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Analysis of Rider Behavioral Factors in Motorcycle Traffic Accidents

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Traffic accidents remain a serious issue in the field of transportation. The high number of accidents is often attributed to risky driving behavior, which not only endangers the driver but also other road users and the surrounding environment. In Palangka Raya alone, 303 traffic accident cases were recorded throughout 2024. This study aims to identify behavioral factors contributing to traffic accidents, determine the most dominant factor, and evaluate the extent of the influence of driver behavior on accident occurrence. The research employs multiple linear regression analysis using SPSS. Based on the analysis, driver behavior variables are categorized into four factors: compliance (X1), personality (X2), skills (X3), and knowledge (X4). The most dominant driver behavior identified was "Frequently driving at high speed (60–70 km/h)." In the multiple linear regression test, the variable with the highest positive coefficient change was X1.4 with a value of 0.221 toward Y1, while the variable with the greatest negative coefficient was X3.2 with a value of -0.224. For variable Y2, the largest positive coefficient was found in X4.1 (0.122), and the largest negative coefficient was in X2.3 (-0.402).

Keywords: accident, driver behavior, regression, traffic safety

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Introduction

Transportation refers to the movement or transfer of people or goods from one place to another for a specific purpose (Sabir et al., 2022). This process is carried out by humans acting as drivers. A competent driver is one who has developed fundamental driving skills, proper driving habits, maintains good psychophysiological condition, and possesses healthy sensory, mental, and physical judgment (Imanulloh & Prihutomo, 2019).

Traffic accidents constitute a serious problem in both transportation and public health (WHO, 2023). In Indonesia, the traffic accident mortality rate stands at 31.8 per 100,000 people, placing the country in the category of nations with very high road traffic mortality rates (WHO, 2023). A significant portion of these accidents is attributed to risky driving behavior, as well as actions that disrupt a driver's focus and safety (Mauludi et al., 2021; Amalia & Nurmansyah, 2020; Lulie & Hatmoko, 2005). Such behavior not only endangers the driver but also poses serious risks to other road users and the surrounding environment (Sahara & Syuhada, 2023). According to Tabengan Online (2024), the Palangka Raya City Police recorded 303 traffic accident cases in 2024, resulting in 46 fatalities, 11 serious injuries, and 365 minor injuries.

A driver's behavior is influenced by numerous factors, including weather conditions, visual field limitations, surrounding environment, and nighttime lighting (Prasetyanto, 2019). Physical conditions, such as general health, vision, hearing, and stamina, are crucial for safe driving. Temporary impairments, such as drowsiness, alcohol consumption, and intoxication, can lead to unsafe behavior on the road. Additionally, psychological states such as anger, impatience, fear, and anxiety can significantly affect how a person drives (Prasetyanto, 2019). Environmental factors, including whether the road is straight and flat or hilly, whether the weather is clear or adverse, and whether travel occurs in the morning, afternoon, or at night, also play an important role in shaping driver behavior (Prasetyanto, 2019).

Understanding how these factors interact is essential to reducing traffic accidents. One critical step is to examine the behavioral patterns of motorcycle drivers involved in such incidents. This analysis aims to identify which driver behaviors contribute to traffic accidents, determine which behavioral factor is most dominant, and assess the degree to which driver behavior influences accident rates.

This analysis is consistent with earlier studies. Sahara and Syuhada (2023), for example, investigated the driving behavior of Generation Z riders at Universitas Negeri Jakarta using descriptive and qualitative methods. They found that unsafe behaviors such as running yellow lights, using phones for calls or texting while riding, speeding, riding with more than two people, and failing to wear helmets, even on short trips, were common among students. These findings highlight the importance of understanding both driver behavior and the adequacy of vehicle safety measures.

A related study conducted by Hakzah and Fadly (2022) in Barru Regency employed both quantitative and qualitative methods involving 405 respondents. The data, processed using SPSS version 25, revealed that 59% of respondents were male and 41% female, with 144 people owning more than one driving license. The age distribution was 68% between 17–25 years, 28% between 26–45 years, and 4% between 45–65 years. The study found a strong correlation between traffic accidents and driver behavior, with a Pearson correlation coefficient (R) of 0.777. This indicated that minor violations (X1) and aggressive violations (X2) were strongly linked to driving safety outcomes (Y).

Method

Research Location

This study was conducted in Palangka Raya City, the capital of Central Kalimantan Province, Indonesia. Palangka Raya is

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characterized by a combination of urban and semi-urban areas, with diverse transportation patterns and infrastructure conditions that influence driver behavior and traffic accident risk. The city's geography, which spans both densely populated regions and wide, open roads, presents unique challenges in terms of traffic safety and law enforcement.

The spatial diversity across Palangka Raya, ranging from administrative centers to peripheral areas, makes it an ideal case study for examining behavioral patterns of motorcycle riders. Factors such as road width, visibility, lighting, traffic density, and accessibility to public facilities vary across the city's districts and may significantly influence accident occurrence.

