THE STRUCTURE OF RISKY RIDING: A FACTOR ANALYSIS OF A MODIFIED MRBQ TO PREDICT CRASH RISK IN A LOW-INCOME SETTING

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ABSTRACT

Road traffic injuries are a serious global health issue, especially in nations with low and moderate incomes. In 2021, for example, the Asia-Pacific region accounted for approximately 60% of all worldwide traffic fatalities, a figure that highlights the urgency of the problem. In Indonesia, a developing country, motorcycles are the most popular mode of transport, but they are also the deadliest, with riders accounting for over 70% of traffic deaths between 2013 and 2018. This issue is particularly pronounced among young adults (aged 18–25), who are responsible for 51% of all traffic accidents in the country.To address this, a comprehensive study was conducted using a modified Motorcycle Rider Behaviour Questionnaire (MRBQ) engaged to the Indonesian context. The research aimed to identify factors associated with unsafe riding behaviors, which are primarily driven by human factors. Of the 96 riders approached, 92 participated (96% response rate); most were male (61.25%), aged 19–20 years, students (97.80%), and used automatic motorcycles (89.70%), with 72% having less than 10 years of riding experience and 58% reporting a near-crash in the past year. Traffic violations ($M = 3.65 \pm 0.46$) and errors ($M = 2.12 \pm 0.32$) were the most prevalent behaviors and were significantly associated with negative attitudes, social norms, and crash involvement ($r = 0.15–0.45$, $p < 0.01$), whereas stunt-related behaviors were rare ($M \approx 1.02$) and formed a distinct factor.These findings highlight the need for targeted interventions that focus on psychological factors like negative attitudes and social norms, which were found to be strongly linked to risky riding and crash history. This study demonstrates that the MRBQ exhibits a context-specific four-factor structure (errors, violations, safety gear violations, and stunts) among Indonesian young adult motorcyclists with strong psychometric support, while also highlighting the need for further item refinement and alternative data collection methods to address contextual behaviors.

***Keyword**: MRBQ, risky riding behavior, low-income countries.*

BACKGROUND

Road traffic injuries indicate a major global health crisis, with a disproportionate impact on low- and middle-income countries. For example, in 2021, the Asia-Pacific region alone saw over 694,000 traffic deaths, representing about 60% of the world's total (WHO, 2018). These accidents also impose a heavy financial burden, sometimes costing over 1% of a country's Gross Domestic Product (GDP) (Watson et al., 2007). In Indonesia, a developing nation experiencing economic growth, traffic accidents have increased. Motorcycles are the most common and deadliest mode of transport, accounting for over 70% of all traffic deaths in the country from 2013 to 2018 (Indonesian National Traffic Police, 2019). Analysis of accident causes shows that human factors are overwhelmingly responsible for accidents (85.57%), with road characteristics as a distant second (7.71%). Furthermore, Indonesian

National Traffic Police data (Indonesian National Traffic Police, 2024) from 2023 to 2024 indicates that motorcyclists and cars consistently make up more than 76.42% of traffic-related fatalities.

The highest crash risk in Indonesia is among young adults, aged 18 to 25 (Wulandari, 2015), who are involved in 51% of all traffic accidents (Riskiansah and Zain, 2016). Human factors in driving are categorized into two distinct areas: driving performance (motor skills and information processing) and driving style/behavior (a driver's choices, such as speed and attentiveness) (Elander et al., 1993). While performance can be improved through training and practice, the careless actions and unsafe riding habits of young adult motorcyclists are a significant, unaddressed issue. In fact, nothing is known about the specific unsafe riding habits of Indonesia's young adult motorcyclists. A more comprehensive approach, which combines all contributing factors to measure every attribute related to riding behavior, is needed to fully understand this issue. Therefore, the ultimate goal of this research is to identify the factors associated with unsafe riding behavior in young adults as a predictor of crash involvement.

