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ORIGINAL ARTICLE

Factors Related to Traffic Accidents among Online Motorcycle Taxi Riders in Bekasi

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ABSTRACT

Introduction: Online motorcycle taxi riders in Bekasi are at risk of traffic accidents, with unknown contributing factors. This study aims to determine the factors associated with these traffic accidents. **Methods:** This quantitative study was conducted using a cross-sectional method with a sample size of 178 riders selected through accidental sampling. Data collection was carried out from April to May 2022 by surveying riders along the road in Bekasi. The dependent variable was traffic accidents, while the independent variables included characteristics of riders, safety riding behavior, work stress, and sleep quality. Data were collected by distributing questionnaires. Analysis was carried out using the Chi-squared test and binary logistic regression. **Results:** This study found a correlation between the incidence of traffic accidents among online riders and sex, age, and safety riding behavior. However, factors such as education level, duration of work, period of work, knowledge of safety riding, perception of safety riding, work stress, and sleep quality were not related to traffic accidents. **Conclusion:** Factors such as sex, age, and safety riding behavior were found to be related to the incidence of traffic accidents among online riders. Therefore, to reduce the death rate, it is recommended that riders, especially female and young riders, prioritize safety driving behavior.

Keywords: online motorcycle taxi rider, safety riding behavior, traffic accidents

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INTRODUCTION

The increasing use of the internet among communities in this digitalization era has led to the rise of online-based transportation tools. These tools offer various alternatives to consumers, providing good service, affordability, fixed and relatively cheaper prices, and easy access (Nasution, Erwin and Bartuska, 2020). However, the increasing rate has brought about various dangerous risks for online motorcycle taxi riders, such as traffic accidents.

According to the World Health Organization (WHO), approximately 1.19 million people die annually from road traffic accidents globally, with 20 million people sustaining non-fatal injuries (WHO, 2023). Traffic accidents are the leading cause of death for children and young adults aged between 5 and 29 years (WHO, 2023). In Indonesia, 25,138 cases were reported in 2022, resulting in 3,706 deaths (Putri, 2023).

According to a report from the Indonesian Ministry of Transportation, 79% of online motorcycle taxi riders experienced traffic accidents in 2017 (Pratama and Koesyanto, 2020). Meanwhile, the number of accidents in Bekasi City was reported to increase from 783 incidents in 2022 to 1,048 in 2023 (Bekasi, 2023). The causes of work-related accidents among online riders are observed from the perception of workers based on the low level of practices, procedures, and policies associated with occupational safety and health (Napitu, Wahyuni and Kurniawan, 2020).

The main causes of traffic accidents include environmental traffic, vehicular, and human factors (Bucsuházy *et al*., 2020). Human factors can be categorized into predisposing (age, gender, education

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level, duration of work, period of work, knowledge, and perceptions), enabling (motorcycle conditions, presence of safety apparel, and participation in safety riding training), and reinforcing (peer role) factors (Manurung, Sitorus, and Rinaldi, 2019).

Setyorini, Umiyati and Djajasinga (2019) conducted a study on safe riding among riders in Bekasi with an age range of 21-30 years and a working period of 1-6 months. The results showed common traffic violations, including speeding (90%), consulting the global positioning system (GPS) while riding (90%), sudden braking (90%), disregarding stop lines (80%), and signs (60%).

Traffic accidents among riders can be prevented through the intervention of risk factors. Therefore, this study aims to determine the factors associated with traffic accidents among online motorcycle taxi riders in Bekasi.

METHODS

This quantitative study was carried out using a cross-sectional design. The subjects included online motorcycle taxi riders in Bekasi, West Java Province. The inclusion criteria were online motorcycle taxi riders who had worked for a minimum of one year and had an online motorcycle taxi rider account. Meanwhile, the exclusion criteria were riders unwilling to participate.

A total number of 178 samples were included in this study. The sample size was calculated using the WHO sample size software 2.0 based on the hypothesis difference of two proportions. Based on the tolerable error of 5% with 95% research power, the proportion of riders who had experienced work accidents with unsafe behavior (P1) was found to be 76.9%. Meanwhile, 50% of riders experienced work accidents with safe behavior (P2) (Tanriono, Doda and Manampiring, 2019).

