF	HF
Frequency band	(Hz)	0.00-0.04	0.04-0.15	0.15-0.40
Peak frequency	(Hz)	0.030	0.083	0.167
Power	(ms^2)	0	4	2
Power	(log)	0.000	1.379	0.824
Power	%	2.57	61.88	35.52
Power	(n.u.)		63.51	36.46
Total Power	(ms^2)	6		
Total Power	(log)	1.859		
LF/HF ratio		1.742		
RESP	(Hz)			

The product value is calculated by multiplying the weight and rating chosen by the respondent when filling out the questionnaire. After the weight and rating calculations are complete, the next step is to calculate the average WWL which aims to get a value for each mental workload indicator. Where the total product value is divided by 15. The calculation in Table 3 shows an example from respondent 1 where the total product value is 1170 categorized into the high load work group. The Borg scale is used to subjectively measure a person's level of perception during physical activity. The Borg Category Ratio (CR-10) scale is an improvement on the RPE scale where the rating used is 1 to 10. The assessment used for online motorcycle taxi drivers on this scale is before and after receiving an order. The resulting value is based on the question of how heavy the physical workload is experienced by the driver before doing the work and after doing the work. In all respondents it can be seen that there is an increase in the perception of fatigue (Figure 1).

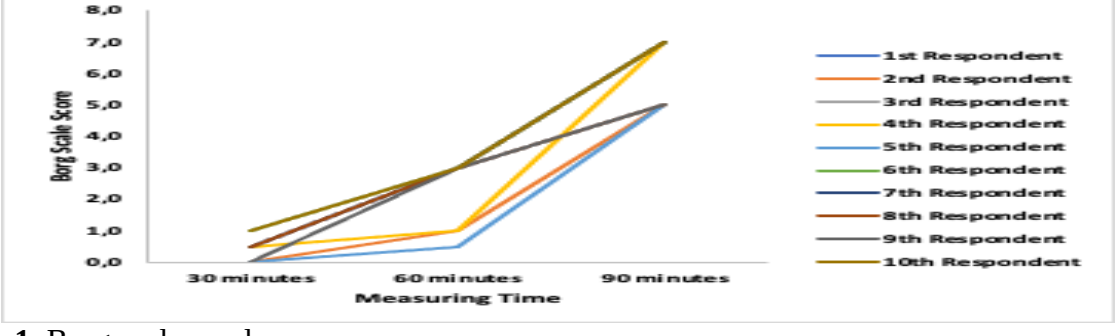

Figure 1. Borg scale resul

Figure 2. Extra footstep

Table 2. Recapitulation score WWL and finale score NASA-TLX

No	Dimensions	Respondent										Average
		1	2	3	4	5	6	7	8	9	10	
1	MD	320	70	360	0	120	225	150	165	150	135	
2	PD	200	320	300	240	195	340	340	340	255	340	
3	TD	90	400	360	220	180	60	140	160	120	70	
4	OP	90	240	0	240	0	255	240	130	225	130	
5	FR	200	0	300	65	180	70	170	80	65	40	
6	EF	270	160	100	210	85	240	140	240	320	280	
WWL (Rating X Weight)		1170	1190	1420	975	760	1190	1180	1115	1135	995	1113
Finale Score NASA-TLX		78	79,33	94,67	65,00	50,67	79,33	78,67	74,33	75,67	66,33	74,20

Tabel 3. Recapitulation rest time

Respondent	Rest Time (Minute)
1	5,79
2	6,23
3	12,79
4	17,31
5	28,69
6	18,42
7	39,88
8	12,38
9	9,73
10	11,52

Figure 3. Congestion detector prototype

DISCUSSION

Measurement Of Physical Workload

The output obtained from data processing using Kubios and Cardiovascular Load (CVL) software id that online motorcycle taxi drivers who were respondents in this study experienced physical fatigue. Heart rate while working greatly influences the value of the CVL percentage for each individual. If the heart rate is low, the physical fatigue experienced will also be low, conversely, if the heart rate is high, the physical fatigue experienced by online motorcycle taxi drivers will be higher (Klein et al., 2017).

