Comparison between motorcyclist' violation behavior and accidents in urban and rural area in Indonesia: A comparative study

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Abstract. Some studies stated that the main factor related to the accident was driving behavior. This study aims to explore the differences between motorcyclist" behaviour and repetitive violation behaviour in two different area, urban and rural area in Indonesia. Respondents were selected based on convenience sampling method in Bandung as a representative of urban area and Kulon Progo as a representative of rural area. They were asked to fill in a questionnaire about driving behaviour, consists of 10 dimensions or 51 questions with Likert scales ranging from 1 (very often) to 6 (never). The results of this study shows that the motorcyclists' behavior differ significantly between rural and urban area. Motorcyclists in the urban area (Bandung) are more committed to violations than in rural area (Kulon Progo). This result is not in line with previous studies in Australia and United States which stated that motorcyclists in rural area more frequently speeding than in urban area. Implications of the result are discussed.
Keywords: motorcyclist, behaviour, urban, rural

1. Introduction

Developments of automotive industry technology and economic conditions in Indonesia have an impact on the increased use of transportation modes, including motorcycle. The number of motorcycle in Indonesia increases about 11,08 percent per year between the periods of 2010-2014. In 2014, the number of motorcycles in Indonesia reached 92 million units [1]. The high rate of motorcycle ownership is in line with the high number of motorcycles involved in a traffic accident. In 2014, the number of traffic accidents involving motorcycles reached 108.883, or approximately 71.6% of total traffic accidents in Indonesia [2].

Some studies in other countries revealed that the main factors related to the accident were driving behavior of motorcyclist [3] [4] [5] [6]. Motorcyclists are often regarded as "speed rebels" and "risk takers" [3]. The behavior of motorcyclists who speeding on the road [3] [4], obey pedestrian space, and lack of obedience to traffic rules is considered as the main cause of accidents [5]. The facts that motorcyclist" violation behavior is a factor that affects the accident has been the focus of research in several countries, both in developed and developing countries such as Turkey [7], the UK [4] and Hong Kong [3].

Considering that motorcyclist behavior is not universal depends on the context and places, several studies focuses in motorcyclist behavior differences in rural and urban area. A study stated that there are significant differences between driver behavior and accident characteristics between urban and rural

area in Utah, United States [8]. Speeding, alcohol involvement, safety belt wearing and various road characteristics become a factor prevalent in the rural area. In line with previous study, study in the rural Queensland showed that road users tend to be involved in fatal accidents due to speeding, drunk and violation of road rules [9]. Otherwise, a study in the rural New South Wales concluded that the majority of young people in the rural area are not high-risk takers or sensation seekers [10]. Respondents in the rural area tend to driving over the speed limit or speeding. This condition is because the average distance that must be taken by young people in the rural area farther than in the urban area.The fact that Indonesia suffers from high rate of motorcyclist accident underlined a comprehensive approach in effort to reduce motorcyclist accident. However, in author knowledge, only limited research has been conducted in Indonesia related to motorcyclist behavior, that are influencing factors on motorcycle accident in urban area [5]; and reasons underlying behavior of motorcyclists disregarding traffic regulations in urban area of Indonesia [11]. Considering that behavior approach works in changing behavior in other field of study in Indonesia [12] (e.g., Widyanti et al., 2014), this approach is worth noting to implement in driving behavior.

This study aims to observe and to compare motorcyclist behavior and accident between urban and rural area as a first step in a series of efforts to reduce motorcyclist accident in Indonesia. With a hypothesis that there are differences in motorcyclist behavior and accident between rural and urban area in Indonesia, different approach should be taken.

2. Methods

The research was conducted in one of urban area in Indonesia, i.e., Bandung and one of rural area, i.e., Kulon Progo, Yogyakarta, Indonesia. Bandung is one of the metropolitan cities in Indonesia and the capital of West Java province. While, Kulon Progo is one of the district in Yogyakarta, Indonesia. The number of respondents in Bandung are 32, whereas Kulon Progo are 33. Respondents were selected based on convenience sampling method.

The data collection was conducted using questionnaire. The questionnaire consists of three parts, (1) demographic data of respondents such as gender, age, employment status, marital status, frequency of the motorcycle usage per trip and travel distance per trip, (2) the motorcyclist behavior of respondents. Variables used in the questionnaire were developed based on the concept of Theory of Planned Behavior [13] and other factors from literature studies [3] [4]. The scale used for the driving behavior question is a Likert scale with a range of 1-6 ranging from "very often" to "never".