This document provides a detailed review of the psychological, socio-cognitive, and demographic factors that influence risky riding behavior, emphasizing the need for focused research in developing countries. Early studies on risky driving heavily utilized the Driver Behaviour Questionnaire (DBQ), which categorized risky actions into errors (unintentional mistakes) and violations (deliberate rule-breaking, like speeding) (Reason, 1990). However, researchers soon recognized that the DBQ's structure and factors varied across different cultures and contexts (Parker et al., 1998). Due to differences in social norms and traffic systems, underscoring the necessity for cultural adaptation and benchmarking of these behaviors. Beyond the DBQ, psychological frameworks like Normative Social Influence Theory (Constantinou et al., 2011). Suggest that an individual's actions are influenced by the perceived behavior of others, leading to conformity. Additionally, the Norm Activation Theory (Scherest, 1972). Connects moral obligations and a sense of responsibility to predicting behavior, aligning with the idea that riders maintain an acceptable level of risk.

Socio-cognitive factors like social norms and attitudes are also significant predictors of unsafe riding. Social norms, defined as group beliefs about appropriate conduct (Newman et al., 2014; Ge et al., 2014) and peer influence have been identified as strong determinants of risky driving, especially among young males (Carpentier et al., 2014). Attitude, a person's level of favorability toward specific actions (Ajzen, 1988), has been consistently shown to be a critical predictor of riding unsafely (Carpentier et al., 2014; Elliot et al., 2007). Furthermore, age and gender are key demographic influences, with young male motorcyclists being particularly susceptible to risk, often underestimating dangers and engaging in thrill-seeking (Chang and Yeh, 2006; Wong et al., 2010). The dual-system model explains this by suggesting that risk-taking decreases as individuals age due to the maturation of executive controls (Mallia et al., 2015). Despite potentially superior cognitive capacities, some research suggests older teenagers continue to engage in dangerous activity, viewing safety as a sign of their ability and control (Musselwhite et al., 2012).

The Motorcycle Rider Behavior Questionnaire (MRBQ), derived from the Driver Behavior Questionnaire (DBQ), is a 43-item tool designed to predict crash risk (Elliot et al., 2007). The questionnaire categorizes rider behavior into five factors: traffic error, speed violation, stunt performance, control error, and safety equipment (Stephens et al., 2017). The five-factor structure of the MRBQ is not consistently applied across all studies, and the specific items assigned to each factor can vary. For example, some studies combine traffic and control errors into a single factor (Sakashita et al., 2014). These inconsistencies are often attributed to differences in sample size and sampling procedures (Elliot et al., 2007; Sakashita et al., 2014).

Furthermore, the predictive validity of the MRBQ scales for self-reported crashes is inconsistent. While some studies have found that traffic errors and speed violations predict crashes (Elliot et al., 2007; Sexton et al., 2004), others have found that stunts are the most reliable predictor (Sexton et al., 2004). These conflicting results are likely due to differences in research methodology, such as varying definitions of "at-fault" crashes and different timeframes for reporting crash involvement. Despite these inconsistencies, there is a general consensus that traffic errors, stunts, and violations are associated with crash risk, while control errors and the use of safety equipment have a weaker link. Research on motorcyclist behavior in Indonesia is limited, with only a few studies using the MRBQ (Leksmono and Anjaya, 2014). Previous Indonesian studies have struggled to establish a clear factor structure for the MRBQ and have not properly tested its internal consistency or predictive validity in relation to crashes. This highlights a significant research gap. Therefore, in order to create a more context-specific model of risky riding behavior, a more thorough investigation of the MRBQ's structure and its relationship to crash participation among Indonesian young adult riders is essential.

METHODOLOGY

This document outlines the development of a modified Motorcycle Rider Behaviour Questionnaire (MRBQ) tailored for Indonesian motorcyclists. It details specific adaptations to the original MRBQ, the inclusion of new sections on social norms and attitudes, and the collection of socio-demographic and trip data.

MRBQ as the Main Instrument

Based on previous studies and expert discussions, the Motorcycle Rider Behaviour Questionnaire (MRBQ), originally developed by Elliot et al. (2007), was adapted to the Indonesian context. This modified version uses a 5-point Likert scale, ranging from "never" to "almost always," to measure various behavioral factors. Several key changes were made to the questionnaire items to ensure local relevance. For instance, new items were added to reflect common violations in Indonesia, such as overtaking on the left, a frequent practice given the country's left-side driving rules. Speeding-related questions were rephrased to align with Indonesian road classifications, such as "arterial/urban roads" and "local/rural roads." Additionally, items related to protective clothing and riding under the influence of alcohol were removed or replaced due to their lower relevance, with a greater focus instead on more common issues like helmet use and passenger safety. Additional questions were also included to cover other prevalent violations, such

as ignoring traffic lights and riding without a license plate.