In data processing, it was found that the average percentage of CVL was 42.02% with 9 respondents experiencing physical fatigue and 1 respondent not experiencing physical fatigue while working. The level of workload experienced by Grab riders in Mubarok (2023) used the CVL method with a CVL percentage result of 31% which shows that improvements are needed even though they are not urgent and there are proposals to reduce their physical workload, namely improving the quality of the Grab application, implementing time policies. maximum, and transparency for the driver (Rissa Hanny & Fahrizal, 2021).

Based on data processing using ratings from the Borg scale (CR-10), the level of physical fatigue experienced by 10 online motorcycle taxi drivers always increases. The resulting value is obtained through questions asked to respondents every 30 minutes. Online motorcycle taxi drivers who carry passengers and deliver food experience different levels of physical fatigue. Online motorcycle taxi drivers who carry passengers tend to be more tired because each passenger has a different weight and the distance traveled is uncertain. Meanwhile, the physical fatigue of online motorcycle taxi drivers carrying food is lower because of the waiting time which can be a temporary rest period while waiting for the ordered food to be ready.

Measurement Of Mental Workload

Heart Rate Variability (HRV) is used to objectively measure the mental workload experienced by each individual. From the processing of HRV data obtained using Kubios software, all respondents of online motorcycle taxi drivers who carry passengers and deliver food are in the range of values that are still reasonable for their mental fatigue. Based on research conducted by Guspriyadi et al (2014), the results of the average mental workload for respondents were the largest, namely 800.5 ms. The cause of fatigue occurs because the travel time on duty is 5 hours, carrying out duty at night, and being physically unfit leads to a decreased mental condition (Chadijah et al., 2019).

The study showed that workload and work stress variables have a partially significant negative effect on the performance of employees of online motorcycle taxi drivers (Grab, Maxim, and Gojek) in the Semarang City area (Purnomo & Waluyo, 2023). Results from other studies showed that workload has no significant effect on driver performance; commitment has a significant effect on driver performance; and workload and commitment have a significant effect on driver performance simultaneously (Hartono, 2023). This study concluded that factors that have a relationship with the work stress of online motorcycle taxi drivers are age, gender, marital status, and workload. While the interpersonal relationship variable has no relationship (Biella et al., 2023).

The mental fatigue experienced by online motorcycle taxi drivers who carry passengers (and deliver food is in the high category. The mental fatigue experienced is caused by the increasing number of competitors among online motorcycle taxi drivers with various cheaper platforms, the increase in the use of motorized vehicles by each individual, and the decreasing account rating which has resulted in a lack of customers for some people. This has a big impact on drivers' stress levels due to the demands they have to fulfill their individual life needs (Prabaswari et al., 2020).

This high mental fatigue score can also cause your physical condition to decline, because the lack of customers makes you feel weak and uninspired. Meanwhile, research conducted by (Hutabarat, et al (2023) on Gojek drivers in Surakarta City resulted in a mental workload score of 76.9 with the highest indicator value being the level of frustration caused by demands for fulfilling points, low number of incoming orders, and severe traffic jams. The results of this study and several previous studies show that mental workload is related to fatigue and performance of online motorcycle taxi drivers. Therefore, in addition to physical workload, mental also needs to be a concern for stakeholders.

Improvement Suggestions

Based on physical workload calculations using cardiovascular load (CVL), the results obtained were an average percentage of CVL of 42.02%. This percentage falls into the category of need for improvement, even though it is not urgent. And from the results of increasing the rating on the Borg scale (CR-10) fatigue. In order to reduce the level of physical workload experienced, there are improvement efforts for online motorcycle taxi drivers. The following are the proposed improvements:

Adding extra footstep for drivers who use automatic motorbikes which is useful for reducing leg fatigue as in Figure 2.

Calculate the total rest time while working. The following in Table 4 is an example of calculating rest time using a physiological approach (Handika et al., 2020).

Using sprayable energy discovered by a United States biochemist to reduce drowsiness (Siswanto & Tesavrita, 2015).

Based on research conducted on intercity bus drivers, a proposal to reduce mental workload is for companies to facilitate GPS or traffic jam detection devices (Maulana, 2019).

