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Original Research

The perilous riding behavior and accident of motorcycles in university students

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Abstract

Background: An inevitable traffic accident frequently resulted from the dereliction of individualized community from disobeying regulation which causes an impact on the safety of another person. The impact raised is not merely in terms of material but also non-material.
Objective: This research was aimed to know the correlation between risky riding behavior and the accident of motorcycles experienced by university students of Halu Oleo University of Kendari, Indonesia.
Methods: This research utilized the cross-sectional design. Data were collected on June 2021 using a validated questionnaire online among 251 respondents.
Results: 84.5% of respondents had ever experienced motorcycle accidents. There was a correlation between listening to music while riding (p = 0.973), riding with the speed more than 50 km/hour (p = 0.220), sudden braking (p = 0.267), overtaking without turning rear light (p = 0.518), with the motorcycle accidents.
Conclusion: The dangerous riding behavior can potentially decrease the rider's ability and increase the possibility of a car accident. The university could improve safe riding through empowering and encouraging education about riding towards students.

Keywords: accident; unsafe behavior; teenager; motorcycle; Indonesia

Background

Ownership of motorcycle based-vehicles in Indonesia, especially two-wheeled vehicles, is increasing. This causes various problematic traffic such as traffic jams. The fact in the field shows that it is not only the number of traffic jams but also the amount of traffic accident had increasingly occurred. This is due to the lack of insight related to traffic regulation, which consequently, many people commit traffic violations (Nurgiansah et al., 2020). Therefore, traffic and transportation must be considered to improve social mobility so that society can do activities properly and allow them to avoid accidents (Indria et al., 2019; Dermawan, 2020).

Traffic violations are frequently committed by the public driver, rider, or pedestrians who do not pay attention to the applied regulations, which impact other people's safety and the material and non-

material losses (Nurfauziah & Krisnani, 2021). According to WHO, regarding the protection of the road, highlighting that the number of traffic deaths has reached 1.35 million. The traffic accident and injured people mostly indicated from the age of 5-29. This disproportional burden is mainly experienced by pedestrians, cyclists, and motorcycle riders, especially those who live in developing countries. The fact also shows that the deaths in Southeast Asia and Western Pacific mainly involved motorbikes with a percentage of 43% (World Health Organization, 2018).

Indonesia happened to be one of the countries with the tenth rank of the highest number of deaths. According to the center of the health crisis of the Indonesian Ministry of Health, the traffic accident in 2017 was the third-largest accident categorized as a non-natural disaster in Indonesia (Ministry of Health Republic of Indonesia, 2018). The Statistics data of the National Police Corps in 2017 showed that motorbikes become the most number of traffic accidents in two quarterly periods at the end of 2016 and in early 2017 with the percentage as much as 63,251 (Kepolisian Republik Indonesia, 2017).

According to the Department of Land Transportation, the human factor becomes the primary factor that causes the accident. The ratio of each respective factor of traffic accidents in Indonesia from 2010 until 2016 is a human factor, the factor of facilities or vehicles is 21.21%, and road infrastructure is 9.09% (Komite Nasional Keselamatan Transportasi, 2016). According to the Sulawesi Central Statistics Agency, based on recapitulation of each district and city, it is known that in Southeast Sulawesi, the number of motorcycles based-vehicle in 2017 is 598,294, while in 2018 are 649,308 and in 2019 are 710.520. Regarding Kendari itself, the number of motorcycle based-vehicle from 2017 to 2018 had undergone a significant increase as much as 293 545 in 2019 (Badan Pusat Statistik, 2020).

With the large number of college students who commit traffic violations, it brings about tremendously worrying behavior. A large number of traffic violations can potentially cause a traffic accident. On the other side, a helmet is commonly used as head protection in numerous activities, such as military and civil society activity, just like sports, mining, or any other activities. In this case, the helmet could render additional protection for the head from any things that fall up or quickly crash. Moreover, even some other countries obligated their citizens to use the helmet for either motorcycle riders or any other rider in the non-motorcycle rider (Widiasih, 2018).

After observing various data, it can be concluded that Indonesia is one of the countries with the largest number of riders globally. Therefore, there is a high demand for specific research in order to analyze the dangerous riding behaviors at a university. This research aimed to investigate or examine the correlation of the perilous riding behavior with the number of motorbike traffic accidents in students of Halu Oleo Kendari University campus, Indonesia.