Figure 1 illustrates the administrative map of Palangka Raya City, showing the boundaries and road networks across its districts (Petatematikindo). This map provides important context for understanding the spatial distribution of traffic accidents and identifying high-risk zones, which is essential for targeted interventions in improving road safety.

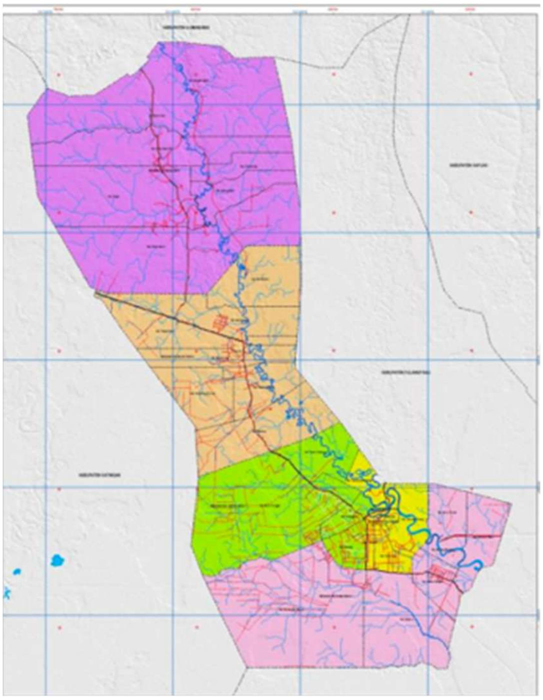

Figure 1 Administrative Map of Palangka Raya City, Central Kalimantan Province (Regional Development Planning Agency (Bappeda) of Palangka Raya City)

Theoretical Foundation and Study Direction

This research was grounded in an extensive review of scholarly literature, which served to construct the theoretical and empirical context for the study. Key themes explored included risk-related driver behavior, psychological and physical conditions influencing traffic incidents, and statistical patterns of road accidents in Indonesia and other developing contexts. Previous studies such as those by Mauludi et al. (2021), Amalia & Nurmansyah (2020), and Sahara & Syuhada (2023) were reviewed to understand behavioral triggers that often lead to motorcycle crashes.

The literature also revealed gaps in understanding how multiple behavioral factors interact to influence accident rates, particularly in mid-sized cities such as Palangka Raya. Drawing from this foundation, the study was directed toward identifying which driver behaviors are most influential in contributing to traffic accidents, and how significantly each of them affects the frequency or severity of these incidents. The research questions were thus developed to explore three key areas: identifying contributing behavioral factors, determining the most dominant factor, and measuring the degree of influence behavior has on traffic accident outcomes.

Data Collection Strategy

The data collection process utilized both primary and secondary sources to ensure robustness and triangulation of results.

Primary Data were collected through structured questionnaires and interviews targeting motorcycle drivers in Palangka Raya. The questionnaire measured behavioral indicators including compliance with regulations, reaction patterns, skills, and safety awareness. Interviews were conducted with selected participants to gain qualitative insights, adding depth to the survey findings.

Secondary Data were obtained from official traffic accident records published by local authorities, as well as from previously published research. These sources were used to contextualize the primary data and validate emerging patterns observed in the field.

Data Processing and Statistical Techniques

All collected data were analyzed using SPSS, employing several core statistical tools. The central technique was multiple linear regression analysis, which helped evaluate the relationships between independent behavioral variables and the dependent variable (traffic accident involvement). Complementary tests included:

1. F-Test to determine the collective significance of the behavioral variables.
2. Coefficient of Determination (R^2) to assess how much variance in accident rates could be explained by driver behavior.
3. T-Test to evaluate the individual influence of each behavioral factor.
4. Dominance Analysis to identify which single behavioral variable had the greatest impact.

This comprehensive statistical treatment ensured both generalizability and specificity in the results.

Key Interpretations and Applied Insights

The findings provided nuanced insight into the behavioral causes of traffic accidents among motorcycle riders in Palangka Raya. Not all factors contributed equally; while some variables demonstrated strong statistical significance, others had negligible or even inverse relationships. The dominant behavioral factor identified through regression modeling offered a critical leverage point for public safety campaigns and enforcement strategies.

Beyond identifying risks, the study also formulated practical recommendations to address the behavioral dimensions of traffic safety. These included targeted public education efforts, improved traffic monitoring, and institutional collaboration to reinforce traffic law compliance. By aligning these actions with the most impactful behavioral variables, city authorities and stakeholders can implement more effective interventions.

Finally, the research recognized the need for continued exploration in this field. Suggestions for future studies include expanding the geographic scope, incorporating spatial analysis to map accident hotspots, and integrating socio-demographic data to deepen the behavioral understanding across population segments.