Data were collected using questionnaires from April to May 2022 from online motorcycle taxi riders around the streets of Bekasi City. The data collected consisted of the characteristics of riders, safety riding behavior, work stress, and sleep quality.

The data on traffic accidents and safety riding were measured using a questionnaire adapted from Rupman and Srisantyorini (2021). Meanwhile, the data on work stress were measured using a questionnaire adapted from Runtulalo, Areros and Sambul (2020). The data on sleep quality were measured using the Pittsburgh Sleep Quality Index (PSQI) questionnaire from Zulkarnain, Setyowati and Sultan (2022).

The questionnaires were tested for validity with the Pearson's correlation test and reliability with the Cronbach's alpha test. All questions were deemed valid and reliable based on the calculated r value of 0.361. The safety riding knowledge questionnaire had a validity test result of 0.966 and a reliability test result of 0.855. However, the validity test result for the safety riding perception questionnaire was 0.870 and the reliability test result was 0.742 (Wahyuningsih and Ramdana, 2021). In addition, the validity test result of the traffic accidents questionnaire was 0.855 and the reliability test result was 0.635 (Rupman and Srisantyorini, 2021). Moreover, the validity test result of the work stress questionnaire was 0.635 and the reliability test result was 0.893 (Runtulalo, Areros and Sambul, 2020). Finally, the reliability of the Pittsburgh Sleep Quality Index (PSQI) was 0.83 (Zulkarnain, Setyowati and Sultan, 2022).

Age was categorized into old (≥30 years old) and young (<30 years old), while sex was grouped into male and female. Education level was categorized into secondary/higher education (high school and college) and low education, ranging from no school, elementary, to junior high school. Work duration was categorized into eight hours or less and more than eight hours. Work period was classified into more than five years and five years or less (Rupman and Srisantyorini, 2021). Safety riding knowledge was grouped into high ($X \geq 100$) and low ($X < 100$), where X was calculated using the correct score formula divided by 13 times 100% (Rupman and Srisantyorini, 2021).

Furthermore, safety riding perception was categorized into positive ($X > 33$) and negative ($X \leq 33$). Meanwhile, safety riding behavior was categorized into unsafe ($X \leq 78$) and safe ($X > 78$) (Rupman and Srisantyorini, 2021). Work stress was grouped into not stressful ($X < 32$) and stressful ($X \geq 32$) (Runtulalo, Areros and Sambul, 2020), while sleep quality was categorized into good ($X \leq 5$) and poor ($X > 5$) (Zulkarnain, Setyowati and Sultan, 2022). Traffic accident data refers to the occurrence of accidents over the past year while working as online motorcycle taxi riders. Therefore, riders who have experienced a minimum of one traffic accident were categorized as "ever", while those who have not experienced accidents while working as online motorcycle taxi riders were categorized as "never" (Rupman and Srisantyorini, 2021).

The data were analyzed using univariate, bivariate, and multivariate tests. The univariate test was used to determine the proportion of traffic accidents among online riders. The Chi-squared test was conducted to determine the difference in the proportion of traffic accidents based on the characteristics of safety riding, work stress, and sleep quality. Variables with p-values of less than 0.05 based on the results of the Chi-squared test were included in the logistic regression test. Subsequently, binary logistic regression test with the backward method was used to determine the variables associated with the incidence of traffic accidents. This study received ethical clearance from the Research and Development Ethics Committee of the Faculty of Medicine, Udayana University/ Sanglah Central General Hospital with a certificate number 1025/UN14.2.2.VII.14/LT/2022.

RESULTS

Table 1 shows that the majority of respondents were males (91.57%) and elderly (75.28%), with a higher level of education (85.96%), worked more than 8 hours (78.65%), with a period of five years or less (70.22%), had a high level of knowledge of safety riding (51.69%), but negative perception of safety riding (60.11%). The majority (59.55%) of the respondents had not experienced traffic accidents, while 51.69% engaged in unsafety riding behavior. The results also showed that 51.69% of the respondents experienced work-related stress, while 57.87% reported good sleep quality.

