Daily Income Targets and Passenger Pressure on Safety Risky Riding Behavior Among Online Motorcycle Taxi Riders in Jakarta, Indonesia

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Abstract

Online motorcycle taxi riders, a vulnerable group on the road, are more susceptible to serious injury than non-motorcycle riders. This study analyzed a correlation between daily income targets, passenger pressure, risk perception, safety attitudes, and risky riding behavior. This cross-sectional study used a semi-quantitative approach by collecting online-based questionnaires from 500 online motorcycle taxi riders in Jakarta, and 50 of them were obtained through offline interviews. The findings revealed a significant relationship between daily income targets, passenger pressure, risk perception (danger level, stochastic evaluation, and safety priority), safety attitudes (pragmatic attitude to rule violations and dissatisfaction with traffic rules), and risky riding behavior, with a p-value of <0.05. In particular, a pragmatic attitude to rule violations was the most impactful on risky riding behavior. Online motorcycle taxi companies should provide regular training on traffic laws and safe riding practices to improve road safety. This holistic approach may enhance safety through education, passenger awareness, and rigorous management.

Keywords: daily income target, passenger pressure, risk riding behavior, risk perception, safety attitude

Introduction

Motorcycles are the most popular mode of transportation in Asian countries, particularly Southeast Asia.[1] The number of motorcycles in Indonesia ranks the third largest in Southeast Asia. Thailand holds the top position among the Southeast Asian countries for having the highest number of motorcycles, with 87% of Thai households owning at least one motorcycle, followed by Vietnam in the second place.[1] According to data from the Indonesian National Police, as of January 2, 2024, 83.51% of motorized vehicles used in Indonesia were motorcycles, totaling around 159 million units.[2] Data from the Statistics Indonesia of Special Capital Region of Jakarta Province website shows that transportation in Jakarta, the capital and business city of Indonesia, is dominated by 79% of motorcycles, amounting to approximately 21 million units in 2022.[3] Advances in smartphone technology and internet connectivity have driven significant improvements in the transportation sector, especially in developing countries, with the introduction of online motorcycle taxi-hailing applications. These applications enable customers to order the nearest motorcycle taxi through an online platform.[4] Online motorcycle taxi services are in great demand in Indonesia as they offer flexible, reliable, and cost-effective mobility.

However, this situation has major safety implications as motorcycle riders are considered a vulnerable group on the road. When involved in an accident, motorcycle riders are more likely to suffer serious injuries than non-motorcycle riders due to the lack of protection for the vehicle's structure.[5] Serious injuries, as defined in the Model Minimum Uniform Crash Criteria 4th Edition, encompasses any injury other than a fatal one that leads to one or more of the following conditions: severe laceration resulting in the exposure of underlying tissues, muscles, or organs or causing significant blood loss; broken or distorted extremity (arm or leg); crush injuries; suspected skull, chest, or abdominal injuries (excluding bruises or minor lacerations); significant burns (second and third-degree burns covering 10% or more of the body); unconsciousness at the crash scene; and paralysis.[6] The World Health Organization reports that traffic accidents result in the loss of 1.35 million lives annually, ranking it as the eighth cause of death worldwide.[7] In

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Indonesia, 74% of traffic accident-related deaths involve riders of two and three-wheeled motorcycles.[7] Based on the 2021 Statistics Indonesia of Special Capital Region of Jakarta Province report, a total of 4,507 motorcycle riders became traffic accident victims in Jakarta.[8]

Online motorcycle taxi services are also not immune from traffic accidents. Online motorcycle taxi riders are more susceptible to traffic accidents for more frequent rides compared to private motorcycle riders.[4] Furthermore, customers potentially influence the behaviors of online motorcycle taxi riders. Several studies from South Korea,[9] and China,[10] concluded that couriers often violated traffic rules to reach their destinations faster. A study involving 602 online motorcycle taxi riders in Vietnam indicated that 183 riders were involved in accidents, with 78.1% occurring due to risky riding behavior.[4] Another study on risky behavior among 328 motorcycle riders in Bali Province, Indonesia, revealed that 30% of riders often changed lanes to overtake other vehicles, almost 20% often ran red lights, and 10% of riders often engaged in distractions (using phones) while riding.[11]