Methods

Study Design

This research utilized the cross-sectional design. The study was carried out on June 2021 in Halu Oleo University of Kendari, Southeast Sulawesi, Indonesia.

Population and sample

The sample was calculated using a large sample formula for the different hypothesis test 2 proportions with a degree of significance of 5%, strength test was 95%, and a calculated second hypothesis of the sample sides. Therefore, at least 217 samples are required. Convenience sampling was used to select the samples. The inclusion criteria of the samples were those who were riding motorbikes as transportation all day long and in a period of pursuing undergraduate education at the university.

Instrument

The instrument to collect the primary data was done using a questionnaire adopted from the previous research (Wartatmo & Kuschitawati, 2011) and whose validity and reliability have been tested by the previous researchers (Cronbach's alpha = 0.842). The questionnaire has three phases; the first phase involves the question about the general characteristics, the second phase questioned about dangerous behavior in riding a motorbike, and the third phase is about the description of the history, frequency, and the accident category experienced by respondents in the last twelve months.

Data Collection

Data were collected from 9 to 19 of June 2021 using Google Online Form distributed to the students.

Data Analysis

Data were analyzed using SPSS application version 16.0. Descriptive statistics and correlational statistics were used for data analysis.

Ethical Consideration

This research has been approved by the Research Ethics Committee of the Faculty of Health Sciences in South Sulawesi, Indonesia. Using the primary data source in the form of a questionnaire distributed online using the google form application. Respondents were given an explanation prior to approval regarding the study and were also asked to fill out informed consent before filling out the research questionnaire.

Results

There were 251 respondents included in this study. Their characteristics can be seen in the tables below.

Table 1 The distribution of frequency based on the respondents' characteristic

General characteristic	N	%
Sex		
Male	93	37.1
Female	158	62.9
Age		
<17	3	1.2
18	31	12.4
19	43	17.1
20	95	37.8
>21	79	31.5
Faculty		
Health	150	59.8
Non-health	101	40.2
Riding experience		
<1 year	27	10.8
1-3 year	52	20.7
3-5 year	50	19.9
>5 year	122	48.6
Riding duration		
Not everyday	108	43
<30 Minutes	20	8
30 minutes – 1 Hour	47	18.7
1-2 Hour	19	7.6
2-3 Hour	11	4.4
>3 Hour	46	18.3
Riding distance		
<5 KM	94	37.5
>5 KM	157	62.5

Based on table 1, it is shown that most respondents were females (158 respondents; 62.9%), aged 20 years (95; 37.8%). Most respondents were from health faculty (150 respondents; 59.8%). The majority of the respondents had more than five years of most motorcycle riding experience (122; 48.6%). Most respondents had a non-everyday riding duration (108; 43%), and more than half of the respondents had a riding distance > 5 KM (157; 62.5%).

Based on table 2, it is shown that in the past two couple months, most of the respondents experienced motorcycle accidents (212; 84.5%), with at least one-time accidents (87; 34.7%), and with minor accidents (153; 61%).

Table 2 The distribution of accidents experienced by the respondents

Respondents Accident Record	N	%
The Accident Record		
Ever	212	84.5
Never	39	15.5
The Accident Frequency		
Once	87	34.7
Twice	65	25.9
Three times	42	16.7
Four times	18	7.2
Never	39	15.5
The Accident Category		
Minor accident	153	61
Medium accident	47	18.7
Fatal accident	12	4.8
Never	39	15.5

Table 3 The correlation among of law-abiding, administrational requirement factor and motorcycle accident

Variable	The Accident Record						*P-Value*	OR (95%CI)
	Ever		Never		Total			
	N	%	N	%	N	%		
Riding with multiple passengers								
Yes	87	41	14	35.9	101	40.2	0.547	1.243 (0.612-2.526)
No	125	59	25	64.1	150	59.8		
Going through the traffic red light								
Yes	23	10.8	8	20.5	31	12.3	0.092	0.472 (0.194-1.148)
No	189	89.2	31	79.5	220	87.7		
Riding on the sidewalk								
Yes	27	12.7	11	28.2	38	15.2	0.013	0.371 (0.166-0.832)
No	185	87.3	28	71.8	213	84.8		
Owning driving license Type C								
Yes	88	41.5	23	59	111	44.2	0.044	2.026 (1.012-4.055)
No	124	58.5	16	41	140	55.8		