Sampling and Model Specification

A purposive sampling method was applied using structured interviews. Respondents were asked to answer a set of questionnaire items directly guided by the researcher. The target population included motorcycle drivers aged between 12 and 65 years. To determine the appropriate number of respondents, Slovin's formula was used based on the total population of Palangka Raya, which was recorded at 306,104 residents according to the Central Statistics Agency (BPS Kota Palangka Raya, 2024). With a margin of error (e) set at 10%, a standard allowance for large populations, the minimum required sample size was calculated using Equation 1 (Marbun, 2021).

$$n = \frac{N}{1 + Ne^2} \quad (1)$$

Where:

n = sample size
N = population size
e = margin of error (0.10 for large populations, 0.20 for small populations)

To analyze the effect of multiple behavioral variables on traffic accidents, the study employed a multiple linear regression model, which can be represented by Equation 2 (Vandiah, 2022).

$$Y = \alpha + \beta1.X1 + \beta2.X2 + \beta3.X3 + \beta4.X4 + e \quad (2)$$

Where:

Y = dependent variable (accident involvement)
α = intercept (constant)
β_1, β_2, β_3, β_4 = regression coefficients for each behavioral factor
X_1 = compliance factor
X_2 = personality factor
X_3 = skill factor
X_4 = knowledge factor
ε = error term

Data Collection Procedure

A total of 100 valid responses were collected from the primary data instruments (questionnaires). These responses represented a sufficient and statistically justified sample size based on the earlier calculation. The behavioral variables assessed in this study included compliance with traffic rules, personality traits during driving, technical driving skills, and knowledge related to road safety. Each variable was operationalized through multiple indicators within the questionnaire to ensure accurate measurement and reliability. The classification of research variables used in this study is summarized in Table 1.

Validity Test Results for Each Variable

Table 2 presents the results of the validity test for each statement item grouped under four measured variables: Compliance, Personality, Skill, and Knowledge. The test was conducted by calculating the correlation coefficient (r count) for each item and comparing it to the critical value of the correlation coefficient (r table) at a significance level of α = 0.05. Based on the results, all items show r count values greater than r table (0.361), indicating that each statement item is valid and suitable for use in subsequent data analysis.

Table 1 Classification of Research Variables

Code	Type of Variable	Description
X1	Independent Variable	Driver Compliance
X2	Independent Variable	Driver Personality
X3	Independent Variable	Driving Skills
X4	Independent Variable	Driver Knowledge
Y	Dependent Variable	Traffic Accidents

Table 2 Validity Test Results of Questionnaire Items for Each Variable

Variable	Statement	r count	r table (α=0.05)	Description
Compliance	Statement 1	0.65	0.361	Valid
	Statement 2	0.72	0.361	Valid
	Statement 3	0.68	0.361	Valid
	Statement 4	0.75	0.361	Valid
	Statement 5	0.7	0.361	Valid
Personality	Statement 1	0.69	0.361	Valid
	Statement 2	0.73	0.361	Valid
	Statement 3	0.71	0.361	Valid
	Statement 4	0.74	0.361	Valid
	Statement 5	0.66	0.361	Valid
Skill	Statement 1	0.68	0.361	Valid
	Statement 2	0.61	0.361	Valid
	Statement 3	0.69	0.361	Valid
	Statement 4	0.7	0.361	Valid
	Statement 5	0.65	0.361	Valid
	Statement 6	0.73	0.361	Valid
Knowledge	Statement 1	0.75	0.361	Valid
	Statement 2	0.71	0.361	Valid
	Statement 3	0.7	0.361	Valid
	Statement 4	0.66	0.361	Valid
	Statement 5	0.69	0.361	Valid
	Statement 6	0.68	0.361	Valid

Table 3 shows the reliability test results of the questionnaire items using Cronbach's Alpha coefficient for each measured variable: Compliance, Personality, Skill, and Knowledge. A variable is considered reliable if the Cronbach's Alpha value is greater than 0.70, indicating acceptable internal consistency among the items within the scale.

As presented in the table, all four variables have Cronbach's Alpha values ranging from 0.71 to 0.82, which exceeds the minimum threshold of reliability. Therefore, it can be concluded that all variables used in the instrument are reliable and can be consistently applied for further statistical analysis.

Table 3 Reliability Test Results Based on Cronbach's Alpha for Each Variable

No	Variable	Number of Items	Cronbach's Alpha	Description
1	Compliance	6	0.78	Reliable
2	Personality	6	0.82	Reliable
3	Skill	6	0.71	Reliable
4	Knowledge	6	0.74	Reliable

Data Analysis Techniques

This study employed both qualitative and quantitative data analysis techniques. The qualitative analysis was conducted through the interpretation of secondary data obtained from traffic accident reports provided by the local police (Polresta). The data were analyzed to identify the year with the highest number of accident occurrences. Based on these findings, questionnaire items were then formulated.