Social Norms and Attitude

To provide a comprehensive understanding of the factors influencing Indonesian motorcyclist behavior, new sections were added to the questionnaire to assess social norms and attitudes towards safety. The social norms section, based on research by (Stephens et al., 2017), measures how peer influence shapes riding habits. This section includes questions on issues common in Indonesia, such as wearing a helmet as a fashion statement or using aggressive honking. The items are grouped into three variables: perceived social pressure regarding speeding, helmet use, and general rule disregard. Additionally, the attitudes towards safety section, adapted from (Wong et al., 2010), contains questions about speeding, riding against traffic, and multitasking while riding, like using a phone. These questions are organized into two key variables—perceived danger of disregarded rules and perceived danger in speeding—which (Stephens et al., 2017) identified as significant influences on Indonesian riders.

Demographic and Crash Data

The questionnaire also collects comprehensive data on socio-demographics (age, gender, education, employment), trip characteristics (number of trips, purpose, distance), and crash history (self-reported crashes, near-crashes, and traffic violations over the past 12 months). This comprehensive approach aims to create a robust dataset for analyzing the various factors contributing to risky riding behavior in Indonesia.

Implementation Process

Back-translation method was used to adapt the original questionnaire into Bahasa Indonesia. This process involved having a professional lecturer from a national university translate the document, followed by a second professional translating it back into English to ensure the integrity and preservation of the original meaning. A pilot study was conducted in 2020 to ensure the translated questionnaire was clear, fully understandable, and effectively delivered to the participants questionnaire was directed at young riders in Java, Indonesia. High school kids, young professionals, and university students from the State University of Surabaya were among the participants. Data was gathered during business hours and on weekdays.

Participation was completely voluntary. The first page of the survey included an informed consent form that outlined the study's purpose and guaranteed the confidentiality of all data collected. Participants were not required to provide any private information, such as their name or phone number. The survey took approximately 15 to 20 minutes to complete, and participants received a road safety awareness sticker as a token of appreciation for their contribution.

Data Management and Interpretation

After collecting the data, the research will proceed with several analytical steps. First, missing data will be addressed; cases with more than 10% missing responses will be excluded, while those with less will have missing values replaced by the 5% trimmed mean. Descriptive statistics will then be used to summarize the sample characteristics. The core of the analysis involves testing the factor structure of the MRBQ. Although previous research has used confirmatory factor analysis (CFA), the original model often shows a poor fit to new data. Therefore, this

study will first use Exploratory Factor Analysis (EFA) with Principal Axis Factoring and Oblimin rotation to respecify the factor structure and explore relationships among the variables.

RESULT AND DISCUSSION

Of the 96 participants approached, 92 completed the survey, resulting in a 96% response rate. As shown in table 1, the sample was mainly male (61.25%) with an average age between 19-20 years. The vast majority of respondents (92.40%) had an education level above high school, and most held a motorcycle license (62.60%) or both a car and motorcycle license (17.80%). A small percentage (10.10%) reported riding without a license. Approximately 72% of participants had less than 10 years of riding experience, indicating that some began riding underage. The most common vehicle type was an automatic transmission motorcycle (89.70%).

The primary purpose for riding was education, as most participants were students (97.80%). Weekly mileage varied; almost 82% of respondents rode less than 20 km on weekdays, with this figure dropping to less than 51% on weekends. In terms of risky behavior and crash history, 22.80% of participants received a traffic violation fine in the past year. Over half (58%) reported a near-crash experience, and 16.70% were involved in a motorcycle crash within the same period.

Reliability analysis using Cronbach's alpha showed acceptable internal consistency (> 0.70) for all variables except for the "safety" and "stunts" factors. However, consistent with recommendations by Schmitt (1996), these lower alpha values are acceptable given the small number of items (5 and 4, respectively) in those specific dimensions.