Previous studies confirmed a correlation between risk perception, safety attitudes, and risky riding behavior. A study involving 621 riders in China showed that risk perception was significantly associated with risky riding behavior.[12] Riders with a higher level of risk perception were likely to avoid risky behaviors and took preventive measures against accidents, such as reducing vehicle speed.[13] Safety attitudes while riding are related to the riders' approaches to traffic rules and violation of the rules.[14]

In Indonesia, studies on riding behavior among motorcycle riders have been conducted in several provinces, such as Nanggroe Aceh Darussalam,[15] West Java,[16] Special Region of Yogyakarta,[16] East Java,[16] and Bali.[11] However, these studies did not specifically analyze which dimensions of risk perception and safety attitudes influence risky riding behavior. Additionally, most of them examined motorcycle riders (private motorcyclists), and only a few focused on those riders who use motorcycles for a living (e.g., online motorcycle taxi riders). Therefore, this study aimed to address these gaps through the following objectives: (1) to analyze a relationship between dimensions of risk perception (danger level, concern degree, stochastic evaluation, safety priority, and safety riding knowledge) and risky riding behavior among online motorcycle taxi riders in Jakarta in 2023; (2) to explicate a relationship between dimensions of safety attitudes (pragmatic attitudes to rule violations, attitudes to motorcyclist rule enforcement, and dissatisfaction with traffic rules) and risky riding behavior among online motorcycle taxi riders in Jakarta, 2023; and (3) to assess the influence of income targets and passenger pressure on the risky riding behavior among online motorcycle taxi riders in Jakarta in 2023. The study findings may assist the Special Capital Region of Jakarta provincial government in determining strategies to improve and enhance traffic safety, particularly among online motorcycle taxi riders while on the road.

Method

This cross-sectional semi-quantitative study took place in Jakarta from June to August 2023. The data were collected through online questionnaires distributed among the Jakarta online motorcycle taxi social media groups and offline interviews by approaching participants directly. The minimum sample size was calculated using the Lemeshow formula (Formula 1) to ensure accurate study findings.

The Lemeshow formula was used due to the absence of precise data on the exact number of online motorcycle taxi riders in Jakarta or Indonesia.[17] The minimum sample size required for this study based on the calculation was 384 samples. However, the questionnaires were distributed online to 500 online motorcycle taxi riders operating in Jakarta to ensure a more representative outcome, and 50 of them were interviewed offline. Before filling in the questionnaires, participants signed an informed consent form to confirm their conscious and voluntary participation in the survey.

The questionnaires were translated and tested for validity and reliability among online motorcycle taxi riders. The validity of questionnaire items was determined by comparing the calculated R with the tabulated R; if the calculated R more than the tabulated R, the item was considered valid. The calculated R ranged between 0.206 and 0.7211, while the tabulated R-value was 0.1966. The test results showed that all items had a composite reliability index value of Cronbach Alpha 0.907 (>0.6), indicating the questionnaire is reliable.

The respondent's identity questionnaire was applied to gather sociodemographic information. The Motorcycle Rider Behavior Questionnaire, modified by Chouchan et al.[18] was adopted to obtain information on risky riding behavior. This questionnaire comprises four dimensions: traffic errors, control errors, speed violations, and stunts. The

$$n = \frac{z_{1-\alpha/2}^2 P\,(1-P)}{d^2}$$

$$Range = \frac{Maximum\ value - Minimum\ value}{2}$$

Formula 1. Lemeshow Formula for the Minimum Sample Size Calculation

Formula 2. Categorizing of Likert Scale Response Formula

Motorcycle Rider Behavior Questionnaire comprises a total of 32 items, with responses rated on a 4-point Likert scale: never (1), rarely (2), often (3), and always (4). The Riding Risk Perception Questionnaire, adapted from Wang et al.[17] consists of three dimensions: danger level, concern degree, and stochastic evaluation. The questionnaire included two additional dimensions: safety priority and safety riding knowledge.

The safety priority dimension comprises three items related to how daily income targets and passenger pressure influence the rider's safety priorities.[10,19] The safety riding knowledge dimension is structured based on literature review findings, resulting in two items related to either online motorcycle taxi riders receiving training on safe riding practices from the online taxi service providers or perhaps learning some riding principles through mass media.[20] The questionnaire consists of 16 items, with responses rated on a 4-point Likert scale ranging from strongly disagree (1), disagree (2), agree (3), to strongly agree (4).