The next step involved quantitative analysis using multiple linear regression, conducted with the assistance of SPSS software. The quantitative analysis included the following statistical tests:

1. Multiple Linear Regression Equation
2. F-Test (Simultaneous Significance Test)
3. Coefficient of Determination (R^2) Test
4. T-Test (Partial Hypothesis Test)
5. Identification of the Dominant Factor

Results and Discussion

Based on primary data collected through interviews and questionnaire responses concerning the behavior of motorcycle riders in Palangka Raya City, the respondents ranged in age from 12 to 65 years, with a total sample of 100 individuals. The study examined four independent variables: compliance (X1), personality (X2), skill (X3), and knowledge (X4), each measured through six question items. The dependent variable was traffic accidents (Y), assessed using two items: Y1 and Y2.

A linear regression test was conducted to identify which specific indicators from each independent variable showed a meaningful linear relationship with the dependent variables. The selected indicators were those with relatively higher R Square values, reflecting stronger linear associations. The results of the linear regression analysis are presented in Table 4.

Test of the Multiple Linear Regression Model

Table 5 shows the results of the multiple linear regression analysis conducted to examine the effect of several independent variable indicators on the dependent variable Y1, which represents traffic accidents. The model includes indicators from compliance (X1.2, X1.3, X1.4), personality (X2.1, X2.4), skill (X3.1, X3.2, X3.3, X3.4, X3.5), and knowledge (X4.1, X4.5, X4.6). The regression output provides unstandardized coefficients, standard errors, standardized beta values, t-values, and significance levels (p-values).

Based on the analysis, the constant value is 3.645 and statistically significant (p = 0.000), indicating that the regression model as a whole is valid. Among all predictors, only two variables are statistically significant at the 5% level: X1.4 (compliance) with a positive influence (B = 0.221, p = 0.015) and X3.2 (skill) with a negative influence (B = -0.224, p = 0.034). This suggests that higher scores on X1.4 are associated with an increase in traffic accident incidents, while higher scores on X3.2 are associated with a decrease. Other indicators, although included in the model, do not show a statistically significant effect, as their p-values exceed 0.05.

Tabel 4 Linear Regression Test Results of Independent Variables (X) on Dependent Variables Y1 and Y2

Variable Y1	R Square	Variable Y2	R Square
X1.1	0.001	X1.1	0.002
X1.2	0.021	X1.2	0.002
X1.3	0.023	X1.3	0
X1.4	0.034	X1.4	0.005
X1.5	0.002	X1.5	0.026
X1.6	0.003	X1.6	0.003
X2.1	0.023	X2.1	0.023
X2.2	0.001	X2.2	0.033
X2.3	0.001	X2.3	0.036
X2.4	0.035	X2.4	0.001
X2.5	0.002	X2.5	0.023
X2.6	0.000	X2.6	0.044
X3.1	0.048	X3.1	0.047
X3.2	0.084	X3.2	0.004
X3.3	0.071	X3.3	0.003
X3.4	0.065	X3.4	0.005
X3.5	0.025	X3.5	0
X3.6	0.002	X3.6	0.021
X4.1	0.039	X4.1	0.029
X4.2	0.008	X4.2	0.007
X4.3	0.001	X4.3	0.004
X4.4	0.009	X4.4	0.022
X4.5	0.011	X4.5	0.008
X4.6	0.011	X4.6	0.009

Furthermore, the standardized coefficients (Beta) indicate that X1.4 and X3.2 have the strongest impact on Y1 compared to other variables, with Beta values of 0.245 and -0.248, respectively. These findings imply that certain aspects of compliance and skill play a more dominant role in influencing traffic accident behavior among motorcyclists, and they should be prioritized in further behavioral intervention programs or driver education policies.

Based on the analysis of variable Y1, the results indicate that four independent variables have positive coefficients, with X1.4 (compliance factor) showing the strongest influence. This suggests that a 1% increase in this compliance factor is associated with a 0.221 increase in the level of involvement in traffic accidents. This finding aligns with the previous study by Anggraini et al. (2022), which emphasized that adherence to traffic regulations significantly impacts driving safety. In essence, greater compliance with traffic rules contributes to safer driving behavior and helps reduce the risk of traffic accidents.

The multiple linear regression equation derived from the analysis is as Equations 3 and 4.