Table 1.
Reliability Test on Each Atrribute

	Min	Max	Mean	Std. Deviation	Skewness	Cronbach Alpha
Attitudes	1	5	2.85	0.612	0.12	0.77
Social norm	1	5	1.64	0.493	0.45	0.77
Error	1	5	2.62	0.558	0.21	0.76
Violation	1	5	2.98	0.252	0.12	0.79
Safety	1	5	1.10	0.652	0.33	0.55
Stunts	1	5	1.02	0.751	3.53	0.37

Correlation

A bivariate correlation analysis was conducted to examine the relationships among the study's primary variables. The findings revealed that negative attitudes toward safety exhibited a significant correlation with four categories of aberrant riding behavior. The most pronounced correlation was observed with errors ($r=0.452$, $p<0.01$), indicating that a more negative disposition is associated with a higher propensity for making errors while riding. Similarly, negative social norms were significantly correlated with violations ($r=0.389$, $p<0.01$), errors ($r=0.351$, $p<0.01$), and safety violations ($r=0.188$, $p<0.01$), suggesting that individuals influenced by these norms are more likely to engage in aberrant behavior. Furthermore, negative attitudes were significantly and positively correlated with a history of crash

involvement (r=0.145, p<0.01), indicating a link between more negative attitudes and a higher incidence of crashes or near-crashes. Notably, all MRBQ subscales, with the exception of stunting, were found to be highly correlated with crash involvement.

Regarding socio-demographic factors, both gender and age were significantly associated with social norms. Male riders were more susceptible to negative social norms than their female counterparts and also reported a higher frequency of violations (r=−0.213, p<0.01) and stunting (r=−0.171, p<0.01). Conversely, older participants reported being more influenced by negative social norms (r=0.107, p<0.05), while younger participants demonstrated a greater tendency for committing errors. Age was also significantly correlated with crash involvement (r=−0.259,p<0.01), with a greater crash history observed among younger participants. Despite the statistical significance of these findings, all observed correlations were weak to moderate, with coefficients ranging from 0.1 to 0.6

Table 2.
Socio demographic of participants

	Gender	Age	Years of Riding	Travel Pattern	Neg SocNorm	Neg Att	Error	Violation	Stunt	Safety	Output
Gender	1										
Age	.025	1									
Years of Riding	.182*	.013	1								
Travel Pattern	.032	.023	.002	1							
Neg SocNorm	-.137*	.152*	-.258**	.078	1						
NegAtt	-.251**	-.021	.036	-.089	.551**	1					
Error	.001	-.285**	.005	.007	.351**	.452**	1				
Violation	-.213**	-.052	.085**	.058	.389**	.322**	.253**	1			
Stunt	-.171**	-.033	.006	.065	.023	.187**	.051	.184*	1		
Safety	.002	.085	-.062	.021	.188**	.252**	.362**	.511**	.052	1	
Output	.037	-.259**	-.362*	.055	-.032	.145*	.285**	.432**	.001	.158*	1

Factor Analysis

According to the riders in this study, breaking traffic laws is the most common deviant activity. As shown in table 3 For example, item 29 "exceed the speed limit on an urban road" (M=3.64 ± 0.057), item 43 "Running a red light at an intersection" (M=3.52± 0.042), and item 32 "riding on sidewalk" (M=3.15± 0.065) have the highest scores, with an average score ranging from 1 = never to 5 = almost always. The three items with the lowest scores, however, are associated with performing stunts: item 45, "smoking while riding" (M=1.10± 0.029); item 40, "intentionally spinning the rear wheel" (M=1.09± 0.019); and item 39, "attempting or performing a wheelie" (M=1.01± 0.015).