The Safety Attitudes Questionnaire was adapted from the study by Kummeneje and Rundmo,[14] comprising three dimensions: pragmatic attitudes to rule violations, attitudes to motorcyclist rule enforcement, and dissatisfaction with traffic rules. The questionnaire consists of a total of 9 items. Responses to the questionnaire are rated on a 4-point Likert scale ranging from strongly disagree (1), disagree (2), agree (3), to strongly agree (4).

This study used a structured approach for data analysis. Univariate analysis was performed to explore each variable's data distribution and frequency. A bivariate analysis was conducted using a Chi-square test to determine the relationship between the variables. Data recording was done using median data. A simple approach was adopted to categorize Likert scale responses (Formula 2).

After calculating the maximum and minimum values on the Likert scale, a range of 2.5 was obtained, which can be interpreted as the boundary between the respondents' answers on a Likert scale. The analysis then used multiple linear regression with risky behavior as the dependent variable and risk perception, safety attitudes, income targets, and passenger pressure as independent variables. The aim was to comprehend the factors influencing risky behaviors among motorcycle taxi riders in Jakarta.

Results

Results of the study, derived from 500 online motorcycle taxi riders as respondents, provide an overview of the distribution of individual characteristics (such as sex, education, age, motorcycle type, motorcycle riding experience, and work period), risk perception, safety attitude, and risky riding behavior, as shown in Table 1. Most respondents were male with 447 (89.4%) respondents, secondary level-educated, including junior and senior high school levels with 412 (82.4%) respondents, and in the youth category with 347 (69.4%) respondents. A total of 395 (79.0%) respondents used automatic motorcycles, had a riding experience for 10 years or longer with 233 (46.6%) respondents, and worked

Table 1. Overview of Individual Characteristics, Risk Perception, Safety Attitude, and Risky Riding Behavior of Online Motorcycle Taxi Riders in Jakarta, 2023 (n = 500)

Variable	Category	n	%
Sex	Male	447	89.4
	Female	53	10.6
Education	Elementary	14	2.8
	Secondary	412	82.4
	Higher	74	14.8
Age	Youth (<35 years)	347	69.4
	Middle-aged (35–55 years)	129	25.8
	Senior (>55 years)	24	4.8
Motorcycle type	Automatic	395	79.0
	Manual	105	21.0
Motorcycle riding experience	Novice (≤3 years)	70	14
	Intermediate (4–9 years)	197	39.4
	Experienced (10 years)	233	46.6
Work period	≤5 years	431	86.2
	>5 years	69	13.8
Risk perception	Good	360	72.0
	Bad	140	28.0
Safety attitude	Positive attitude	437	87.4
	Negative attitude	63	12.6
Risky riding behavior	At risk	42	8.4
	Not at risk	458	91.6

as online motorcycle taxi riders for five years or less with 431 (86.2%) respondents.

The study found that 72.0% of respondents had good risk perception, which means that the respondents understood potential dangers and risks they might face while riding. Almost all the respondents (91.6%) exhibited non-risky riding behavior. This evaluation process involved positive or negative assessments of an object and was referred to in the literature as "attitude."

Risk Perception

Most online motorcycle taxi riders, totaling 433 (86.6%) respondents, were aware of traffic situations and riding activities as potentially risky for riders and other road users. Then, 357 (71.4%) respondents felt concerned about accident-related risks, riding behaviors, or a specific traffic environment. Many perceived possible risks while riding, as 283 (56.6%) online motorcycle taxi riders estimated the potential losses that might occur while riding a motorcycle. A total of 329 (65.8%) did not prioritize safety. However, 328 (65.6%) respondents had received a safe riding-related education or training that could help minimize errors and improve traffic skills (Table 2).

Safety Attitude

Regarding the safety attitude variable, this study observed 433 (86.6%) respondents opposing a pragmatic attitude to the rule violation. A total of 320 (64.0%) respondents opposed current motorcyclist rule enforcement. The respondents here perceived that the existing supervision and rules were inadequate. Also, intensified monitoring and stricter penalties for riders violating the rules were needed.

Risky Riding Behavior

Of all the respondents, 444 (88.8%) rarely made traffic errors and indicated paying attention to the road users and traffic signs, thereby minimizing traffic errors. Regarding control errors, 90.6% of the total respondents rarely or did not encounter control errors and had reasonable control over the motorcycle while riding.