Table 5 Multiple Linear Regression Coefficients of Independent Variables on Traffic Accidents (Y1)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.645	0.689	–	5.288	0
X1.2	-0.104	0.079	-0.135	-1.328	0.188
X1.3	-0.061	0.104	-0.059	-0.587	0.559
X1.4	0.221	0.089	0.245	2.484	0.015
X2.1	-0.024	0.125	-0.022	-0.192	0.848
X2.4	0.054	0.151	0.043	0.359	0.721
X3.1	0.063	0.132	0.049	-1.254	0.213
X3.2	-0.224	0.104	-0.248	-2.156	0.034
X3.3	-0.102	0.082	-0.135	-1.242	0.218
X3.4	-0.134	0.081	-0.175	-1.654	0.102
X3.5	-0.105	0.088	-0.116	-1.192	0.237
X4.1	-0.064	0.124	-0.059	-0.521	0.604
X4.5	0.145	0.14	0.127	1.035	0.303
X4.6	0.017	0.131	0.015	0.129	0.897

$$Y = \alpha + \beta1.\ X1.2 + \beta1.\ X1.3 + \beta1.\ X1.4 + \beta2.X2.1 + \beta2.X2.4 + \beta3.X3.1 + \beta3.X3.2 + \beta3.X3.3 + \beta3.X3.4 + \beta3.X3.5 + \beta4.X4.1 + \beta4.X4.5 + \beta4.X4.6 + e \quad (3)$$

$$Y1 = 3{,}645 + (-0{,}104) + (-0{,}061) + (0{,}221) + (-0{,}024) + (0{,}054) + (-0{,}079) + (-0{,}224) + (-0{,}102 + (-0{,}134) + (-0{,}105) + (-0{,}064) + (0{,}145) + (0{,}017) + e \quad (4)$$

From the regression results, the variables that positively influence the increase in traffic accident involvement include X1.4 (compliance), X2.4 (personality), and X4.5 and X4.6 (knowledge). Conversely, several variables show a negative relationship, indicating their role in reducing traffic accident involvement. These include X1.2 and X1.3 (compliance factors), X2.1 (personality), the entire group of X3.1 to X3.5 (skill factors), and X4.1 (knowledge). This distinction between positive and negative coefficients offers insight into which aspects of driver behavior and awareness are most influential in contributing to or mitigating traffic incidents.

Based on the regression analysis of variable Y2, the results show that only one variable has a positive coefficient, namely X3.1. This indicates that a 1% increase in this skill factor leads to an increase in traffic accident casualties by 0.054 units. This finding is consistent with the study by Chrisnatalia et al. (2023), which demonstrated that certain personality traits significantly contribute to increased driving risk. Moreover, Aini (2025) confirmed that personality factors are causal variables that directly influence motorcycle accident involvement.

The multiple linear regression equation for Y2 is as Equations 5 and 6.

Table 6 Multiple Linear Regression Coefficients of Independent Variables on Traffic Accidents (Y2)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.052	0.379	–	8.054	0
X1.5	-0.098	0.056	-0.157	-1.73	0.087
X2.1	-0.014	0.047	-0.031	-0.336	0.763
X2.2	-0.102	0.047	-0.232	-2.192	0.031
X2.3	-0.402	0.221	-0.166	-1.818	0.072
X2.5	-0.103	0.071	-0.133	-1.441	0.153
X2.6	0.057	0.028	0.182	-2.015	0.047
X3.1	0.054	0.026	-0.142	2.117	0.037
X3.6	-0.051	0.037	-0.08	-1.407	0.163
X4.1	-0.122	0.045	-0.198	2.694	0.008
X4.4	-0.097	0.044	-0.198	-2.171	0.033

$$Y = \alpha + \beta1.\ X1.5 + \beta2.\ X2.1 + \beta2.\ X2.2 + \beta2.\ X2.3 + \beta2.X2.5 + \beta2.X2.6 + \beta3.X3.1 + \beta3.X3.6 + \beta4.X4.1 + \beta4.X4.4 + e \quad (5)$$

$$Y2 = 3{,}052\ \alpha + (-0{,}098) + (-0{,}014) + (-0{,}102) + (-0{,}402) + (-0{,}103) + (-0{,}057) + (0{,}054) + (-0{,}051) + (0{,}122) + (-0{,}097) + e \quad (6)$$

The variable that contributes to the increase in traffic accident casualties is X3.1 (skill factor). On the other hand, the variables that contribute to the reduction of traffic accident casualties include X1.5 (compliance); X2.1, X2.2, X2.3, X2.5, X2.6 (personality factors); X3.6 (skill); and X4.1, X4.4 (knowledge factors).

Model Significance Testing Using ANOVA (F-Test) for Traffic Accident Involvement (Y1)

The F-test was conducted to assess the overall significance of the regression model for the dependent variable Y1 (traffic accidents). As shown in Table 7, the F-value is 2.759 with a significance level (Sig.) of 0.003, which is less than 0.05. This result indicates that the regression model is statistically significant, meaning that the set of independent variables included in the model collectively contributes to explaining the variance in Y1. Therefore, at least one of the predictors has a significant relationship with the dependent variable, and the model can be considered valid for further interpretation and prediction.