Table 3.
Factor Analysis of each attribute

	Atrributes	Factor			
		Error	Violation	Safety gear violation	Stunts
Q24	Attempting to pass other vehicles on the left side of the road.	0.758			
Q35	Failing to anticipate or notice a vehicle pulling out, leading to difficulty stopping.	0.595			
Q28	Entering a corner at a speed that risks a loss of control.	0.592			
Q51	Riding at a speed that causes a feeling of fear or personal discomfort.	0.552			
Q49	Experiencing difficulty controlling the motorcycle at high speeds.	0.532			
Q26	Following a vehicle too closely, making it difficult to stop in an emergency.	0.523			
Q27	Having a delayed reaction when a car door opens suddenly in front of you.	0.517			
Q21	Nearly colliding with a vehicle in front while focused on merging traffic.	0.517			
Q48	Running wide while going around a corner.	0.501			
Q34	Pulling out into a main road without noticing other vehicles or misjudging their speed.	0.489			
Q50	Losing traction (skidding) on wet roads or manhole covers.	0.466			
Q33	Failing to notice someone stepping out from behind a parked vehicle until it is nearly too late.	0.454			
Q20	Failing to yield to pedestrians when turning into a side street.	0.431			
Q25	Finding it difficult to stop in time when a traffic light changes to red.	0.412			
Q29	Exceeding the speed limit on urban roads.		0.782		
Q43	Riding on the sidewalk.		0.716		
Q41	Running a red light at an intersection.		0.710		
Q44	Using a mobile phone (calling or texting) while riding.		0.538		
Q38	Participating in unofficial "races" with other riders or drivers.		0.522		
Q32	Lane-splitting within fast-moving traffic.		0.462		
Q37	Disregarding the speed limit late at night or in the early hours of the morning.		0.415		
Q42	Riding against the flow of traffic on the roadway.		0.404		
Q54	Chatting with passengers or other riders while driving.		0.384		
Q31	Accelerating from a traffic light to race the driver or rider next to you.		0.360		
Q30	Exceeding the speed limit on local or rural roads.		0.351		
Q57	Riding without a helmet.			0.669	
Q58	Transporting a passenger who is not wearing a helmet.			0.637	
Q52	Carrying oversized cargo on a motorcycle.			0.518	
Q53	Riding with more than one passenger (overloading).			0.449	
Q55	Wearing a helmet without a fastened chin strap.			0.365	
Q45	Smoking while riding.				0.758
Q40	Intentionally spinning the rear wheel (wheelspin).				0.747
Q39	Attempting or performing a wheelie.				0.425

Prior to investigating the factor structure for MRBQ among young adult drivers in Indonesia, a confirmatory factor analysis (CFA) is conducted. The fit of the factor structure discovered in the earlier work by Elliot et al. (2007) will be examined by CFA. According to Sakashita et al., (2014), each of the five components is measured using the following indicators, which are actually developed based on Elliot's model: Control errors (6, 9, 14, 15, 16, 29, 30, 31): speed infractions (7, 10, 11, 12, 17, 18, 19): stunts (20, 21): traffic errors (1, 2, 3, 4, 6, 8, 28, 32): and safety (36, 38). It is discovered that the percentage of missing and random data is less than 1%. As a result, a conservative listwise deletion mechanism is used and no missing data treatment is applied. Maximum likelihood estimate is used to carry out CFA. With a GFI of 0.75,

which is also less than 0.9, and root-mean-square errors of approximation (RMSEA=.03), which are less than 0.1 as the standard of the goodness of fit criteria, the result is found to be considerably ($\lambda 2$= 1582.954). Nevertheless, the NFI and CFI values are 0.85 and 0.73, respectively, below the Goodness of Fit criterion of 0.9. A lack of fit is routinely indicated by this model. Thus, exploratory factor analysis should be used to re-identify a new model.

Ten factors with eigenvalues greater than one are produced by the first PAF; however, the parallel Monte Carlo analysis is also performed in SPSS (Stephens et al., 2017; Sakashita et al., 2014) and reveals that four factors are the most suitable model. Additionally, PAF employs direct oblimin rotation, which is applied to 39 items while maintaining the four MRBQ variables. Only items with a loading of 0.35 or higher will be retained for additional analysis, in line with two earlier research (Elliot et al., 2007; Sakashita et al., 2014; Ozkan et al., 2004).

