# Relationship Analysis Between Characteristics, Safety Riding Knowledge, and Intensity of Driver Mobility in Students with Traffic Accident Rates

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| Article Info | Abstract |
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By the Director General of Land Transportation in Central Java, traffic accidents that happen are dominated by drivers with high school educational backgrounds. Based on "Anatomy Report" by Blora Traffic Police, number of accident incidents with a high school equivalent educational background is 206 out of total 313 cases. Senior High School 1 Blora is one of the high schools in Blora that has carried out face-to-face learning activities starting in late 2020, giving rise to probability of students mobilizing by vehicle. By close observation found that 20% of the 80 students had accidents with one incident died. The purpose of the study to determine whether characteristics, knowledge of safety riding, and intensity of mobility influenced the incidence rate of accidents that occurred in Senior High School 1 Blora, through a cross-sectional approach and quantitative analytical observational research design that used questionnaires as the main instrument. From 176 student data that were considered valid, it was concluded that age and education level as form of characteristic factors, then the level of understanding of safety riding, and the use of Personal Protective Equipments (PPE), which is included in safety riding knowledge, have a close relationship with the level of accidents that occurs.

**INTRODUCTION**

The high tendency to use private vehicles compared to public vehicles teenage drivers is in line with the increase in the incidence of traffic accidents. According to the definition put forward by the World Health Organization, a traffic accident is an event of collision of a motor vehicle with another object that can result in losses and is random, involves many factors, is unpredictable, and is preceded by a situation when one or more parties make mistakes in anticipating real driving environmental conditions (Amin et al, 2020). In one of the web uploads owned by the Ministry of Communication and Information, it was stated that 61% of human factors are the main cause of accidents that occur, while 30% are due to infrastructure, and 9% are due to vehicles. One of the human factors that greatly influence accidents is the application of safety riding or aspects of safe and rule-compliant driving behavior (Srisantyorini et al, 2021).

Based on WHO data, traffic accidents are the cause of death of 1000 children per day with vulnerable ages of 10-24 years (Hidayati, 2016). The reason behind the high number of accidents with vulnerable children and teenages is synonymous with physical and psychological conditions that are below the standard of propriety of carrying a motor vehicle, an example that often occurs is the tendency to be reckless, aggressive, not applicable according to applicable regulations and safety riding standards (Chris & Paramadina, 2020). In addition to being viewed through unsafe driving behavior, drivers with adolescence also largely do not meet the legality rules as a driver by having a driver's license (Nastiti, 2017).

Teenage drivers are said to tend to have a low perception of danger risk because of their thinking that driving is something that can be done by their age, but in fact, they still do not have enough understanding or experience to equip them with real situations when driving on the road (Setyowati et al, 2018). In addition to the level of experience and understanding, the characteristics of drivers characterized by age, sex, physical readiness, risk-taking tendencies, as well as the ability to detect hazards quickly are also key to rider safety in adolescence (Joewono & Susilo, 2017).

Of the total 100,028 accidents recorded in the history of the Traffic Police of the Republic of Indonesia (2021) in 2020, according to the Ministry of Transportation, as many as 80,641 cases involved drivers with the educational backgrounds of the perpetrators and victims were high school students. In the same year, as many as 28,051 accident cases were recorded by the Central Statistics Agency in Central Java province, which was told the Director General of Land Transportation in the Central Java task area that the figure was dominated by motorcyclists under 20 years of age or equivalent to high school.

One of the districts that need to be observed in the Central Java area is Blora, because this area feels the loss from traffic accidents with a nominal that is not proportional to the incidence rate. In 2020 through IRSMS (Integrated Road Safety Management System) by the Directorate of Traffic of the Central Java Police, there were 313 cases which made this district ranked 28th out of 35 districts in Central Java, but the loss figure suffered is Rp131,120,000 equivalent to the loss of the 18th ranked district. Then in 2021, there was an increase in the number of accident events by 61 cases with a nominal loss of IDR 428,500,000, equivalent to Boyolali regency in 10th place. This is predicted to happen because accidents that occur in the city of Blora involve more victims and perpetrators of productive age, during productive hours, such as departure and return hours of activities that occur in drivers of working age and students. The results of the analysis are evidenced through descriptive data "Anatomical Report," which is regularly updated by the Blora area Traffic Police, with a description of the events in 2020 of accident perpetrators ranging in age from 15-19 years to 79 years, and victims 14-16 years old to 67 cases. The figure increased by 16.28% for perpetrators and 87 cases for victims. In addition to age, the picture of accidents at a productive age in Blora can also be described through an educational background, that in 2020 there were 206 cases

of incidents of both perpetrators and victims with high school education, and this increased to 255 cases in 2021 from a total of 374 accident events.