Of the 500 respondents, 65.8% set the income targets, which led to driving late at night and risking their safety (Table 3). In addition, 60.2% of respondents fastened their speed of riding upon their passengers' requests, violated the traffic rules, and disregarded safety. A total of 50 online motorcycle taxi riders were interviewed offline in September 2023, which aimed to delve deeper into understanding the impact of daily income targets and passenger pressure on risky riding behavior. The respondents expressed their dedication to work despite facing challenging situations. Most respondents continued to work despite being tired and often worked overtime to meet their family's financial needs.

Table 2. Overview of IRisk Perception, Safety Attitude, and Risky Riding Behavior Dimensions (n = 500)

Element	Variable	Category	n	%
Risk perception	Danger level	Alert	433	86.6
		Not alert	67	13.4
	Concern degree	Worried	143	28.6
		Not worried	357	71.4
	Stochastic evaluation	Possible	283	56.6
		Impossible	217	43.4
	Safety priority	Priority	171	34.2
		Not a priority	329	65.8
	Safety riding knowledge	Understand	328	65.6
		Not understand	172	34.4
Safety attitude	Pragmatic attitude to rule violation	Support	67	13.4
		Oppose	433	86.6
	Attitude to motorcyclist rule enforcement	Support	180	36.0
		Oppose	320	64.0
	Dissatisfaction with traffic rules	Satisfied	279	55.8
		Dissatisfied	221	44.2
Risky riding behavior	Traffic error	Error	56	11.2
		Not error	444	88.8
	Control error	Error	47	9.4
		Not error	453	90.6
	Speed violation	Violate	82	16.4
		Comply	418	83.6
	Stunt	Extreme	45	9.0
		Not extreme	455	91.0

Table 3. Overview of Daily Target Income and Passenger Pressure (n = 500)

Variable	Category	n	%
Daily target income	Forcefully	329	65.8
	Not forcefully	171	34.2
Passenger pressure	Accept request	301	60.2
	Dismiss request	199	39.8

Table 4. Relationships Between Individual Characteristics, Risk Perception, and Safety Attitudes Including Each Dimension of Risky Riding Behavior

Variable	Category	Risky Riding Behavior						OR (95% CI)	p-value
		At Risk		Not at Risk		Total			
		n	%	n	%	n	%		
Sex	Male	38	8.5	409	91.5	447	100	1.138 (0.390–3.325)	1.000
	Female	4	7.5	49	92.5	53	100		
Education	Elementary	5	35.7	9	64.3	14	100		
	Secondary	29	7	383	93	412	100	–	0.001
	Higher	8	10.8	66	89.2	74	100		
Age	Youth (<35 years)	32	9.2	315	90.8	347	100	–	0.573
	Middle-aged (35-55 years)	8	6.2	121	93.8	129	100		
	Senior (>55 years)	2	8.3	22	91.7	24	100		
Motorcycle type	Automatic	27	6.8	368	93.2	395	100	0.440 (0.225–0.862)	0.025
	Manual	15	14.3	90	85.7	105	100		
Motorcycle riding experience	Novice (≤3 years)	5	7.1	65	92.9	70	100	–	0.712
	Intermediate (4-9 years)	19	9.6	178	90.4	197			
	Experienced (≥10 years)	18	7.7	215	92.3	233	100		
Work period	≤5 years	23	12.2	165	87.8	188	100	2.150 (1.137–4.064)	0.026
	>5 years	19	6.1	293	93.9	312	100		
Danger level	Alert	23	34.3	44	65.7	67	100	11.390 (5.756–22.538)	<0.001
	Not alert	19	4.4	414	95.6	433	100		
Concern degree	Worried	7	4.9	136	95.1	143	100	0.474 (0.205–1.092)	0.107
	Not worried	35	9.8	332	90.2	357	100		
Stochastic evaluation	Possible	11	5.1	206	94.9	217	100	0.434 (0.213–0.885)	0.029
	Impossible	31	11.0	252	89.0	283	100		
Safety priority	Priority	4	2.3	167	97.7	171	100	5.452 (1.912–15.544)	0.001
	Not priority	38	11.6	291	88.4	329	100		
Safety riding knowledge	Understand	28	8.5	300	91.5	328	100	0.949 (0.486–1.855)	1.000
	Not understand	14	8.1	158	91.9	172	100		
Pragmatic attitude to rule violation	Support	29	43.3	38	56.7	67	100	24.656 (11.839–51.348)	<0.001
	Oppose	13	3.0	420	97.0	433	100		
Attitude to motorcyclist law enforcement	Support	13	7.2	167	92.8	180	100	0.781 (0.395–1.544)	0.586
	Oppose	29	9.1	291	90.9	320	100		
Dissatisfaction with the traffic rules	Satisfied	6	2.2	273	97.8	279	100	8.854 (3.657–21.436)	<0.001
	Dissatisfied	36	16.3	185	83.7	221	100		
Passenger pressure	Accept request	37	12.3	264	87.7	301	100	5.438 (2.099–14.090)	<0.001
	Dismiss request	5	2.5	194	97.5	199	100		
Daily income target	Forcefully	37	11.2	292	88.8	329	100	4.207 (1.622–10.912)	0.003
	Not forcefully	5	2.9	166	97.1	171	100		