Table 2 shows that riders who have been involved in traffic accidents tend to exhibit unsafety riding behavior (59.78%), work-related stress (41.30%), poor sleep quality (44%), and are typically young (68.18%). Additionally, the majority of those involve in traffic accidents were females (86.67%), with a secondary/high level of education (41.83%), worked more than 8 hours (47.86%), with a period of five years or less (48%), had a low level of knowledge of safety riding (43.02%) and negative perception of safety riding (47.66%).

Table 3 shows that the incidence of traffic accidents among online riders is related to safety riding behavior (AOR = 5.89; 95% CI [2.736, 12.675]; p = 0.000), age (AOR = 5.54; 95% CI [2.433, 12.593]; p = 0.000), and sex (AOR = 24.35; 95% CI [4.716, 125.699]; p = 0.000).

DISCUSSION

The results showed that the incidence of traffic accidents among online motorcycle taxi riders was 40.45%, which was significantly lower compared to the incident rate in Tembalang, Semarang, which was 58.6% (Napitu, Wahyuni and Kurniawan, 2020). Furthermore, the incidence of traffic accidents was higher in community X in Tembalang at 79% (Joddy, Wahyuni and Kurniawan, 2022). The difference is

Table 1. The Proportion of Traffic Accidents, Respondent Characteristics, Safety Riding Behavior, Work Stress, and Sleep Quality

Characteristics	n = 178	%
Traffic accident		
Ever	72	40.45
Never	106	59.55
Age		
Older	134	75.28
Younger	44	24.72
Sex		
Male	163	91.57
Female	15	8.43
Level of Education		
High	153	85.96
Low	25	14.04
Duration of Work		
≤8 hours	38	21.35
>8 hours	140	78.65
Period of Work		
>5 years	53	29.78
≤5 years	125	70.22
Safety Riding Knowledge		
High	92	51.69
Low	86	48.31
Safety Riding Perception		
Positive	71	39.89
Negative	107	60.11
Safety Riding Behavior		
Safe	86	48.31
Unsafe	92	51.69
Work Stress		
Stressful	92	51.69
Not stressful	86	48.31
Sleep Quality		
Good	103	57.87
Poor	75	42.13

Source: Primary data (2022)

Table 2. The Proportion of Traffic Accidents Based on Respondent Characteristics, Safety Riding Behavior, Work Stress, and Sleep Quality

Variable	Traffic Accidents				OR	95% CI OR	p-value
	Ever		Never				
	n	%	n	%			
Safety Riding Behavior							
Safe	17	19.77	69	80.23	6.03	1.914-4.779	0.000
Unsafe	55	59.78	37	40.22			
Work Sress							
Stressful	38	41.30	54	58.70	1.08	0.731-1.493	0.810
Not stressful	34	39.53	52	60.47			
Sleep Quality							
Good	39	37.86	64	62.14	1.29	0.814-1.658	0.4102
Poor	33	44	42	56			
Age							
Old	42	31.34	92	68.66	4.69	1.577-3.001	0.0000
Young	30	68.18	14	31.82			
Sex							
Male	59	36.20	104	63.80	11.46	1.801-3.182	0.0001
Female	13	86.67	2	13.33			
Level of Education							
High	64	41.83	89	58.17	0.65	0.419-1.395	0.3532
Low	8	32	17	68			
Duration of Work							
≤8 hours	5	13.16	33	86.84	6.06	1.578-8.382	0.0001
>8 hours	67	47.86	73	52.14			
Period of Work							
>5 years	12	22.64	41	77.36	3.15	1.248-3.602	0.0016
≤5 years	60	48	65	52			
Safety Riding knowledge							
High	35	38.04	57	61.96	1.23	0.792-1.615	0.4987
Low	37	43.02	49	56.98			
Safety Riding Perception							
Positive	21	29.58	50	70.42	2.17	1.069-2.429	0.0161
Negative	51	47.66	56	52.34			

Source: Primary data (2022)

attributed to variations in the selection method and sample size. This study included 178 riders, but the analysis conducted in community X included 30 riders selected using the total sampling technique.

This study found a significant difference in the frequency of traffic accidents among riders. Specifically, 6.94% of riders experienced accidents three times or more, 26.39% experienced accidents twice, and 66.67% experienced accidents once. In terms of severity, 79.17% was classified as mild and 20.83% was classified as moderate. Mild accidents involved damage to the object/vehicle, while moderate accidents involved damage to the object/goods and minor injuries to riders.