Based on the data displayed in Tables 3 to 6, the result of the research explained the correlation between perilous driving behavior variables and the incidence of motorcycle accidents. The study results indicated that most respondents had dangerous driving behavior in riding a motorcycle with a speed over 50 km/h (236; 94%) and rode as opposed to the road direction (226; 90%). In addition, the majority of the respondents did not have driving license type C (140; 55.8%), conducted sudden braking (117; 46.6%), overtook from the sideroad shoulder/left side of the road (89; 35.4%), and surpassed without a turn rear signal (82; 32.7%). Among those variables, only the variables of using the sidewalk ($p = 0.013$), having no type C driving license ($p = 0.044$), and no keeping a distance ($p = 0.035$) had a significant relationship with the motorcycle accidents.

However, utilizing the sidewalk could potentially experience an accident, 0.371 times greater than not using sidewalks (95% CI: 0.166-0.832). Also, the potential of experiencing an accident for those who did not have a type C driving license was 2.026 (95% CI: 1.012-4.055) times compared to those having a type C driving license. Additionally, there was a significant correlation between the act of not keeping the distance when riding a motorcycle with an accident, with the range of potential as much as 2.465 (95% CI: 1.042-5.835) times compared to maintaining distance.

Table 4 The correlation between the personal condition in riding factor and motorcycle accident

Variable	The Accident Record						P-Value	OR (95%CI)
	Ever		Never		Total			
	N	%	N	%	N	%		
Riding in drunk condition								
Yes	5	2.4	1	2.6	6	2.4	0.938	0.918 (0.104-8.077)
No	207	97.6	38	97.4	245	97.6		
Riding in exhaustion and sleepy condition								
Yes	45	21.2	8	20.5	53	21.1	0.920	1.044 (0.449-2.429)
No	167	78.8	31	79.5	198	78.9		
Riding in the early dawn								
Yes	44	20.8	9	23.1	53	21.1	0.744	0.873 (0.386-1.973)
No	168	79.2	30	76.9	198	78.9		
Eating and drinking								
Yes	69	32.5	9	23.1	78	31.1	0.240	1.608 (0.724-3.574)
No	143	67.5	30	76.9	173	68.9		
Smoking								
Yes	25	11.8	4	10.3	29	11.5	0.783	1.170 (0.383-3.569)
No	187	88.2	35	89.7	222	88.5		
Using handphone								
Yes	16	7.5	-	0	16	6.4	0.076	0.925 (0.890-0.961)
No	196	92.5	39	100	235	93.6		
Listening to music								
Yes	44	20.8	8	20.5	52	20.7	0.973	1.015 (0.436-2.363)
No	168	79.2	31	79.5	199	79.3		

Table 5 The correlation between riding preparation factor and motorcycle accident

Variable	The Accident Record						P-Value	OR (95%CI)
	Ever		Never		Total			
	N	%	N	%	N	%		
Taking routine reparation								
Yes	30	14.2	3	7.7	33	13.1	0.273	1.978(0.573-6.832)
No	182	85.8	36	92.3	218	86.9		
Checking wheel condition and pressure								
Yes	146	68.9	32	82.1	178	70.9	0.096	0.484(0.203-1.153)
No	66	31.1	7	17.9	73	29.1		
Checking brake function								
Yes	169	79.7	32	82.1	201	80.1	0.876	-
No	42	19.8	7	17.9	49	19.5		
Checking main light function								
Yes	171	80.7	32	82.1	203	80.9	0.839	0.912(0.376-2.213)
No	41	19.3	7	17.9	48	19.1		
Checking turn signal light function								
Yes	168	79.2	29	74.4	197	78.5	0.495	1.317(0.597-2.906)
No	44	20.8	10	25.6	54	21.5		
Checking rear mirror								
Yes	170	80.2	29	74.4	199	79.3	0.409	1.396(0.631-3.088)
No	42	19.8	10	25.6	52	20.7		
Using Indonesian national standardized helmet								
Yes	181	85.4	34	87.2	215	85.7	0.768	0.859(0.312-2.365)
No	31	14.6	5	12.8	36	14.3		
Using jacket and glove								
Yes	193	91	35	89.7	228	90.8	0.797	1.161(0.372-3.618)
No	19	9	4	10.3	23	9.2		