Table 7 ANOVA[a] – F-Test for the Regression Model of Y1

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	28.479	13	2.191	2.759	0.003[b]
Residual	68.281	86	0.794		
Total	96.76	99			

[a] Dependent Variable: Y1
[b] Predictors: (Constant), X4.6, X2.1, X3.4, X3.5, X4.1, X1.2, X1.3, X1.4, X3.1, X3.3, X3.2, X2.4, X4.5

To evaluate the overall significance of the regression model predicting the dependent variable Y2 (traffic accident casualties), an F-test was conducted through ANOVA analysis. As shown in Table 8, the F-value is 3.882 with a significance level (Sig.) of 0.000, which is below the threshold of 0.05. This result indicates that the regression model is statistically significant, meaning that the independent variables included in the model jointly explain a significant proportion of the variance in Y2.

In other words, the probability that this outcome occurred by chance is extremely low, supporting the conclusion that at least one of the independent variables (compliance, personality, skill, or knowledge) has a significant relationship with traffic accident casualties. Therefore, the regression model for Y2 is considered valid and appropriate for further interpretation.

Table 8 ANOVA[a] – F-Test for Y2

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.211	10	0.521	3.882	0[b]
Residual	11.949	89	0.134		
Total	17.16	99			

[a] Dependent Variable: Y2
[b] Predictors: (Constant), X4.4, X3.1, X2.6, X2.2, X2.3, X2.1, X1.5, X3.6, X2.5, X4.1

Coefficient of Determination Test for Traffic Accident Involvement (Y1)

The coefficient of determination test (R Square) was used to measure how well the independent variables collectively explain the variance in the dependent variable Y1 (traffic accident involvement). As shown in Table 9, the R value is 0.543, indicating a moderate positive correlation between the predictors and the dependent variable. The R Square value is 0.294, meaning that approximately 29.4% of the variation in Y1 can be explained by the combination of the independent variables in the model.

The Adjusted R Square is 0.188, which accounts for the number of predictors in the model and provides a more accurate estimate of the explanatory power when using multiple variables. Although the explained variance is moderate, it still indicates that the model has meaningful predictive ability. The standard error of the estimate is 0.891, reflecting the average distance that the observed values fall from the regression line.

These results suggest that while other unexplored factors may influence traffic accident involvement, the model provides a statistically valid explanation of nearly a third of the observed variation in Y1.

Table 9 Coefficient of Determination Test for Variable Y1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.543[a]	0.294	0.188	0.891

[a] Predictors: (Constant), X4.6, X2.1, X3.4, X3.5, X4.1, X1.2, X1.3, X1.4, X3.1, X3.3, X3.2, X2.4, X4.5

The coefficient of determination test results indicates that the R Square value for Y1 is 0.294, meaning that the influence of the independent variables (X1–X4) on traffic accident involvement is 29.4%, while the remaining 70.6% is attributed to other variables outside the regression model (Table 9). In comparison, the regression analysis for Y2 (traffic accident casualties) shows an R Square value of 0.304, indicating that 30.4% of the variation in Y2 is explained by the independent variables, with the remaining 69.6% affected by other external factors not captured in the model (Table 10).

Table 10 Coefficient of Determination Test for Variable Y

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.551[a]	0.304	0.225	0.366

[a] Predictors: (Constant), X4.4, X3.1, X2.6, X2.3, X2.2, X1.5, X3.6, X2.5, X4.1, X2.1

T-Test (Hypothesis Testing)

To assess the significance of each independent variable individually, a t-test was conducted. This test evaluates whether a single predictor significantly influences the dependent variable. The test uses a critical value (t-table) of 1.66105, based on a 5% significance level and degrees of freedom (df = 100–5 = 95). Hypothesis testing was structured as follows:

- Null hypothesis (H_0): Driver behavior has no significant effect on traffic accident outcomes.
- Alternative hypothesis (H_1): Driver behavior significantly affects traffic accident outcomes.

The t-test results for Y1 show that among all predictor variables, only X1.4 (checking the vehicle before driving) demonstrates a statistically significant effect. This variable has a p-value (Sig.) of 0.015, which is less than 0.05, and a t-value of 2.484, which exceeds the t-table value of 1.66105. Therefore, X1.4 significantly influences Y1, and the alternative hypothesis (H_1) is accepted for this variable (Table 11).

Table 11 Hypothesis Test for Y1

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.645	0.689		5.288	0
X1.2	-0.104	0.079	-0.135	-1.328	0.188
X1.3	-0.061	0.104	-0.059	-0.587	0.559
X1.4	0.221	0.089	0.245	2.484	0.015
X2.1	-0.024	0.125	-0.022	-0.192	0.848
X2.4	0.054	0.151	0.043	0.359	0.721
X3.1	0.063	0.063	-0.126	-1.254	0.213
X3.2	-0.224	0.104	-0.248	-2.156	0.034
X3.3	-0.102	0.082	-0.135	-1.242	0.218
X3.4	-0.134	0.081	-0.175	-1.654	0.102
X3.5	-0.105	0.088	-0.116	-1.192	0.237
X4.1	-0.064	0.124	-0.059	-0.521	0.604
X4.5	0.145	0.14	0.127	1.035	0.303
X4.6	0.017	0.131	0.015	0.129	0.897

For the Y2 model, two variables are found to be statistically significant. First, X3.1 (ability to control the vehicle on curves) has a p-value of 0.037 and t-value of 2.117, indicating a significant negative effect on accident casualties. Second, X4.1 (using a phone or listening to music while driving) has a p-value of 0.008 and a t-value of 2.694, also exceeding the threshold. As a result, both X3.1 and X4.1 are accepted under the alternative hypothesis (H_1), confirming their individual significance in predicting Y2 (Table 12).