Conclusion

The physical fatigue that online motorcycle taxi drivers endure increases every 90 minutes as a result of several factors such as age, cigarette usage, weather, and the volume of incoming orders. The category of mental burden is high. Calculating working breaks, offering more steps to alleviate leg tiredness, enabling traffic-signal detecting devices, enhancing application quality, and minimising exposure to heat stress while at rest are some of the suggested enhancements. Additional investigation is required to develop a work structure that can reduce drivers' physical and mental load.

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Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics Statement

This study is approved by the Universitas Serang Raya Ethics Committee (Approval Number: 02/KEPK/X/2023).

Author Contributions

Study Design, WK, AM, AN, Data Collection, AM; Statistical Analysis, AM and AN; Data Interpretation, AM and WK; Manuscript Preparation, WK, AM, AN; Literature Search, WK, AM, AN. All authors have read and agreed to the published version of the manuscript.

REFERENCES

Annur, C. M. (2022). Nilai Transaksi Ojek Online di Indonesia Diproyeksi Sebesar Rp 124 Triliun pada 2022. Katadata Media Network.

Asnawi, A. (2022). Kesiapan Indonesia Membangun Ekonomi Digital Di Era Revolusi Industri 4.0. *Jurnal Ilmiah Indonesia, 7*(1), 398. [CrossRef]

Belia, R. & Handayani, P. (2018). Faktor-Faktor Yang Mempengaruhi Kelelahan Kerja Pada Pengemudi Bus Primajasa Trayek Balaraja–Kampung Rambutan. Health Publica: *Jurnal Kesehatan Masyarakat 1*(01), 44-51.

Biella, S., Latifah, N. & Fajrini, F. (2023). Factors Related to Work Stress in The Online Motorcycle Taxis Driver Community in Depok City in 2022. *Muhammadiyah International Public Health and Medicine Proceeding*, *3*(1), 318–323. [CrossRef]

Bramantyo, M. F., & Nugroho, S. W. (2023). Analisis Faktor-Faktor Penyebab Kelelahan Kerja dengan Metode Subjective Self Rating Test (SSRT) (Studi Kasus: Pekerja Bagian Lantai Produksi PT. Marabutana Berkaya Ceperindo). Industrial Engineering Online Journal, 12(1).

Chadijah, D. I., Wijaya, M., & Soemanto, R. B. (2019). Industrial Relations between Ojek Online Drivers with PT. Gojek Indonesia Branch Of Surakarta. *Journal of Islamic World and Politics*, *3*(2). [CrossRef]

Elwindra, E., & Dokolamo, S. (2021). Faktor-Faktor yang Berhubungan dengan Kelelahan Kerja pada Pengemudi Ojek Online di Jakarta Timur Tahun 2020. Jurnal Persada Husada Indonesia, 8(29), 24–29. [CrossRef]

Neyens, D. M., & Boyle, L. N. (2008). The influence of driver distraction on the severity of injuries sustained by teenage drivers and their passengers. Accident Analysis & Prevention, 40(1), 254–259. [CrossRef]

Guspriyadi, D., Wahyuning, C. S., & Yuniar, Y. (2014). Analisis tingkat stres dan tingkat kelelahan masinis berdasarkan heart rate variability. Reka Integra, 2(2).

Handika, F. S., Yuslistyari, E. I., & Hidayatullah, M. (2020). Analisis Beban Kerja Fisik Dan Mental Operator Produksi Di Pd. Mitra Sari. Jurnal Intent: *Jurnal Industri Dan Teknologi Terpadu, 3*(2), 82–89. [CrossRef]

Hartono, H. (2023). The Effect of Workload and Commitment on Online Motorcycle Taxi Drivers' Performance. Jurnal Ilmu Manajemen Advantage, 7(1), 70–78. [CrossRef]

Hutabarat, J., Pradana, J. A., Achmadi, F., & Lestarining Basuki, D. W. (2023). Micro Ergonomics: the Influence of Human Characteristics Towards Mental Workload Among Online Motorcycle Ojek Drivers. *International Journal of Manufacturing Economics and Management*, *3*(1), 6–16.