Table 6 The correlation between riding technique factor and motorcycle accident

Variable	The Accident Record						P-Value	OR (95%CI)
	Ever		Never		Total			
	N	%	N	%	N	%		
Decreasing speed on damage and slippery road, and in rain condition								
Yes	117	55.2	21	53.8	138	55	0.877	1.056 (0.532-2.095)
No	95	44.8	18	46.2	113	45		
Riding at a speed over 50 Km/hour								
Yes	201	94.8	35	89.7	236	94	0.220	2.088 (0.629-6.929)
No	11	5.2	4	10.3	15	6		
Sudden braking								
Yes	102	48.1	15	38.5	117	46.6	0.267	1.484 (0.737-2.985)
No	110	51.9	24	61.5	138	53.4		
Overtaking without rear light sign								
Yes	71	33.5	11	28.2	82	32.7	0.518	1.282 (0.603-2.723)
No	141	66.5	28	71.8	169	67.3		
Turning on the main light in the daylight								
Yes	55	25.9	8	20.5	63	25.1	0.472	1.357 (0.589-3.131)
No	157	74.1	31	79.5	188	74.9		
Overtaking other vehicles on the left side or the roadside								
Yes	78	36.8	11	28.2	89	35.4	0.303	1.482 (0.699-3.141)
No	134	63.2	28	71.8	162	64.6		
Turning on the rear light before taking the turn								
Yes	46	21.7	6	15.4	52	20.7	0.371	1.524 (0.602-3.860)
No	166	78.3	33	84.6	199	79.3		
Keeping the distance								
Yes	23	10.8	9	23.1	32	12.7	0.035	2.465 (1.042-5.835)
No	189	89.2	30	76.9	219	87.3		
Riding opposed road direction								
Yes	189	89.2	37	94.9	226	90	0.273	0.444 (0.100-1.965)
No	23	10.8	2	5.1	25	10		
Carrying stuff with overload capacity								
Yes	29	13.7	3	7.7	32	12.7	0.303	1.902 (0.550-6.579)
No	183	86.3	36	92.3	219	87.3		

Discussion

Of 251 respondents, 212 people (84.5%) had a record of accidents in the past 12 months. This case is greater compared to several previous research related to motorcycle accidents, as previous studies recorded around 30 incidents of traffic accidents occurred in some students (Prima, 2015), and 229 accident cases in Bogor city in 2014 (Fadilah & Ginanjar, 2018).

The above accident happened because the high-risk population who potentially experienced a traffic accident is a teenager. It is also stated that one of the biggest contributors segments in traffic accidents comes from teenagers because they are in the transformation period from childhood to adulthood, which in this phase, teenagers tend to try on a lot of new things like riding a motorcycle (Fadilah & Ginanjar, 2018).

This research stated that the use of the sidewalk potentially caused the accident with the risk of 0.371 times greater than not using the sidewalk. It is because the sidewalks were not suitable for vehicles. In line with the previous research stated that the proportion of accidents due to the use of the inappropriate road is greater than the use of the right road. This is due to the increasing number of vehicles that often lead to congestion so that the riders go passes the sidewalk, which is not only putting themselves in danger but also endangers pedestrians around the sidewalk (Hidayati & Hendrati, 2016). The other significant risk of traffic accidents in this research is found from the riders who did not have a type C driving license, with a number of 2,026. On the contrary, the study

conducted by (Fikriyah, 2016), which stated that the driving license ownership was not related to traffic accidents, in line with the research done by (Town, 2017) and the study in 2010 Until 2012, which asserted that the riders without driving license were involved in accidents in Mamuju District West Sulawesi. Another research conducted to showed that the majority of respondents who already have a driving license have a better understanding of Safety Riding than users who do not have a driving license (Nastiti, 2017).

Besides those two risks above, this research indicated the results that the act of not keeping the distance potentially experienced a traffic accident with the number of 2.465. it seems in line with the study conducted by (Saragih, 2011), which showed that about 0.14% of the accidents that occur in the city of Pematang Siantar are caused by the act of not keeping the distance. This is because of the negligent riders in riding the vehicle cause a decrease in concentration and responsibility (Arfan & Wulandari, 2018).