SHS 1 Blora is one of the high schools in Blora that has carried out face-to-face learning activities starting in late 2020, thus raising the probability of students mobilizing with vehicles and the risk of traffic accidents arising. With this probability, researchers observed 80 students and found that there had been 15 accidents (20%) involving 16 students, one of whom was a case of death, and most of the others were seriously injured, it was also known that they started driving without being equipped with knowledge of safe driving standards and also the school explained that due to the COVID-19 pandemic, the socialization of safety riding by the Traffic Police could not be held back since 2018.

Based on the findings and description of data that has been obtained from the field, it can then be said that teenage drivers do have a high risk of experiencing traffic accidents, but not all teenage drivers can be said to have committed violations and acted unsafely when driving. So factors such as characteristics built by age, sex, education level, and physical health status, then the safety riding knowledge, which includes the level of understanding, participation in training, use of PPE, and possession of a driver's license must be ascertained whether it has a close influence on accidents that occur, in addition to mobility factors in terms of the average distance and time in one-week students can be one of the things that must be considered to reduce risks and reduce the number of accidents by drivers that occur.

## METHODS

This research is a quantitative study with observational analytical methods that uses a cross-sectional approach, with the target population are 753 students in grades 11th and 12th at SHS 1 Blora. The research will only conducted on 11th and 12th graders because at the time the study is held, only 11th grade and 12th grade are already scheduled to have attend hybrid face-to-face meetings, grade 10th is not yet have to based on the early curriculumn, this is also related to the new school year. Then after only focusing on grades 11th and 12th, researchers used Slovinn's formula to find a minimum number of sample sizes, which was 97 correspondents.

The main research instrument used in this study is the Questionnaire, which is distributed by the researcher through google form media with the delivery directly represented by the class representative, which the representative will then continue to his classmates to fill in the duration according to the procedures described. The questionnaire fillers will be again sorted by the researcher according to the inclusion criteria, namely: (1) Being in the age range of 15-19 years, (2) Having driving experience more or equal to 2 years, (3) Having experienced a traffic accident within the last three years; and exclusion criteria: (1) Travel out of the city of Blora for one week before or when the study is held, and (2) Unable to drive a motor vehicle.

The analysis used is then divided into two sessions, namely univariate to analyze the frequency of single data distribution per variable and bivariate to test the relationship between dependent and independent variables, that is the traffic accident rate. In the bivariate test, researchers used the Chi-Square and Fisher Exact tests, which were followed by Risk Estimate testing to obtain the prevalence ratio.

## RESULT AND DISCUSSION

**Commented [HL1]:** Hasil sebaiknya tidak diawali dengan Table. Tapi perkuat dengan narasi dulu

The number of students who were willing to fill out the questionnaire to become respondents was 294 students out of a total of 753 population. Of the total questionnaire fillers of 294 students, based on the inclusion criteria that is "having experienced a traffic accident in past three years," only 179 data were used, students who had never had a traffic accident were considered as invalid data.

Table 1. Overview of general questionnaire result

| Experienced of Traffic Accident | Frequency | |
|---|---|---|
| | N | % |
| Never had been | 115 | 39,1% |
| Have been, once | 147 | 50,0% |
| Have been, more than once | 32 | 10,9% |
| Total | 294 | 100% |

Table 2. Overview of sample

| Traffic Accident Rate | Frequency | |
|---|---|---|
| | N | % |
| Mild | 22 | 12,3% |
| Moderate | 116 | 64,8% |
| Severe | 41 | 22,9% |
| Total | 179 | 100% |

In table 2, a univariate analysis was carried out regarding the frequency distribution of the accidents rate that occurred in respondents who were considered valid as samples, the highest distribution was in moderate accidents that had a difference of more than 40% from mild and severe accident rate.

Table 3. Crosstabs overview of Characteristic variabels with Traffic Accident Rate

