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# Managing Motorcycle Safety and Youth Riders in Rapidly Growing Indonesian Communities

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**Abstract**

Road safety is an effort to reduce traffic accidents and their consequences. When road users follow traffic regulations, road safety levels increase. Road users are expected to prioritize safety when driving on the highway. Numerous factors influence road safety, including environmental conditions, weather, driver behavior, road conditions, vehicle equipment, and the enforcement of traffic laws, all of which significantly affect traffic congestion. In this research, three variables will be analyzed: driver behavior, vehicle equipment, and traffic law enforcement, serving as independent variables that influence road safety, the dependent variable. The problem formulation, research objectives, and hypotheses in this study aim to analyze how independent variables, such as driver behavior, vehicle equipment, and adherence to traffic laws, impact road safety. The study focuses on underage motorcycle users in Tawangsari Village, Wonosobo Regency. Data sources include primary and secondary data. The study's sample consists of 100 respondents who are parents with children in Tawangsari Village, Wonosobo Regency

**Keywords**

Driving Safety, Driver Behavior, Driving Equipment, Traffic Law Enforcement, Underage

## 1. Introduction

Indonesia has been experiencing rapid population growth year after year, not only in urban areas but also in rural regions. The rapid population growth is accompanied by an increase in the economic development of the population. One of the indicators that can be observed is the continuously rising number of motorized vehicles. According to data from the Indonesian Central

Statistics Agency (*Badan Pusat Statistik* or BPS), the number of motorcycles had surpassed 61 million by the year 2010. The current rapid growth of motorcycles has also led to an increase in accidents involving motorcycle riders (Marsaid et al., 2013). The rising accident rates are believed to be caused by driving behaviors that tend to disregard safety measures, failure to comply with traffic regulations regarding vehicle equipment, and a lack of public awareness of traffic safety (Islam et al., 2017; Ahmad et al., 2021).

The issue at hand is the persistently high number of traffic accidents on the roads. Data from the World Health Organization (WHO) reveals that 1.3 million people die each year due to road traffic accidents worldwide, equivalent to 3,500 individuals every day. In Indonesia, approximately 9,000 lives are lost each year due to road traffic accidents. These figures mean that every fifty-seven minutes, twenty-five people lose their lives on the roads, making road traffic accidents the third leading cause of death, after coronary heart disease and diseases caused by the tuberculosis virus (Simarmata et al., 2018).

The influence of this cultural trend has also affected the lives of the community in Tawangsari Village, Wonosobo Regency. Many parents with increasing income levels now gift motorcycles to their children, even if the children are not of legal age or do not meet the criteria for riding a motorcycle. This is a matter of concern as it can endanger the safety of the children and other road users. Based on observations, in addition to violations related to riding motorcycles, another concern regarding underage motorcycle riders is the failure to use proper head protection, such as a standard helmet while riding. The negative impact of this cultural trend needs to be evaluated and corrected by various stakeholders involved in addressing this issue (Puri, 2013).

According to data from the Wonosobo Regional Police, the number of traffic accidents in Wonosobo Regency in 2013 reached 295 cases, with 17 fatalities. This figure represents a decrease compared to 2012, which had 368 cases and 23 fatalities, marking a 26 percent decrease. However, this data is still considered high, given that Wonosobo is a small town with relatively fewer motor vehicle traffic and not a major route for motorists from other cities. As for severe injuries, Agus clarified that there was also a significant decrease. In 2012, there were 81 cases of severe injuries, while in 2013, there were only 37 cases, representing a decrease of 45.7 percent on average.

The primary cause of traffic accidents is human error. The average age of drivers involved in these accidents ranges from 16 to 40 years. In addition to evaluating the number of accidents, Agus stated that during 2013, the Wonosobo Regional Police took action against 23,524 traffic violators. Among them, 10,988 were issued traffic citations. This enforcement was carried out to encourage road users to obey traffic rules while driving, thereby reducing road accidents. One of the main triggers for accidents is road users violating regulations. Looking at this data, in 2014, the authorities continued their efforts to reduce traffic accidents (Suraji et al., 2010). One of the measures taken was to encourage the community to cultivate traffic safety as a necessity. This was done through schools, motorcycle taxi communities, and public transportation communities (Wu & Loo, 2016).