Table 12 Hypothesis Test for Y2

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	(B)	Std. Error	(Beta)		
(Constant)	3.052	0.379		8.054	0
X1.5	-0.098	0.056	-0.157	-1.73	0.087
X2.1	-0.014	0.047	-0.031	-0.297	0.763
X2.2	-0.102	0.047	-0.232	-2.192	0.031
X2.3	-0.402	0.221	-0.166	-1.818	0.072
X2.5	-0.103	0.048	-0.138	-2.115	0.037
X2.6	0.057	0.028	0.182	2.007	0.048
X3.1	0.054	0.026	0.207	2.117	0.037
X3.6	-0.051	0.036	-0.142	-1.407	0.163
X4.1	0.122	0.045	0.268	2.694	0.008
X4.4	-0.097	0.044	-0.198	-2.171	0.033

Based on the results of the hypothesis testing:

- For Y1, only variable X1.4 meets the significance criteria, with a p-value (Sig.) of 0.015, which is less than 0.05, and a t-value of 2.484, which is greater than the critical value of 1.66105. Therefore, X1.4 has a significant effect on Y1, and H_1 is accepted.
- For Y2, variable X3.1 is significant, with a p-value of 0.037 < 0.05 and t-value of 2.117 > 1.66105, indicating that X3.1 significantly influences Y2, and H_1 is accepted.

Additionally, variable X4.1 also meets the significance threshold, with a p-value of 0.008 < 0.05 and a t-value of 2.694 > 1.66105, meaning that X4.1 significantly affects Y2, and thus H_1 is accepted as well.

Dominant Factor

The results of the multiple linear regression analysis indicate that variable X3.2, which represents the behavior of frequently riding at high speeds (60–70 km/h), emerges as the most dominant predictor influencing traffic accident involvement. This is evidenced by a significance value (Sig.) of 0.020, which is below the standard threshold of $\alpha = 0.05$, thereby indicating that the variable has a statistically significant contribution to the regression model. Moreover, the standardized beta coefficient (β) for X3.2 demonstrates a relatively high absolute value compared to other predictors, suggesting that its influence is not only statistically significant but also practically meaningful within the model.

Descriptive analysis further reinforces the dominance of this variable. As illustrated in Figure 4, the response distribution for X3.2 shows that 32% of respondents reported engaging in high-speed riding behavior occasionally ("sometimes"), while 25% indicated they had "ever" done so. Another 25% claimed they "never" engaged in such behavior, 16% responded "often", and 2% admitted to "always" riding at high speed.

This distribution implies that although the proportion of respondents who consistently engage in speeding is relatively low, a substantial portion still exhibits occasional or situational high-speed riding behavior, which represents a latent risk factor in traffic safety. The behavioral pattern captured by X3.2 aligns with common risk-taking tendencies among motorcyclists, particularly in urban settings where speed regulation is often neglected.

From a theoretical perspective, speeding behavior is closely associated with reduced situational awareness, increased braking distances, and elevated impact forces during collisions, all of which escalate both the likelihood and severity of traffic accidents. The findings of this study are consistent with existing literature that identifies riding speed as a primary behavioral determinant of accident involvement, especially among young or risk-prone motorcyclists.

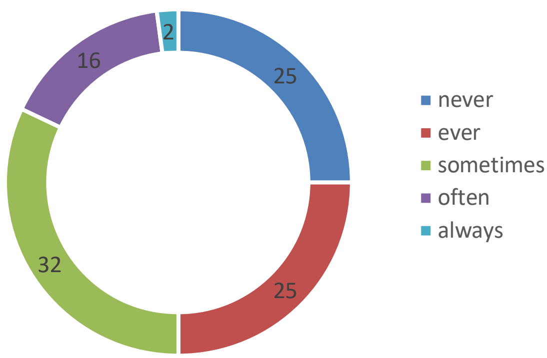

Figure 4 Distribution of Responses for Variable X3.2 (High-Speed Riding Behavior)

Given these findings, it is recommended that X3.2 be considered a critical focus in behavioral-based traffic safety interventions. Educational campaigns, targeted enforcement strategies, and rider training programs should explicitly address the risks associated with speeding. Emphasis should be placed on preventive education for at-risk demographic groups, particularly riders in the productive age range who may exhibit higher tendencies for unsafe speed-related behavior.