| Variabel | Traffic Accident Rate | | | | | | Total | | p-value | PR (95% CI) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mild | | Moderate | | Severe | | | | | |
| | n | % | n | % | n | % | n | % | | |
| Age | | | | | | | | | | |
| 15-16 years | 16 | 17,6 | 60 | 65,9 | 15 | 16,5 | 91 | 100 | 0,023 | 1,491 |
| 17-18 years | 6 | 6,8 | 56 | 63,6 | 26 | 29,6 | 88 | 100 | | (1,418-1,566) |
| Sex | | | | | | | | | | |
| Male | 7 | 11,3 | 44 | 71 | 11 | 17,7 | 62 | 100 | 0,42 | |
| Female | 25 | 12,8 | 72 | 61,5 | 30 | 25,7 | 117 | 100 | | |
| Education level | | | | | | | | | | |
| 11th grade | 18 | 19 | 60 | 63,2 | 17 | 17,8 | 95 | 100 | 0,008 | 1,469 |
| 12th grade | 4 | 4,7 | 56 | 66,7 | 24 | 28,6 | 84 | 100 | | (1,395-1,543) |
| Health status | | | | | | | | | | |
| No disorders history | 17 | 14,3 | 77 | 64,7 | 25 | 21 | 119 | 100 | 0,426 | |
| With disorders history | 5 | 8,3 | 39 | 65 | 16 | 26,7 | 60 | 100 | | |
| Total | 22 | 12,3 | 116 | 64,8 | 41 | 22,9 | 179 | 100 | | |

In table 3, a bivariate analysis test was carried out between the characteristic variables and the accident incidence rate through crosstabs.

**The Relationship between Age and Traffic Accident Rate**

The correlation between age and accident rate is considered to be due to lack of experience, real mastery of the driving environment and unsafe-act carried out by drivers with a younger age.

This happened to respondents at the study site because of the encouragement of high driving needs and desires but not based on adequate understanding, especially on knowledge and experience because they were relatively new to being able to drive a motor vehicle. According to case studies based on age groups, the younger the age of the driver, the higher the impact of accidents due to unsafe-act or behavior not according to safety standards that have been applied (Chen Lihui, 2017). Another study that also corroborates that age greatly affects the rate of accidents that occur in teenage drivers is a study by Franco et al (2020), stating that the younger the age of the driver, the higher the probability of carrying out unsafe behavior that is at risk of causing traffic accidents, this is influenced by a low level of experience when facing vehicle situations and the real environment.

**The Relationship between Sex and Traffic Accident Rate**

Based on respondents in the research conducted, students with the male sex do not necessarily have a better driving tendency, on the contrary, students with the female sex do not necessarily have a worse driving ability, this may be caused by the environment where they grow or associate which is the cause of how to behave when driving. Based on research from Billah et al (2022), that from the results of logistic regression used in analyzing data, the tendency of environmental factors such as time when driving, terrain when driving, and experiences of having been through accidents is more dominant to influence than gender.

**The Relationship between Education Level and Traffic Accident Rate**

In research on students of SHS 1 Blora, the level of education is considered to affect the accident rate because the higher the level of education class taken, the broader a person's view of rules and behavior, then the more information that can be used when driving in a real environment. This applies to students as respondents, the higher the education, namely being in grade 12th, the higher the probability of knowledge and experience that has been gained compared to respondents who are in grade 11th. In addition, respondents who are currently on 12th grade had more opportunities in terms of in-person driving experience before the COVID-19 pandemic, which greatly limited activities to move outdoors with the possibility of using vehicles. One of the studies that revealed that the level of education affects the understanding and level of accidents that occur in a driver is a study belonging to Rumlawang & Kondolembang (2019), in the study the lower the last level of education received, affecting the incidence of accidents experienced by respondents. In addition, research by Dewi (2018) also concluded that the last education received by a group of people will affect the driving environment of that group of people. Driver with a young age and a lower education are also considered less responsible for what they do when they are driving (Issa, 2016).

**The Relationship between Health Status and Traffic Accident Rate**

This variable was considered to have no relationship with accident rates because respondents in the study who filled in had a history of disease did not consider the history of the disease they suffered to be an acute and very disturbing type of disorder when driving, the average respondent had visual impairments that could be treated with the help of glasses, and they did not take any type of treatment that resulted in drowsiness and weakness while traveling (Alonso et al, 2017). One of the studies that supports that health status does not determine the level of accidents experienced by students is a study by Rolison et al (2018), in the results obtained in the study, compared to the health status or history of health disorders that have been experienced, the consumption of alcohol and illegal drugs has more influence on the level of concentration and behavior when driving, besides that most health disorders are considered to affect the level of accident when a driver has entered the adult age range (over 40 years).