The changing times significantly influence the mindset and lifestyle of the present-day society, which can manifest as both positive and negative cultural shifts. Many of these aspects are evident in our surroundings and stem from the dominant role of parents in successfully educating and raising their children (Smetana, 2017). This, in turn, impacts transportation safety,

particularly regarding underage riders of two-wheeled motor vehicles or motorcycles who are permitted to ride by their parents. To analyze the safety of motorcycle riders under the legal age in Tawangsari Village, Wonosobo Regency, research covering three key aspects is necessary. It is crucial to investigate whether rider behavior has an impact on the accident rate. This involves a deep understanding of the actions and compliance of riders with traffic rules (Maurer et al., 2016).

Vehicle equipment should also be evaluated to determine the extent to which this factor affects the safety of young riders. This includes inspecting the condition of the vehicle and the availability of personal protective gear such as helmets and jackets (Solah et al., 2019; Bartkowiak et al., 2021). Lastly, traffic law enforcement is also a critical factor that needs to be analyzed because strict enforcement of traffic rules can have a significant impact on driver behavior. The results of this research will assist in formulating more effective policies and prevention efforts to enhance the safety of underage motorcycle riders in the Wonosobo area.

## 2. Literature Review and Hypothesis Development

According to the Republic of Indonesia Law Number 22 of 2009 on Road Traffic Article 1, Clause 31, traffic, and road transport safety refers to a condition in which every individual is protected from the risk of accidents while in traffic caused by human factors. Meanwhile, as per the Republic of Indonesia Law Number 22 of 2009 on Road Traffic Article 1, Clause 24, a traffic accident is an unforeseen and unintended event on the road involving a vehicle, with or without other road users, resulting in casualties. In a study by Mohamad (2009), safety riding is an effort to reduce traffic accident rates and their consequences.

Safety riding is highly essential in traffic to ensure the smooth flow of transportation. Additionally, it aims to prevent and minimize the impact of accidents. As legal subjects, the community must adhere to and comply with the safety riding standards established by the government. By implementing safety riding, it creates a safe and efficient traffic environment for all users. Understanding the benefits of safety riding can be challenging as it is often considered uncomfortable and time-consuming. Sometimes, not following safety riding standards may seem like a more convenient choice (Wahab, 2014).

Drivers play a crucial role in traffic (Mårdh, 2016). Findings from various countries indicate that human factors are the primary causes of traffic accidents (Bucsuházy et al., 2020; Zhang et al., 2019). In Indonesia, according to the statistical data of the Indonesian National Police, approximately 84% of accidents are attributed to driver-related factors, while the Department of Transportation's data suggests it to be around 86.8%. These factors encompass driving without adequate equipment, disregarding traffic signs and regulations, improper driving techniques and skills, and poor control while driving, such as driving while drowsy, under the influence of alcohol or drugs. Approximately 91% of accidents are caused by human error, 5% by vehicle-related factors, 3% by road-related factors, and 1% by environmental factors. Human error is the most significant contributor due to non-compliance with traffic regulations.

Indonesia has been experiencing rapid population growth year after year, not only in urban areas but also in rural regions. The rapid population growth is accompanied by increased economic development. One noticeable indicator is the continuous increase in the number of motorized vehicles. According to data from BPS in the report "Development of the Number of

Motorized Vehicles by Type from 1987 to 2010," the number of motorcycles had exceeded 61 million by the year 2010. The current rapid growth of motorcycles has also led to an increase in accidents involving motorcycle riders. The rising accident rates are attributed to driving behaviors that tend to neglect safety measures, non-compliance with safety equipment as mandated by traffic laws, and a lack of public awareness of traffic safety (Jadaan et al., 2018).