The result of the questionnaire is independent data between respondents in the urban and rural area. The scale used is ordinal scale and the data are not following normal distribution. Therefore, the data were analyzed by using Mann Whitney U Test to evaluate significant differences among 10 dimensions of driving behavior (repetitive violation behavior, ordinary violation, aggressive violation, subjective norms, perceived behavior, believe and attitudes, speed violation, traffic errors, safety equipment and stunts). All statistical analyses were performed using the IBM SPSS program version 20.0 for Windows.

3. Result and discussion

Demographic characteristics of the respondents in each area can be seen in Table 1. Behavior of motorcyclist of Bandung and Kulon Progo respondents are describing in Table 2. In addition, Mann Whitney U Test is applied to observe mean differences between the groups. H0 is that motorcyclist's violation behavior in Bandung and Kulon Progo is not different, while H1 is that motorcyclist's violation behavior in Bandung and Kulon Progo is different. H0 is accepted if the alpha cronbach more than 0.05, otherwise H0 is rejected.

Table 1. Demographic of sample of respondents

Characteristics		Proportion (%)	
		Bandung	Kulon Progo
Gender	Male	40.6	45.5
	Female	59.4	54.5
Age	Aged between 17 and 29	93.8	75.8
	Aged between 30 and 39	3.1	3.0
	Aged between 40 and 49	3.1	12.1
	Aged 50 or more	0	9.1
Employment	Student	81.3	27.3
	Full-time employed	12.5	57.6
	Entrepeuner	0	6.1
	Unemployed	3	0
	Other	3.1	9.1
Marital status	Single	90.6	69.7
	Married	9.4	30.3
Frequency of the motorcycle usage per day	Once	15.6	3.0
	Two times	31.3	30.3
	Three times	12.5	24.2
	Four times	3.1	6.1
	More than four times	37.5	36.4
Travel distance per trip	Less than 1 km	3.1	0
	1-2 km	6.3	9.1
	2-3 km	9.4	0
	3-4 km	6.3	6.1
	More than 4 km	75.0	84.8
Driving license ownership	Have a driving license category A	6.3	0
	Have a driving license category B	0	3.0
	Have a driving license category C	37.5	66.7
	Not own any driving license	21.9	0
	Have more than one driving license	34.4	30.3

Based on the result obtained in Table 2, there are 13 statements having significant difference between motorcyclists violation behavior in Bandung and Kulon Progo, that are repetitive violation behavior (2, 8, 11, 12, 13, 14, 15, 17), ordinary violation behavior (2, 7), subjective norms (2) and perceived behavioral control (1,2).

Table 2. Different behavior of motorcyclist of Bandung and Kulon Progo
(a)

Dimensions		Variables	Mean		Asymp. Sig. (2-tailed)
			Bandung	Kulon Progo	
Repetitive violation	1	Ignore traffic lights at junctions	1,625	1,697	.752
	2	Do not respect the stop line at junctions	2,062	1,606	.031*
	3	Do not turn on head-lights during the day	1,344	1,394	.365
	4	Do not turn on turning-lamp (indicator light) when turning	1,969	1,546	.162
	5	Speeding	1,321	2,606	.979
	6	Overtaking other vehicles on the wrong side	1,153	2,656	.305
	7	Deliberately do not allow the other vehicles to overtake	1,247	1,103	.067
	8	Cutting ones' way of move or take short cuts	1,304	.708	.024*
	9	Do not bring the required paperwork and driving license whilst driving	1,680	.809	.246
	10	Carrying overweight goods or too many passengers	1,198	.882	.117
	11	Driving slow on fast lanes	.896	.658	.035*
	12	Pushing the motorcycle through a (very) narrow gap	1,319	1,237	.001*
	13	Listening to music whilst driving	1,515	.933	.002*
	14	Eating, smoking or drinking whilst driving	1,306	.415	.046*
	15	Calling or texting whilst driving	1,318	.822	.003*
	16	Chatting with other riders and/or passengers whilst driving	1,436	1,479	.275
	17	Not wearing safety equipment such as helmets	1,216	.833	.023*
	18	Not wearing additional safety equipment such as jackets and gloves	1,496	1,034	.107
	19	Riding on pedestrian overpasses	1,014	.364	.526
Ordinary violation	1	Driven through an amber light when it was about to turn red	2,812	2,606	.876
	2	Made an illegal U-turn	2,187	1,424	.003*
	3	Imitated the postures and movements used in a motorcycle race while driving on the public road, such as touching the ground with a knee when turning	1,218	1,272	.759
	4	Driven as fast on a wet road surface as on a dry one	1,968	1,606	.203
	5	Driven too close to the car in front	2.25	2,393	.601
	6	Sounded your horn to show your annoyance to another road user	2,468	2,333	.536
	7	Driven the wrong way down a one-way street	1,875	1,363	.005*