This study showed that safety riding behavior among riders was correlated with traffic accidents. Riders with unsafety riding behavior were 5.89 times more susceptible to accidents. These findings are consistent with research in Manado City which found that riders who engaged in unsafe actions were more likely to experience accidents at work (Kairupan, Doda and Kairupan, 2019). However, a different study conducted in Manado found that safe riding behavior did not correlate with traffic

Table 3. Multivariate Analysis Results

Variable	Final Model		
	AOR	95% CI	P
Safety Riding Behavior			
Safe	5.89	2.736-12.675	0.000
Unsafe			
Age			
Old	5.54	2.433-12.593	0.000
Young			
Sex			
Male	24.35	4.716-125.699	0.000
Female			

Source: Primary data (2022)

accidents (Amak, Malonda and Kawatu, 2020). This difference was attributed to variations in the number of samples, data collection, and sampling method. This study collected a sample size of 178 people by distributing questionnaires using the accidental sampling method. In Manado, the number of samples was 80 people and the data were collected through interviews using the total sampling method (Amak, Malonda and Kawatu, 2020).

Furthermore, 59.78% of online motorcycle taxi riders who have experienced traffic accidents showed unsafe riding behavior, such as speeding, due to the need for prompt delivery. Additionally, some riders often use smartphones to access GPS for directions to the addresses or destinations of customers. Many riders do not use complete personal protective equipment (PPE) when riding, such as shoes, jackets, masks, and gloves, particularly during rainy weather (Solah *et al*., 2021; Septiari and Budiharti, 2022).

Another variable related to the incidence of traffic accidents was age. Specifically, young riders had a 5.54 times higher tendency to experience traffic accidents. Riders who have experienced accidents were more often young (68.18%). This phenomenon is attributed to negative attitudes towards the rules, leading to disobedience while driving (Adira and Satwika, 2022). Riders aged 30 years showed more careful behavior compared to those under 30 years (Deanty, Marisdayana and Mirsiyanto, 2022). Similarly, research conducted in West Sumba Police Resort in 2018 found that traffic accidents among motorcycle riders were related to age (Ngongo, Berek and Talahatu, 2019). Risky driving behavior among young riders was associated with ownership of a driving license, knowledge of traffic rules, and the presence of police officers as supervisors on the highway. Riders who did not have a driving license were more likely to exhibit bad behavior in traffic. Young riders with low knowledge of road markings also showed a higher chance of bad traffic behavior (Ningsih and Krishanandini, 2019). Other factors included sensation seeking, attitudes towards risky riders, and perceptions of risk when riding (Puspoprodjo, 2021).

In 2019, the Ministry of Health of Indonesia stated that the age over 30 years was included in the adult category. The characteristic of adulthood is the ability to solve problems maturely by considering the consequences of the actions taken. Adults tend to have more stable emotions and show maturity in their thinking patterns and attitudes compared to young people. Research conducted in Norway found that older riders were better able to adapt to overcoming challenges while riding (Robertsen *et al*., 2022). A study from Beni-Suef in South Egypt found that young people were more likely to engage in unsafe driving practices, such as not using seat belts, eating while driving, and driving while feeling drowsy. In contrast, mature riders show more cautious behavior, including fewer violations, errors, irregularities, and are less likely to drive while feeling drowsy (Arafa, Saleh and Senosy, 2020). Young riders had a higher level of perceived danger associated with negative emotions compared to older riders who showd positive emotions (Huo *et al*., 2022).

Sex was found to be a significant factor in the incidence of traffic accidents among riders in Bekasi. This finding is consistent with research conducted on PT X online motorcycle taxi riders in Semarang City, which also found a significant relationship between sex and traffic accidents. Female riders were 24.35 times more susceptible to experiencing traffic accidents compared to male riders (Rey-Merchán and López-Arquillos, 2021; Tarlochan, Ibrahim and Gaben, 2022). In this study, 13 out of 15 (86.6%) female riders have experienced traffic accidents due to work demands exceeding their physical abilities. The results showed that 60% of female riders had unsafety riding behavior. This phenomenon was also observed in the United States, where female riders showed unsafe driving behavior compared to males (Wu *et al*., 2018).