In Law Number 2 of 2002 concerning the Indonesian National Police, Article 14, paragraph (1), sub-paragraphs (a), (c), (e), (g), and (i) outline the general tasks and roles of the police in their daily duties, encompassing matters related to security, order, investigation, and protection of the safety of individuals, community property, and the environment from disruptions in order and disasters. This includes aiding and aid while upholding human rights. As a part of the Indonesian National Police, traffic police are an executing element responsible for conducting police duties, including surveillance, regulation, escorting, and patrolling, public education, and traffic engineering, to maintain traffic safety, order, and flow (Zheng et al., 2020).

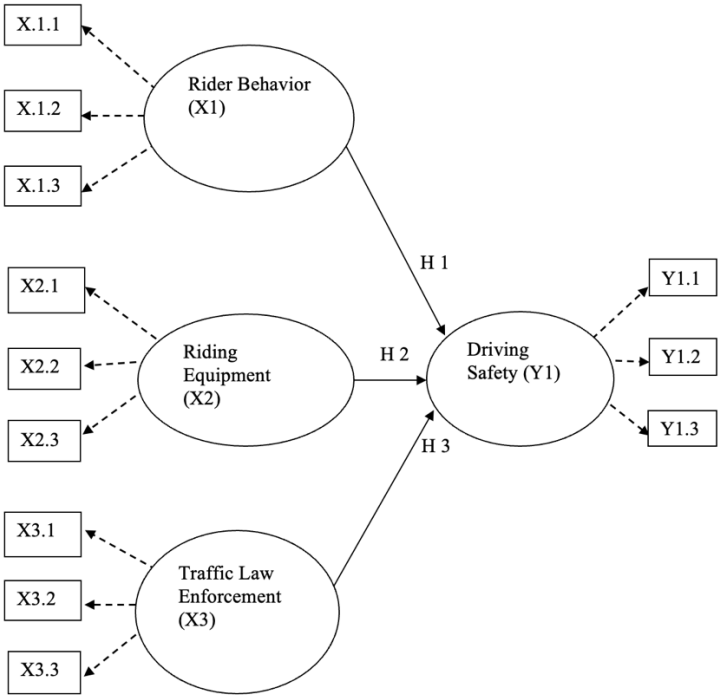


**Figure 1.** Research Framework

H1. The better the rider behavior, the better driving safety
H2. The better the riding equipment, the better driving safety
H3. The better the traffic law enforcement, the better driving safety

## 3. Research methods

This study employs multiple linear regression analysis to comprehensively assess the influence of various factors on driving safety among underage motorcycle riders. The objective of this analysis is to gain insights into how specific aspects of driver behavior, adherence to traffic regulations, and the condition of driving equipment, in conjunction with the enforcement of traffic laws, collectively affect the overall safety of young riders on the road. The statistical analysis is conducted using the software tool SPSS, allowing for a thorough examination of the relationships between these key variables.

The research encompasses the entire population of Tawangsari Village, located within the Wonosobo Regency, with a total population of 3,336 residents. To ensure the robustness of the findings, the sample size was determined through the application of the Slovin formula, resulting in a representative sample of 100 respondents. This sample size, rounded up from the calculated 97.089, ensures that the research data remains reliable and statistically significant. As for the nature of the data collected, it primarily comprises qualitative data, offering a rich and nuanced perspective on the various factors affecting road safety among underage motorcycle riders in the selected area. This qualitative approach enables a comprehensive exploration of these factors, ultimately enhancing the depth of the analysis.