Table 4. Crosstabs overview of Safety Riding Knowledge variabels with Traffic Accident Rate

| Variable | Traffic Accident Rate | | | | | | Total | | p-value | PR (95% CI) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mild | | Moderate | | Severe | | | | | |
| | n | % | n | % | n | % | n | % | | |
| Safety riding understanding level | | | | | | | | | | |
| Poorly understood | 3 | 42,8 | 1 | 14,7 | 3 | 42,8 | 7 | 100 | | 2,737 |
| Understand | 4 | 12 | 19 | 57,6 | 10 | 30,3 | 33 | 100 | 0,017 | |
| Well Understand | 15 | 10,8 | 96 | 69,1 | 28 | 20,1 | 139 | 100 | | (2,660-2,812) |
| Participation in safety riding training | | | | | | | | | | |
| Never been attend | 15 | 12 | 81 | 64,2 | 30 | 23,8 | 126 | 100 | 0,895 | |
| Have attended | 7 | 13,2 | 35 | 66 | 11 | 20,8 | 53 | 100 | | |
| Use of PPE | | | | | | | | | | |
| Not complete | 10 | 17,2 | 30 | 51,7 | 18 | 31,1 | 58 | 100 | 0,04 | 1,324 |
| Complete | 12 | 10 | 86 | 71 | 23 | 19 | 121 | 100 | | (1,254-1,393) |
| Posession of Driving Lisence | | | | | | | | | | |
| Not have yet | 21 | 13.3 | 102 | 64,6 | 35 | 22,1 | 158 | 100 | 0,542 | |
| Already have | 1 | 4,7 | 14 | 66,7 | 6 | 28,6 | 21 | 100 | | |
| Total | 22 | 12,3 | 116 | 64,8 | 41 | 22,9 | 179 | 100 | | |

**The Relationship between Safety riding understanding level and Traffic Accident Rate**

As far as research was conducted on students of SHS 1 Blora, the level of understanding of safety riding shown through filling in the questions was done quite well and produced a fairly significant number in the form of an average level of knowledge in the category of "Well understand," which indicates that most of the basic concepts of safety riding have begun to be understood by them, but this does not mean that the application of knowledge has been applied fully, so there are still respondents with a score of "Well understand," still experiencing traffic accidents, especially in the classification of accidents that are quite severe or it can be said that there is a lack of application so that it is only limited to theory. Based on research by Machfutra et al (2022), drivers with a high understanding of safe driving behavior will suffer lower losses due to traffic accidents, but understanding alone is not enough. Explained in Hidayati's research (2016), it is stated that the probability of an accident, especially the emergence of losses, can be seen from whether there is an application of safe driving practices or what is commonly called safety riding which of course starts from understanding the concept of safety riding itself which includes such as the meaning of signs, driving rules, road usage rules, ownership letters and driving permits.

**The Relationship between Participation in safety riding training and Traffic Accident Rate**

The absence of a meaningful relationship between participation in safety riding training in SHS 1 Blora students and accident rates is because most of the students have not received the training, for those who have received it, the training is only fleeting or at one time. In addition, the training that may have been received comes from one of the private parties or the Traffic Police, so it cannot be measured and equalized how the information obtained, the training is also obtained privately rather than simultaneously through the school. As stated in Law No. 22 of 2009 articles 78 to 79, safety riding training is mandatory to be obtained by a person as a debriefing before obtaining a driver's license, and is organized by the local government with the help of the Traffic Police. According to research by Nugroho et al (2021), it is stated that participation in safety riding training does not have a more pronounced impact on driving behavior, but instead support from social friends and parents is a factor related to attitudes and behaviors directly when driving because it is

more pronounced its application in life habits. In addition by Machfutra et al (2022)'s research, participation in safety riding training is not mentioned to be one of the factors that support the accident incidence rate, but rather experience and understanding of the terrain itself.

**The Relationship between use of PPE and Traffic Accident Rate**

The lack of PPE use in some respondents can be related to the level of application to the understanding of safety riding previously mentioned, this is also very related to personal comfort because the more PPE used, the heavier it is usually and there is also a lot of burden felt during driving, besides that the absence of a supervisor who puts in order the use of PPE increases the order of the respondent in its use which is then in line with the habit of application by individuals due to environmental influences.

The use of Personal Protective Equipment or PPE when driving is regulated in Law No.22 of 2009, with the aim of being a preventive measure from the risk of impact and damage to the driver's body parts when experiencing a traffic accident, this also applies the principle to the K3 risk control hierarchy. In Konlan & Hayford (2022) research, the use of helmets is one of the main factors in rider factors that affect the incidence of accidents, besides that in the research of Aulia et al (2020), it also revealed that the use of PPE such as SNI helmets, jackets, and masks can be marked as safety-conscious driving behavior or the application of safety riding which can reduce the risk of exposure and damage to body parts that may occur when driving. Both studies are also in line with the research of Manouchehrifar et al (2018), which in more detail that the use of PPE greatly affects the severity of the wound, the part of the body exposed to the wound, the form of post-accident trauma, and the losses covered, this is the same as that shown in the results of this study.