This study discovered that several variables were not related to traffic accidents, including work stress, sleep quality, education level, work duration, work period, and knowledge, and perception about safety riding. The difference in the results was due to the research method and variation in sample size.

Work-related stress was not related to the incidence of traffic accidents among riders. Meanwhile, research conducted in Tembalang, Semarang found that work stress was related to accidents among riders with a p-value of 0.012 (Napitu, Wahyuni and Kuniawan, 2020). Riders who experienced work-related stress were known to have a higher risk of fatigue (Manuel and Wirawan, 2020). According to data obtained from the National Highway Traffic Safety Administration, more than 100,000 accidents each year are related to fatigue (Kuntoro and Linggardini, 2020).

Sleep quality was not related to traffic accidents among riders. Similar research found that riders who showed symptoms of obstructive sleep quality were not significantly associated with the risk of accidents (Tanriono, Doda and Manampiring, 2019). However, a prospective cohort study yielded different results, indicating a relationship between sleep disturbances and a-few-hour sleep with accidents in two-wheeled vehicles with a p-value of 0.04 (Mulyono, 2019).

Education level was not related to traffic accidents among riders. Based on systematic reviews, education levels was not related to the incidence of traffic accidents (Akbari *et al*., 2021; Hareru *et al*., 2022). However, research conducted on app-based motorcycle taxis in Vietnam found that education had a significant correlation with traffic accidents (Nguyen-Phuoc *et al*, 2019).

Traffic accidents among riders were not associated with work duration. This result differed significantly from previous research, that found a relationship between the duration of work and accidents among riders (Meilani *et al*., 2019; Kuntoro and Linggardini, 2020; Oktavia, Widajati and Pramesti, 2022). In addition, the work period, which ranged from four to five years, was not related to traffic accidents among riders. The majority of riders experienced traffic accidents during the first five years of work. Furthermore, the incidence of traffic accidents among riders aged above 20 years in the Jatiwaringin area, East Jakarta, did not show any correlation with the period of work. Work accidents are more common in workers with a work period of seven to 12 years (Lupita, 2020). Different results were also found among PT X online motorcycle taxi riders in Semarang, where those with less than one year of experience were more likely to engage in traffic accidents (Pratama and Koesyanto, 2020).

Knowledge of safety riding did not have any correlation with traffic accidents among online motorcycle taxi riders. Similarly, no significant relationship was found between knowledge levels and safety behavior among online motorcycle taxi riders in Bogor Regency in 2020 (Azizah, 2016; Pratama and Koesyanto, 2020). Research on online-based two-wheeled transportation riders in Pekanbaru City found that knowledge about safe riding was significantly associated with a p-value of 0.000 (Ruzain, Herawati and Christofa, 2020)

The results showed that the perception of safety riding was not related to traffic accidents among riders. However, research conducted in Palembang City found a significant relationship between the perception of safety riding and traffic accidents (Berlicia and Camelia, 2023). This difference could be attributed to the distribution of positive and negative perceptions of safety riding among riders who have experienced an accident. This study found that 60.11% of riders had a positive perception of safety riding, while 38.89% had a negative perception. Additionally, 51 of 72 (70.8%) riders who experienced traffic accidents had a negative perception of safe riding.

Several efforts can be implemented to prevent and reduce accident rates among riders, including the promotion of safety driving by following traffic rules, maintaining a safe speed, and avoiding risky behavior, such as splitting lanes and trailing other vehicles. In addition, riders should overcome fatigue and drowsiness by taking regular breaks during long trips and avoid driving when tired or drowsy. Furthermore, riders are recommended to promote the use of protective equipment such as helmets, gloves, and jackets. Public awareness should also be increased to educate riders and other road users on the importance of safety as well as the challenges associated with riding a motorcycle (Yousif, Sadullah and Kassim, 2020; Board, 2024).

CONCLUSION

In conclusion, this study suggested that the incidence of traffic accidents among riders in Bekasi was relatively lower compared to other cities in Indonesia. Factors related to traffic accidents included safety riding behavior, sex, and age, while work stress, sleep quality, education level, duration of work, period of work, and knowledge of safety riding showed no significant relationship. Therefore, online motorcycle taxi companies are recommended to promote safe safety riding behavior among their members, particularly among female and young riders.

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