## 4. Results and Discussion

As of the end of May 2010, the population of Wonosobo Regency was 888,813 people, comprising 451,363 males and 437,450 females. Wonosobo Regency, located in the Central Java Province, has interesting demographic and topographical characteristics. Demographically, it reflects a balanced population composition between both genders. Topographically, the regency can be divided into three main regions. A significant portion, approximately 33.33%, lies at elevations between 250 to 500 meters above sea level (MASL). The second region, covering about 50.00% of the total area of the regency, has elevations ranging from 500 to 1,000 meters MASL. Meanwhile, approximately 16.67% of the Wonosobo Regency is situated at elevations exceeding 1,000 meters MASL. These features make Wonosobo Regency a highland area, endowed with natural richness and unique landscapes.

The presence of young volcanoes in the vicinity contributes to the fertility of the soil in Wonosobo, which strongly supports agriculture as the primary livelihood of the community. This fertile land is a valuable asset in the development of agriculture, particularly small-scale farming. However, the rugged valley topography also brings about natural disaster risks like landslides, which need to be managed carefully to ensure the safety and well-being of the population. Wonosobo Regency is a real-world example of the significance of understanding demographics and topography in regional planning and management. This understanding greatly supports the development of agriculture as the primary livelihood of the people in Wonosobo. Nonetheless, due to its topography with steep valleys, it is prone to natural disasters like landslides.

The validity test is used to determine the validity of a questionnaire to be distributed. Validity indicates the extent to which a measuring instrument accurately and precisely performs its measuring function. If a tested instrument is appropriate, it can be considered valid. The criteria

for assessing validity testing. This translation appears to be incomplete and lacks specific criteria for validity testing.

**Table 1.** Validity Test Results

| Variable | | r count | r table | Confirmation |
|---|---|---|---|---|
| Rider Behavior (X1) | X1.1 | 0.766 | 0.2565 | Valid |
| | X1.2 | 0.757 | 0.2565 | Valid |
| | X1.3 | 0.731 | 0.2565 | Valid |
| Riding Equipment (X2) | X2.1 | 0.773 | 0.2565 | Valid |
| | X2.2 | 0.727 | 0.2565 | Valid |
| | X2.3 | 0.751 | 0.2565 | Valid |
| Traffic Law Enforcement (X3) | X3.1 | 0.809 | 0.2565 | Valid |
| | X3.2 | 0.829 | 0.2565 | Valid |
| | X3.3 | 0.701 | 0.2565 | Valid |
| Driving Safety (Y) | Y1 | 0.735 | 0.2565 | Valid |
| | Y2 | 0.790 | 0.2565 | Valid |
| | Y3 | 0.743 | 0.2565 | Valid |

The validity test results, as presented in Table 1, indicate that all the variables under examination, namely Rider Behavior (X1), Riding Equipment (X2), Traffic Law Enforcement (X3), and Driving Safety (Y), have been confirmed as valid for the study. Each sub-variable within these categories surpasses the minimum threshold, with their respective r-count values exceeding the critical r-table value of 0.2565. This outcome suggests that the measurements and assessments related to rider behavior, riding equipment, traffic law enforcement, and driving safety are reliable and can be confidently utilized in the subsequent analyses of this research.

Reliability testing is a tool for measuring a questionnaire which is an indicator of a variable. A questionnaire is said to be reliable if a person's answers to the questions are consistent and stable. A questionnaire is said to be reliable if the Cronbach Alpha (α) value is 0.6. SPSS test results are explained in the table below.

**Table 2.** Reliability Test Results

| Variable | Cronbach Alpha | Reliable Standards | Conclusion |
|---|---|---|---|
| Rider Behavior (X1) | 0.612 | 0.6 | Reliable |
| Riding Equipment (X2) | 0.610 | 0.6 | Reliable |
| Traffic Law Enforcement (X3) | 0.679 | 0.6 | Reliable |
| Driving Safety (Y) | 0.623 | 0.6 | Reliable |

The results of the reliability test show that the Cronbach's Alpha value for all the variables above is greater than 0.6, so it can be concluded that the indicators used by the variables driver behavior, driving equipment, traffic law enforcement, and driving safety can be trusted or reliable to be used as measuring instruments for variables. Multiple linear regression equations are used to determine how much influence the independent variables (driver behavior, driving equipment, and traffic law enforcement) individually influence the dependent variable (driving safety). The multiple linear regression test table can be seen in the following table.