Discussion: Rider Behavior and Its Relationship to Motorcycle Accidents

The present study confirms that motorcycle rider behavior significantly influences both the occurrence and severity of traffic accidents, particularly in urban contexts like Palangka Raya. Behavioral variables such as compliance, personality, skill, and knowledge each contributed to variations in accident involvement (Y1) and accident casualties (Y2), with the skill factor, specifically high-speed riding (X3.2), emerging as the most dominant predictor.

This finding aligns with previous studies highlighting the multifaceted role of rider behavior in traffic safety. Bui et al. (2020) observed that in Vietnam, increased riding experience does not necessarily equate to safer practices; instead, familiarity with chaotic traffic may desensitize riders to risk, thus increasing crash likelihood. Similarly, Tanaporn et al. (2024) found that even experienced riders engage in unsafe behaviors, suggesting that behavioral risk is not exclusively tied to experience but also to habitual tendencies.

Moreover, the significance of X3.2 (frequent high-speed riding) in this study echoes the concerns raised by Setoodehzadeh et al. (2021), who associated high-speed maneuvers and failure to adhere to safety practices with more severe injuries. This behavior was also observed in a regional context; Ospina-Mateus et al. (2021) emphasized the prevalence of reckless riding among motorcycle taxi drivers, including speeding and mobile phone use while in motion, behaviors comparable to those in variable X4.1 of the present study.

Knowledge-related behaviors also demonstrated significant effects. As supported by Uttra et al. (2020), a lack of safety knowledge among novice riders contributes to risky decisions, such as ignoring traffic lights or riding with distractions. The current study's finding that X4.1 significantly affects accident casualties (Y2) further affirms this relationship.

Demographic factors, especially age, also influence behavior. Pramesti and Widajati (2021) found that younger riders are more prone to negligent and risky actions, a trend echoed in this study where respondents in the productive age group frequently reported high-speed behavior. Champahom et al. (2023) similarly highlighted that young adults exhibit greater risk-taking tendencies, especially in congested or complex traffic environments.

Environmental and contextual influences further exacerbate behavioral risks. Urban traffic density and infrastructure design, as noted by Jomnonkwao et al. (2023), create conditions that often compel riders to make risky maneuvers. This is particularly relevant in the setting of Palangka Raya, where road congestion and mixed traffic flows may intensify the expression of high-risk behaviors identified in this study.

Lastly, the issue of safety equipment use, particularly helmets, remains a consistent theme across studies. Ijaz et al. (2022) and Siddiqa et al. (2021) found that inconsistent helmet use significantly contributes to injury severity, underscoring the importance of both behavior and enforcement. Although this study did not explicitly analyze helmet usage, elements related to knowledge and compliance indirectly reflect the influence of safety attitudes on accident outcomes.

Taken together, these findings reinforce that behavioral interventions, particularly those aimed at speed control, distraction management, and safety awareness, are essential to improving motorcycle traffic safety. Education programs, policy enforcement, and culturally sensitive campaigns should target high-risk groups, especially young and inexperienced riders, to promote a more responsible and safety-conscious riding culture.

Conclusion

This study concludes that driver behavior contributes significantly to the occurrence of traffic accidents in the city of Palangka Raya. The behaviors examined are grouped into four main variables: compliance (X1), personality (X2), riding skills (X3), and knowledge (X4). Each of these variables consists of six behavioral indicators that reflect common practices and attitudes observed in everyday motorcycle riding.

Through regression analysis using SPSS, the most dominant behavioral factor identified is X3.2, which refers to the tendency to ride at high speeds (60–70 km/h). The distribution of responses to this item shows that 32% of riders sometimes engage in this behavior, followed by 25% who never or have ever done so, 16% who often do, and 2% who always do. This suggests that high-speed riding is a prevalent and impactful risk behavior.

In the regression model for Y1 (accident involvement), the independent variables X1–X4 produce an R Square value of 0.294, indicating that 29.4% of the variance in accident involvement can be explained by these behavioral factors. The most influential positive predictor in this model is X1.4 (routinely checking the vehicle before riding), with a coefficient of 0.221, while the strongest negative predictor is X3.2 (high-speed riding), with a coefficient of -0.224.

For the regression model of Y2 (accident casualties), the R Square is slightly higher at 0.304, meaning that 30.4% of the variance in traffic accident casualties is explained by the model. The strongest positive predictor in this model is X4.1 (using a phone or listening to music while riding), with a coefficient of 0.122, while the most influential negative predictor is X2.3 (riding under the influence), with a coefficient of -0.402.

The findings of this research highlight the importance of behavioral interventions in traffic safety. Unsafe actions, such as disobedience to traffic rules, impaired driving, risky speed choices, and lack of awareness, are proven to be major contributing factors. Therefore, efforts to improve road safety should focus not only on enforcement and infrastructure but also on the development of safe riding attitudes, risk-awareness education, and early behavior correction, especially among younger and more active age groups.

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