Notes: OR = Odds Ratio, CI = Confidence Interval

Riders frequently complied with passengers' requests, mainly due to concerns about their ratings. Their compliance stemmed from fears of a negative impact on their ratings, significantly affecting the frequency of their orders. These riders had often received requests from customers to speed up their rides, especially when passengers were late for work. Understanding that their performance was judged based on customer ratings, they tended to comply. This means that there were significant impact of passenger pressure on the decisions and behavior of online motorcycle taxi riders, and was a crucial factor in their performance.

Individual Characteristics and Risky Riding Behavior
The analysis showed that education (p-value = 0.001), type of motorcycle (p-value = 0.025), and work period as an online motorcycle taxi rider (p-value = 0.026) were significantly related to risky riding behavior, which met a criterion

of p-value<0.005 (Table 4). Online motorcycle taxi riders with higher education performed better safety perceptions. Respondents with automatic motorcycles had a 0.44-fold likelihood of exhibiting risky riding behavior compared to respondents with manual motorcycles. Those with ≤5 years of working experience had a 2.1 times likelihood of exhibiting risky riding behavior. Sex, age, and motorcycle riding experience did not have a significant relationship with risky riding behavior.

Risk Perception and Risky Riding Behavior
The risk perception dimensions significantly associated with risky riding behavior were danger level (p-value < 0.001), stochastic evaluation (p-value = 0.029), and safety priority (p-value = 0.001), with each demonstrating a p-value < 0.05. Respondents with a "not alert" risk perception had an 11.39-fold likelihood of exhibiting risky riding behavior. The stochastic evaluation results showed that those who perceived an "impossible" risk to stochastic evaluation had a 0.434-fold likelihood of exhibiting risky riding behavior. The analysis results for safety priority indicated that respondents who did not prioritize safety had a 5.45-fold likelihood of exhibiting risky riding behavior compared to respondents who did. In essence, riders with higher safety priorities were less likely to engage in risky riding behavior, mainly due to a more positive attitude toward traffic safety.

Safety Attitude and Risky Riding Behavior
The analysis showed that pragmatic attitudes to rule violations and dissatisfaction with traffic rules were significantly related to risky riding behavior with a p-value < 0.001, meeting a criterion of p-value < 0.005. Riders with a pragmatic attitude to violating rules were 24.6 times more likely to exhibit risky riding behavior. Dissatisfaction with traffic rules increased the likelihood of risky riding behavior by 8.85 times.

Daily Income Target, Passenger Pressure, and Risky Riding Behavior
The study found a significant relationship between daily income targets (p-value < 0.001), passenger pressure (p-value = 0.003), and risky riding behavior, meeting a criterion of p-value < 0.005. The respondents fastening their speed at passengers' requests were 5.4 times more likely to exhibit risky riding behavior. Similarly, respondents pushing for income targets were 4.2 times more likely to exhibit risky riding behavior.