On the other side, this research also found that using the sidewalk while riding is more dangerous, with the estimated risk about 0.371 times higher to likely causing the motorcycle accidents to riders and pedestrians compared to students who did not use the sidewalk when riding the motorcycle. This is in line with research conducted by (Makalew et al., 2019) in 2019 in North Sulawesi, which stated that there was a significant correlation with traffic accidents that happened towards the society who lives in rural and urban areas where it was stated that it was 32.5 times higher to likely causing the accidents. From this fact, communities, especially students, need to be aware that the function of the sidewalk is clearly for pedestrians. However, there are still many motorcycle riders who still pass through the sidewalk. From this kind of condition, it can be assumed that some of the riders do not put pedestrian safety into considerations, and this could worsen the social impact in which such attitudes of riders could trigger the potential of the accident to become higher (Makalew et al., 2019).

Another significant risky behavior is a rider who did not have a type C driving license with a risk rate about 2.026 times greater to have a motorcycle accident. One of the traffic requirements is the existence of a driver's license. Therefore, student awareness of making a driving license is highly important to create a sense of traffic rule obedience. This fact is in line with research conducted by (Hidayati & Hendrati, 2016) in Surabaya. It is stated that there is a clear correlation with traffic accidents in junior high school students in Wonokromo District, Surabaya, with a rate risk of the accident about 3.034% (Hidayati & Hendrati, 2016). This accident should encourage the students' awareness of the urgency of making a driver's license to suppress traffic accidents on the road.

Additionally, the impact of traffic violations can be seen from the increasing number of traffic accidents each year. That is why, as students who are categorized as the ones who obey the law, they are required to understand the detailed compilation of proper traffic procedures and the met requirements. From the explanation above, it is known that the awareness of the making and the ownership of a driving license is crucial in reducing the number of motorcycle traffic accidents on the road. Therefore, a driving license is one of the most obligated requirements needed to be fulfilled by all people to ride a motorcycle (Muryatma, 2017).

Keeping a distance away when riding the motorcycle is one of the riskiest actions, with the rate about 2.465 times higher to experience a motorcycle accident. From this case, it is known that one of the factors which need to be considered in riding is a safe distance because, as to how shown in the field that due to the frequent negligence in terms of riding distance, many accidents are caused by riders who are unable to control their vehicle. The closer the distance one vehicle with other vehicles on the front side, the greater the crash risk. A safe distance is a crucial thing that must be preserved, and it can be done by providing the empty space between one vehicle to another front positioned vehicle. The safe distance could be generalized. One vehicle must have at least a minimum distance from other vehicles with an estimation like two-second braking. The first second is a reaction, and the next second is braking. When it comes to a more comprehensive description, in order to determine the safe distance, it is necessary to look at the situation of the road, for example, a vehicle traveling at a speed of 80 km/h. The safe distance is about 80 meters. Likewise, if the speed is 50 km/h, the safe distance is about 50 meters. Those two examples are the ideal safe

distance which could be taken into example (Putra et al., 2020).

According to Winurini (2012), motorcycle riders tend to be unaware of the dangers of riding. The reason for participating beyond their personal safety turns out to be more related to the decision to obey traffic regulation. Therefore, it is strongly important to socialize and educate people or riders about the importance of maintaining a safe distance from other vehicles in riding. Moreover, socialization about the above terms is also required to build better behavior in riding, so better riders could also be preserved (Putra, 2019).

Since this research was carried out using a cross-sectional method, it is impossible to fully explain the causal relationship between independent and independent influences. Therefore, the results of this research could not be taken as a fact to explain all the characteristics of Indonesian students because the sample used was only one university.

Conclusion

By looking at the result of the research, it can be concluded that there was a large correlation between listening to music while riding, riding with a speed more than 50 km/h, and doing overtake in a sudden brake, and overtaking without the presence of lights with traffic accidents. Therefore, by looking at the high rate of accidents, the university is expected to be able to provide socialization and contribute to rendering proper insight related to the importance of paying attention to the traffic regulation system for the sake of individual safety and avoiding the accident specifically in the campus area. Furthermore, to enlarge the reference scale of related information, future researchers are expected to focus on factors that influence the students' perilous riding behavior by taking additional observations regarding the rate of accidents towards the electric motorbike.

Declaration of Conflicting Interest

The authors declare no conflict of interest in this study.

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Author Contributions

Fera Atmawati and Nurhalisa conceptualised and designed the study. Wa Ode Sri Mulyani and Muh.Reza Adyatama Pimpie analysed and interpreted the data, and wrote the initial and final draft of the article. Walid Walyudin Rahman collected and organised that data, checked the final draft of the article.

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