Klein, H. H., Sechtem, U., & Trappe, H.-J. (2017). Fitness to Drive in Cardiovascular Disease. Deutsches Ärzteblatt International, *114*(41), 692–701. [CrossRef]

Kusnandar, V. B. (2023). Kecelakaan Lalu Lintas Meningkat, Capai 94 Ribu Kasus Sampai September 2022. Dipetik dari databoks. katadata. co. id: https://databoks. katadata. co. id/datapublish/2022/11/22/kecelakaan-lalu-lintas-meningkat-capai-94-ribu-kasus-sampai-september-2022 diakses pada tanggal, 7.

Maulana, A. F. (2019). Pengukuran Beban Kerja Mental Sopir Bus Menggunakan Metode Swat (Studi Kasus Di PO. XYZ). Jurnal Valtech, 2(2), 8-13.

May, J. F., & Baldwin, C. L. (2009). Driver fatigue: The importance of identifying causal factors of fatigue when considering detection and countermeasure technologies. *Transportation Research Part F: Traffic Psychology and Behaviour*, *12*(3), 218–224. [CrossRef]

Mubarok, M. Z., & Rusindiyanto, R. (2023). Analisis Beban Kerja Fisik Dan Mental Terhadap Rider Grab Menggunakan Metode Cardiovascular Load (CVL) Dan Subjective Workload Assesment Technique (SWAT)(Studi Kasus: Rider Grab Domisili Kelurahan Balas Klumprik Kecamatan Wiyung). Jurnal Ilmiah Dan Karya Mahasiswa, 1(3), 213-228.

Muslim, E., Nurtjahyo Moch, B., Arlini Puspasari, M., & Alfredo Siregar, R. (2015). Fatigue Measurement of Driving Activity on Male Motorcycle Drivers based on Cognitive, *Physiological, and Subjective Approaches. International Journal of Technology*, *6*(6), 976.

Nizam, A., Isha, S., Mohammed, G., & Naji, A. (2020). The Relationship Between Fatigue and Driving Performance: a Review and Directions for Future Research. *Journal of Critical Reviews*, *7*(14). [CrossRef]

Ospina-Mateus, H., & Quintana Jiménez, L. A. (2019). Understanding the impact of physical fatigue and postural comfort experienced during motorcycling: A systematic review. Journal of Transport & Health, 12, 290–318. [CrossRef]

Prabaswari, A. D., Hamid, A. N., & Purnomo, H. (2020). The mental workload analysis of gojek drivers. IOP Conference Series: Materials Science and Engineering, 722(1), 012008. [CrossRef]

Purnomo, A. M., & Waluyo, D. E. (2023). The Influence of Workload and Job Stress on the Performance of Online Motorcycle Taxi Drivers (Grab, Maxim, and Gojek) in the Semarang City Area. ProBisnis: Jurnal Manajemen, 14(6), 498-506.

Rather, A. A., Ahmed Sofi, T., & Mukhtar, N. (2021). A Survey on Fatigue and Drowsiness Detection Techniques in Driving. 2021 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS). [CrossRef]

Rissa Hanny, & Fahrizal. (2021). Prediction of Online Customer Satisfaction: A Case Study Go-Ride in Jabodetabek. Jurnal Ekonomi & Bisnis JAGADITHA, 8(1), 39–47. [CrossRef]

Septiansyah, A. T., Fitriani, R., & Nugraha, B. (2021). Mental Work Load Analysis Melalui National Aeronautics and Space Administration (Nasa)-Task Load Index (Tlx). Jurnal Sains Dan Teknologi: Jurnal Keilmuan Dan Aplikasi Teknologi Industri, 21(2), 282.

Siswanto, D., & Tesavrita, C. (2015). Evaluasi Kelelahan Dan Tingkat Stres Pengemudi Travel Dan Masinis Kereta Api Berdasarkan Pengukuran Tingkat Kantuk Dan Denyut Jantung. Research Report-Engineering Science, 2.

Wahyuning, C. S. (2018). Studi Kelayakaan Perancangan Instrumen Pengukuran Readiness Level Berdasarkan Kelelahan Fisik dan Mental. 42–48.