Based on Table 5, the online motorcycle taxi riders prioritizing daily income targets and complying with passengers' requests to fasten their speed were significantly less likely to prioritize safety while riding (OR values: 54.902 and 62.749, respectively). Pragmatic attitudes to rule violations and dissatisfaction with the traffic rule were the most dominant elements affecting risky riding behavior (p-value < 0.005). Riders with supportive attitudes to rule violations were 16.3 times more likely to engage in risky riding behavior, while those dissatisfied with traffic rules were 4.3 times

Table 5. Relationships Between Daily Income Target and Passenger Pressure on Safety Priority

Variable	Category	Safety Priority						OR (95% CI)	p-value
		Priority		Not Priority		Total			
		n	%	n	%	n	%		
Daily income target	Forcefully	28	8.5	301	91.5	329	100	54.902 (31.349–96.151)	<0.001
	Not forcefully	143	83.6	28	16.4	171	100		
Passenger pressure	Accept request	16	5.3	285	94.7	301	100	62.749 (34.276–114.874)	<0.001
	Dismiss request	155	77.9	44	22.1	199	100		

Notes: OR = Odds Ratio, CI = Confidence Interval

Table 6. Interconnected Impact of Risk Perceptions and Safety Attitudes on Risky Riding Behavior

Variable	B	SE	p-value	OR	95% CI
Pragmatic attitude to rule violations	2.675	0.393	0.000	14.515	6.721–31.349
Dissatisfaction with the traffic rules	1.330	0.491	0.007	3.783	1.445–9.903
Passenger pressure	0.956	0.532	0.072	2.600	0.917–7.372

Notes: B = Regression Coefficient, SE = Standard Error, OR = Odds Ratio, CI = Confidence Interval

more likely to do so. However, the variable of passenger pressure did not significantly influence risky riding behavior, as the p-value did not reach the significance criterion of <0.005.

Discussion

The major study finding indicated that 458 respondents (91.6%) demonstrated non-risky or rather safe riding behaviors. This finding suggested that a significant portion of the studied online motorcycle taxi riders in Jakarta tended to adhere to traffic rules, had good control of the vehicles, maintained a reasonable speed, and exhibited safer riding behavior. However, further analysis is needed to understand the factors behind such behavior and to implement targeted measures for safer riding practices.

Risk Perception

This study found a strong correlation between the risk perception variable and risky riding behavior among online motorcycle taxi riders in Jakarta. A significant correlation between risk perception variables was revealed, specifically in the dimensions of danger level, stochastic evaluation, safety priority, and risky riding behavior. These findings were in line with a previous study, which indicates that risk perception has a direct impact on risky riding behavior.[17] Riders who consider riding activities to be potentially dangerous are likely to engage in non-risky riding behaviors, which relates to how they estimate the probability of accidents while riding. Those aware of risks are more cautious and prepared to prevent them.[14,17]

A recent study suggests that stochastic evaluation and the level of concern are significantly related to the risk perception of e-bike riders.[17] Online motorcycle taxi riders who were more concerned about riding and believed in higher risks were likely to demonstrate a positive attitude to traffic safety and exhibit safe riding behaviors. These findings suggest that risk awareness could shape a positive safety attitude, which, in turn, could influence safer riding behavior among online motorcycle taxi riders.

Safety Attitudes

This study revealed a relationship between safety attitude dimensions and risky riding behavior among online motorcycle taxi riders. Safety attitudes are directly related to risky riding behavior.[17] It was said that many models representing the cause-and-effect relationship between attitude and behavior had been proposed and proven in social sciences.[21]

In this study, the dimensions of pragmatic attitudes to rule violation and dissatisfaction with traffic rules demonstrated a significant correlation with risky riding behavior. This indicated that riders who had a feeling that traffic rules were too restrictive or were dissatisfied with the existing traffic rules were likely to engage in riskier riding behaviors. These findings were in line with a previous study stating that a pragmatic attitude to traffic rule violations was an important predictor for rule violations while cycling.[14] The more pragmatic the riders were, the more likely they were to violate traffic rules, such as running a red light on an empty road or violating traffic without supervision or for reasons of a faster route.[14]

Dissatisfaction with traffic rules among motorcyclists became an essential predictor for situations involving conflicts with other road users.[14] During the interviews with online motorcycle taxi riders, several riders admitted to traffic rule violations for practical reasons or under certain situations. In this study, although online motorcycle taxi riders normatively knew and understood that violating these rules could be dangerous, they still considered it as a solution under certain situations on the road. This emphasized an urgency for the riders to carefully assess risks and prioritize safety while considering practical factors in their job.