**Table 3.** Multiple Linear Regression Test Results

| Coefficients | | | | | | |
|---|---|---|---|---|---|---|
| | | Unstandardized Coefficients | | Standardized Coefficients | | |
| Model | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | .672 | .942 | | .713 | .477 |
| | Behavior | .337 | .065 | .346 | 5.213 | .000 |
| | Completeness | .279 | .067 | .297 | 4.156 | .000 |
| | Enforcement | .334 | .064 | .385 | 5.223 | .000 |
| a. Dependent Variable: Driving Safety | | | | | | |

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \mu$$
$$Y = 0{,}672 + 0{,}337.X_1 + 0{,}279.X_2 + 0{,}334.X_3 + \mu$$

Based on the equation, it can be seen in the unstandardized coefficients column in Table 3 that the regression analysis can be explained that a constant of 0.672 states that if the independent variable is considered constant, then driving safety (Y) is 0.672. The regression coefficient for driver behavior (X1) is 0.337, meaning that if the values of other independent variables remain constant and driver behavior increases by 1 percent, then the driving safety variable (Y) will increase by 33.7 percent. The regression coefficient for driving equipment (X2) is 0.279, meaning that if the values of other independent variables remain constant and driving equipment increases by 1 percent, then the driving safety variable (Y) will increase by 27.9 percent. The regression coefficient for traffic law enforcement (X3) is 0.334, meaning that if the value of other independent variables is constant and traffic law enforcement increases by 1 percent, then the driving safety variable (Y) increases by 33.4 percent.

The t test basically shows how far the influence of one independent variable individually explains the variation in the dependent variable. The t test can be determined by comparing the calculated t with the t table. There is no positive and significant influence between the independent variables on the dependent variable. positive and significant influence between the independent variables on the dependent variable Determining the Degree of Freedom.

**Table 4.** t-Test Results

| **Coefficients** | | | | | | |
|---|---|---|---|---|---|---|
| | | **Unstandardized Coefficients** | | **Standardized Coefficients** | | |
| **Model** | | **B** | **Std. Error** | **Beta** | **T** | **Sig.** |
| 1 | (Constant) | .672 | .942 | | .713 | .477 |
| | Behavior | .337 | .065 | .346 | 5.213 | .000 |
| | Completeness | .279 | .067 | .297 | 4.156 | .000 |
| | Enforcement | .334 | .064 | .385 | 5.223 | .000 |
| a. Dependent Variable: Safety | | | | | | |

From the results of table 4 of the t test on page 72, it can be explained that the research results of the influence of the driver behavior variable (X1) on the driving safety variable (Y) obtained

a calculated t number of 5.213 > t table 1.9849 so that it can partially have a positive effect on driver behavior (X1) on driving safety (Y). There is a positive influence between driver behavior on driving safety with a significant probability of 0.000, where this value is below the error tolerance that the researchers took, namely 0.05. Nguyen et al., (2023) Thus, Ha is accepted, which means that there is a positive influence between the behavioral factors of underage motorcyclists on driving safety in Tawangsari Village, Wonosobo Regency and its validity has been tested.

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \mu$$
$$Y = 0{,}672 + 0{,}337.X_1 + 0{,}279.X_2 + 0{,}334.X_3 + \mu$$

The results of research on the driving completeness variable (X2) on the driving safety variable (Y) obtained a calculated t number of 4.156 > t table 1.9850, so that partially (individually) it can have a positive effect between driving completeness (X2) on driving safety (Y). There is a positive influence between driving equipment and driving safety with a significant probability of 0.000, where this value is below the error tolerance that the researchers took, namely 0.05. So, Ha is accepted which means that there is a positive influence between the driving completeness factor on the driving safety of underage motorbike riders in Tawangsari Village, Wonosobo Regency which has been tested correctly. Based on the description above it can be explained that the existence of the independent variable influences the dependent variable, this is assumed several variables, namely driver behavior, driving equipment, and traffic law enforcement regarding driving safety.