**The Relationship between Posession of Driving License and Traffic Accident Rate**

Research conducted on students of SHS 1 Blora shows that there is no relationship between the ownership of a driving license and the rate of accident experienced, but the level of education and understanding has a relationship, thus allowing probabilities such as the possession of a driver's license to be carried out not based on formal eligibility tests, being old enough but not yet managing the ownership of a driver's license, or having received enough understanding and experience before having a driver's license. It is written in chapter VIII article 77 paragraph (1) of the Law of the Republic of Indonesia No. 22 of 2009, that everyone is required to have a driver's license as the legality of a driver, which means that a driver is considered worthy of driving if he is eligible to get a driver's license. In Nastiti's research (2017), driving license ownership and participation in the driver's license manufacturing test were considered to have no influence on the accident experienced or the level of damage felt due to the accident. In the study, researchers considered that SIM ownership and participation in the SIM making test would be related to the level of understanding of safety riding, but in the final results of the study, there was still no correlation.

Table 5. Crosstabs overview of Driver Mobility Intention variabels with Traffic Accident Rate

| Variable | Traffic Accident Rate | | | | | | Total | | p-value | PR (95% CI) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mild | | Moderate | | Severe | | | | | |
| | n | % | n | % | n | % | n | % | | |
| Total average time of driving in a week | | | | | | | | | | |
| <6 hours | 14 | 13,3 | 69 | 65,7 | 22 | 21 | 105 | 100 | | |
| 7-16 hours | 8 | 12,9 | 39 | 62,9 | 15 | 24,2 | 62 | 100 | 0,717 | |
| >20 hours | 0 | 0 | 8 | 67 | 4 | 33 | 12 | 100 | | |
| Total average mileage of driving in a week | | | | | | | | | | |
| <20 km | 15 | 17,2 | 53 | 61 | 19 | 21,8 | 87 | 100 | 0,41 | |
| 21-90 km | 6 | 7,7 | 54 | 69,2 | 18 | 23,1 | 78 | 100 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| >100 km | 1 | 7,1 | 9 | 64,3 | 4 | 28,6 | 14 | 100 |
| Total | 22 | 12,3 | 116 | 64,8 | 41 | 22,9 | 179 | 100 |

**The Relationship between Total average time of driving in a week and Traffic Accident Rate**

The study conducted on SHS 1 Blora, is a study conducted on respondents with the characteristics of young driver, on the instruments used, respondents also filled in the average total time in one trip and how often their intensity drove in one week, both showed in one day the average total travel time was less than 8 hours, even the data showed the largest amount of average travel time in one week on respondents were less than 6 hours. So, it can be said that this variable does not affect the incidence of accidents experienced, because on average the total even the time does not exceed the maximum limit of driving in one day, and respondents have the characteristics of young driver. According to the research of Shen et al (2020), that the length of time to drive does not have a direct effect on the incidence of accidents they experience, the time factor is closely related to the character of a rider including acceptance of readiness when driving on the road, a person with better characteristics (based on age, gender, level of education, and experience), the more prepared the person will drive in a certain time. In addition, driving time such as morning or evening also affects the level of readiness of a person's characteristics when driving to pass a distance.

**The Relationship between Total average time of driving in a week and Traffic Accident Rate**

In this study, the average mileage in one day for drivers did not exceed the maximum limit set by the legislation, as well as their total accumulated average mileage in one week which was evenly spread between <20 km and the range of 20-90 km. So young driver with limited mobility needs, limited income, and total average long mileage under the law are not related to the rate of accidents that may occur. Research by Zhu et al (2015), considers that the average mileage in a short span of time such as one day or one week of a group of teenage driver will not have a direct effect on the accidents they experience, this is because the total average annual mileage they use in driving is not that high. Also according to research by Mekonnen et al (2019), traffic accidents due to mobility in drivers are based on income and driving experience, the lower the mobility (due to the need for driving), the lower the risk of traffic accidents through the mileage per time used.

**CONCLUSION**

The conclusions that can be drawn from this study are that the variables of age and education level as forming characteristic factors have a relationship with the rate of accidents that occur. In addition, the level of understanding of safety riding, and the use of PPE when driving, which is included in the understanding of safety riding, also have a relationship with the level of accidents but not with the intensity of the rider's mobility. Hopefully, that through this research, formal educational institutions and local governments will begin to implement learning and provide information about safety riding to students to reduce and reduce the risk of accidents, especially with severe levels of losses.

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**Commented [HL3]:** Judul sebaiknya tidak kapital semua. Silahkan perbaiki daftar pustakanya. Tambahkan 5 jurnal internasional