Daily Income Target

The interviews with online motorcycle taxi riders resulted in many of them setting daily income targets. The interview narrative underlined income targets and decisions to continue working or picking up passengers even in less safe road conditions. The need to gain specific income targets often forces the riders to risk their safety and take higher risks to achieve their financial goals.[22] According to a previous study, economic demands encourage people to take jobs as online motorcycle taxi riders, particularly in Jakarta, where the living cost tends to be higher than other areas.[23]

Apart from economic factors, flexible working hours were also a significant interest for online motorcycle taxi riders. However, the impact of such flexibility was that many riders worked late into the night to gain their daily income targets, sometimes ignoring safety issues. This phenomenon indicated that strong financial demands forced them to work beyond normal working hours to meet their high economic needs, particularly in big cities like Jakarta.

Although the analysis indicated that the daily income targets of online motorcycle taxi riders could affect their riding behavior, it is important to note that online motorcycle taxi riders' application operates on an order distribution

system with algorithms to determine the number of orders received daily. This phenomenon means that the daily income targets of online motorcycle taxi riders were no longer the main factor in risky riding behaviors. Even though they personally set daily income targets, the application only enables limited orders based on the system set up by the company.

Online motorcycle taxi riders often call such limited orders as *"anyep"* (quiet). The riders insisting on meeting their daily income targets tend to work late into the night. The interviews also pointed out certain influential factors to the order distribution system, including passenger rating or feedback based on the riders' service performance.

Passenger Pressure

Online motorcycle taxi riders often said that they were demanded to comply with passengers' requests or instructions, even when these actions were contrary to road safety. Based on the interviews, the fear of receiving a bad rating could force online motorcycle taxi riders to disregard safety measures and fulfill passengers' requests, even if that means engaging in risky behaviors, such as speeding up to meet customer requests. In this context, passenger rating was considered very important as it affected the number of orders riders could receive. This suggested significant pressure for the riders to compromise safety to maintain or improve their ratings on the online motorcycle taxi platform.

While, most riders interviewed mentioned their concerns regarding passenger reviews and willingness to comply with any passenger pressure. If necessary, some passengers expressed a different viewpoint. They stated that they were indifferent to the ratings and pressure from passengers, such as being asked to speed up, break traffic, or run a red light. The reasons behind the indifferent attitudes of riders to passengers' demands, which endanger safety, include prior experience of accidents due to traffic rule violations. These riders considered the accidents as "the lesson learned" and were committed not to repeat such actions in the future.

Additionally, these riders felt a moral responsibility as the head of household or the main financial support for their families. This sense of responsibility motivated them to prioritize their safety by thinking of their families at home. They also mentioned that passengers were not even held responsible if the riders were penalized for violating traffic rules upon the passengers' requests. Therefore, they tended to reject passengers' requests, which compromised safety, and they were unbothered by receiving negative ratings due to rejecting such requests.

Passenger pressure demanding a speed-up frequently occurs in office areas during rush hours. Online motorcycle taxi companies have established rules and guidelines for their riders and consider two distinct types of violations: those reported by customers and those detected by the system.[23] Hence, the companies monitor their riders' riding speeds through their systems. Each violation is classified into one of five levels, depending on the severity of the riders' violations. Sanctions imposed for such violations range from warnings, a 30-minute suspension, deactivation of incentives for three days, and a seven-day suspension to cancel the partnership. Therefore, online motorcycle taxi riders cannot comply with passengers' demands for speeding up as they are monitored by their companies.

Conclusion

Risky riding behavior among online motorcycle taxi riders in Jakarta is strongly associated with their daily income targets, passenger pressure, risk perception, and safety attitudes. The daily income targets and passenger pressure significantly influence risky riding behavior. Financial needs influence daily income targets, which may lead to risky riding behavior to meet those targets. Safety training for riders could be implemented to minimize risky riding behaviors among online motorcycle taxi riders in Jakarta. The companies can provide their riders with periodic training on riding safety and also make campaigns to educate passengers about any risk of risky riding behavior. The companies may also strengthen monitoring and assessment of their riders' riding behaviors by providing guidance or implementing sanctions for risky behaviors and incentives for safe riding.

Availability of Data and Materials

The primary author can provide all data and materials from this study.

Authors' Contribution

ZD, AMK, and AH contributed to the design and implementation of the research. AH and NP were involved in the data analysis, while ZD and AMK provided supervision. ZD, AMK, AH, and NP were involved in manuscript preparation, content refinement, and administration. All the authors discussed the results and contributed to the final manuscript.

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