Based on the results of filling out the questionnaire and the results of multiple linear regression, it shows that the driver behavior variable (X1) is in first place among the three variables that influence driving safety. In this case, it means that the behavior of motorbike riders, which is within the driver's discipline, knowledge and skills, and high speed, affects driving safety in Tawangsarai Village, Wonosobo Regency. This factor shows that driver behavior still needs to be improved to become better so that it is hoped that it can increase the level of driving safety when on the road (Kerimov et al., 2020). The managerial implication is that the Wonosobo Police Traffic Unit needs to increase its supervision of underage motorcyclists who drive their vehicles in the Tawangsari Village area, Wonosobo Regency.

From the results of filling out the questionnaire which has been tested in the multiple linear regression test, it shows that the driving completeness variable (X2) influences driving safety. Where driving equipment includes the use of Indonesian Standard (*Standar Nasional Indonesia* or SNI) standard helmets when driving, eye protection and protective clothing in Tawangsari Village, Wonosobo Regency. The managerial implication is that Dishubkominfo and the Wonosobo Police Traffic Unit are expected to tighten supervision of underage motorbike riders who do not wear proper and complete riding equipment, especially those who ride in Tawangsari Village, Wonosobo Regency, to prioritize their safety with complete attributes when riding.

It can be seen from the results of multiple linear regression that the traffic law enforcement variable (X3) influences driving safety. This can be seen from the results of the t count and the regression coefficient. In this case, this means that the role of law enforcement (Indonesian Police), compliance with traffic laws, and compliance with traffic signs influence driving safety

in Tawangsari Village, Wonosobo Regency. The managerial implication is for the Wonosobo Police Traffic Unit to take firm action against underage motorbike riders who are proven to have violated traffic regulations, especially those driving their vehicles in Tawangsari Village, Wonosobo Regency, to drive well and safely so as not to harm themselves or other motorists when driving. driving on the highway.

## 5. Conclusion

Understanding the level of driving safety for underage motorbike riders in Tawangsari Village, Wonosobo Regency, Indonesia. This research is a response to two main problems. First, the rapid growth of population in Indonesia which is accompanied by increased economic development of society. The impact of this growth is the increase in the number of motorized vehicles, especially motorbikes, which reached more than 61 million units in 2010. However, the increase in the number of motorbikes also has an impact on increasing the number of traffic accidents, especially those caused by driving behavior that tends to ignore safety and lack of awareness of traffic rules. The main problem faced is the high number of traffic accidents on the highway, with around 9,000 deaths every year in Indonesia due to traffic accidents. This data places traffic accidents as the third most common cause of death after coronary heart disease and diseases caused by the TB virus. The role of parents in providing motorbikes to underage children or those who do not meet the criteria for riding.

Many parents, due to increased income, give motorbikes to their children without considering the criteria of their age or readiness to ride. This has the potential to endanger the safety of children and other road users. Apart from violations when riding a motorbike, one of the crucial problems is the lack of use of riding safety attributes such as helmets. This unfavorable cultural influence affects the behavior of underage drivers and must be evaluated and corrected by the relevant parties. Data from the Wonosobo Police shows that the number of traffic accidents in Wonosobo Regency has decreased, but this figure is still significant. Human error, especially by drivers aged 16 to 40, is the leading cause of traffic accidents. To reduce accident cases, the Wonosobo Police have taken action against thousands of traffic violators, especially those who do not obey the rules. However, further efforts are needed to minimize accidents. More effective prevention efforts to improve driving safety for underage motorcyclists in this region. Emphasizing driving safety and changing driver behavior are key steps that need to be taken to reduce the still high number of traffic accidents, which will ultimately help maintain the safety and welfare of the residents of Wonosobo Regency.

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