(b)

Dimensions		Variables	Mean		Asymp. Sig. (2-tailed)
			Bandung	Kulon Progo	
Aggressive violation	1	Exceeded the speed limit in an urban road	3,187	2,878	.250
	2	Crossed double white lines to overtake even though there were vehicles approaching in the opposite lane a short distance away	2.0	1,757	.202
	3	Crossed double white lines to overtake on a sharp bend	1,562	1,575	.953
	4	Overtaken the driver in front when he/she was driving at the speed limit	1,843	2.06	.414
	5	Overtaken even when close to turning	1,718	1,606	.697
	6	Driven on the pavement when caught in a traffic jam	2.0	1,757	.491
Subjective norms	1	Using high beam on congested places	1,906	1,848	.798
	2	Switching engine on in small alleys	2,875	2.03	.023*
Perceived behavioral control	1	The traffic condition	2,312	1,727	.025*
	2	The number and width of road lanes	2,406	1,697	.005*
	3	The road geometric (e.g. slopes and turns)	2,093	1,636	.056
	4	The road side friction and junction side conditions (e.g. "spilled-over" hawkers on the street)	1,937	1,575	.040
	5	The Weather Condition	2,218	1,909	.304
Believe & attitudes		Driven above the speed limit in order not to be late for an appointment	3.25	3,303	.979
Speed violation	1	Exceed the speed limit on a residential road	2,781	2,454	.498
	2	Disregard the speed limit late at night or in the early hours of the morning	2,968	2,333	.076
	3	Race away from traffic lights with the intention of beating the driver/rider next to you	1,281	1,151	.594
	4	Get involved in unofficial 'races' with other riders or drivers	1,218	1.06	.560
	5	Ride so fast into a corner that you scare yourself	1,375	1,272	.762

(c)

Dimensions		Variables	Mean		Asymp. Sig. (2-tailed)
			Bandung	Kulon Progo	
Traffic errors	1	Ride so fast into a corner that you feel like you might lose control	1,468	1,484	.944
	2	Fail to notice that pedestrians are crossing when turning into a side street from a main road	2,031	2,242	.852
	3	Attempt to overtake someone that you had not noticed to be signaling a right turn	1,812	1,667	.328
Safety equipment		Wear body armor	3,593	3.0	.252
Stunts		Intentionally do a wheel spin	1,187	1.06	.560

The results of this study show that there are several behavior items that differ significantly between motorcyclists behavior in Bandung and Kulon Progo, that are repetitive violation behavior item (2, 8, 11, 12, 13, 14, 15, 17), ordinary violation behavior item (2, 7), subjective norms (2) and perceived behavioral control (1,2). Based on the results of the questionnaire, motorcyclists in Bandung more committed these violations than in Kulon Progo. In urban area, the range "often" is more dominant than in rural area.

As stated in previous study, the majority of motorcyclists in the rural area are not high risk takers or sensation seekers [10]. However, in this study, motorcyclists in the rural area do not have significant differences in factor of speeding with motorcyclists in urban area. This result does not in line with previous studies in Australia and United States which stated that motorcyclists in rural area more frequently speeding than in urban area. Presumably, this result was influenced by some of the respondents in Bandung were young motorcyclist. Young motorcyclists are most likely to have a high level of violation behavior such as speeding [3] [4] [11] [14]. Older motorcyclists tend to be acting cautious when riding a motorcycle especially motorcyclists over 50 years old.

Result of this present study gives valuable sight of the differences between urban and rural area. This results imply that different approach must be taken if policy or regulation are determined in Indonesia related to efforts to reduce number of motorcyclist accident in Indonesia. One of the differences in approach that can be emphasized is an education about safety riding for motorcyclists in urban and rural area. Differences in the characteristics of the road and accident can be the factor to be considered.

The present study has some limitations. First, limited numbers of respondents were involved in this study. Much more respondents are needed to draw more rigorous conclusion. Second, respondents in this study are dominated by young motorcyclists (i.e., 17-29 years old). More diverse respondents from the age categories will enrich the result as well. More diverse respondents from other demography categories in Table 1 is needed, for example, since merit and single status of respondents is hypothesized to influence motorcyclist behavior and accident, more representative respondents in both merit and single status is needed.

4. Conclusion

The study found that H0 is rejected and this means that there are significant differences in motorcyclist behavior and accident between rural and urban area in Indonesia. Motorcyclists in the urban area (Bandung) are more committed to violations than in rural area (Kulon Progo).

Government should promote safety riding for young motorcyclists and make regulations to prohibit motorcyclists who do not have a driver's license as an effort to reduce accidents. Because most offenders are young motorcyclists.

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