Principal Axis Factoring (PAF) is used to analyze the four-factor analysis. The model does not include items with low loading factors (items 3, 17, 28, <0.3, and 4, 27, 37<0.35). The sample is sufficient to reflect the factor analysis ('>0.5'), according to the KMO and Bartlett's Test results, which are based on 33 items (see Table 3). The KMO Measure of Sampling Adequacy (MSA) is 0.965. Moreover, 2514.78 chi-squares with 0.00 significance show the value of KMO and Bartlett's test. This indicates that the variables are correlated, making it appropriate for factor analysis. There are no meaningful associations between any of the items, according to the item-interrelationship analysis using anti-image matrices. As a result, all 33 elements are suitable for additional analysis. However, unless protective gear is labeled as "safety violation," some elements are kept due to the similarities of the prior study. The 14 items in Factor 1 account for 25.21% of the variation. Of the nine items, seven are from control error and all are from the traffic error factor (Elliot et al., 2007; Sexton et al., 2004). However, according to Sakashita et al. (2014) every one of the 14 elements is predicated on an error factor. Previous research has agreed that these 12 items are part of the MRBQ factor related to errors (Elliot et al., 2007; Sexton et al., 2004; Ozkan et al., 2012). Ten items, six of which are from the speed violation factor, make up Factor 2, which accounts for 12.85% of the scale's overall variance (Elliot et al., 2007). In the meantime, there is a strong correlation between riders' behavior in the contextual region and the other six things, which are additional items related to a traffic offense. Only two of the six elements in Factor 3, which accounts for 2.35 percent of the variance, come from Sakashita et al. (2014)’s protective gear factor. There is a strong correlation between this characteristic and using protective gear. Two of the three items in Factor 4, which makes up 3.38% of the overall variance, are derived from the Stunts Factor (Elliot et al., 2007; Sexton et al., 2004).

The most common behavior reported in this study is the violation factors (M = 3.65 ± 0.457), which are followed by the error factor (M = 2.12 ± 0.323) based on the composite scores on each factor that represent the average summed items. However, young adult riders in Indonesia rarely engage in safety infractions or execute stunts. Additionally, the correlation between the components indicates that there are weak correlations between all of them. It indicates that although they have a

number of things in common, their structures are nonetheless distinct. Errors and safety breaches had the strongest correlation (r=0.389). Since mistakes and stunts are unrelated to safety gear violations, riding behaviors are not linked to the safety gear that motorcyclists wear.

Factor Structure

This study aims to observe the psychometric qualities of MRBQ among Indonesian young adult motorcyclists. According to the factor analysis, the current results do not align with the factor structure found in the prior study concerning experienced motorcycle riders' self-reported traffic violations and crashes in the UK and Turkey (Elliot et al., 2007; Ozkan et al., 2012). The sample of young adult motorcycle riders in Indonesia cannot be represented by the five criteria that were provided among experienced motorcyclists in the prior study. According to Sakashita et al. (2014), the four-factors structure is the most suitable. Errors, infractions, stunts, and safety gear violations are the four components. The two scales are loaded into a single errors scale, and it has been previously discovered that there is a difference between traffic errors and control errors (Elliot et al., 2007; Ozkan et al., 2012), which is not supported by this study.

The four-factor solution is composed of 39 components. The pilot analysis indicates that six items are dropped because of low loadings. In the current study, 14 factors linked to errors from Sakashita et al. (2014) earlier study are used along with two other items that young riders in Indonesia frequently perform: "attempt to overtake from the left side" and "find it difficult to stop in time when a traffic light has turned against you." Two items have been dropped because of poor loadings.

Six of the twelve factors in the violation factors were linked to speed violations in the last study; nevertheless, the remaining six items are used because they have a strong correlation with young adult riders in Indonesia. They drop two things. While other questions are strongly tied to their action, one of them, "another driver deliberately annoys you or puts you at risk," is related to another respondent's emotional response. Given how emotionally charged this item is, it might not be very reliable across riders. However, according to the Turkish study, this item is a factor in speed offenses. However, because speed infractions and control faults have cross-loadings, it remains a paradoxical item (Ozkan et al., 2012) Only two of the safety criteria were first mentioned in the earlier study; the other four items dealt with safety gear regulations that Indonesian adult riders frequently break. Due to loading, one item—"riding with an impaired motorcycle"—is dropped. This may be the result of many young Indonesians demanding new motorcycles with better performance than the previous models.

Out of the three elements left in the stunt factors, only two were initially identified in the earlier study (Ozkan et al., 2012). Only the stunts element, out of the four, has no discernible relationship to collisions or self-reported violations. Given that there are no particular regulations governing the speed limit on local roads, it is not surprising that the most common behavior among young adult riders in Indonesia is related to speed violations, specifically "exceeding the speed limit on a local/rural road" (item 11). According to item 12, motorcyclists also stated that they almost always "race away from traffic lights to beat the driver or rider next to them." This is a regular occurrence because teenage riders have a

high socio-emotional system, which makes them feel activated by the environment. On the other hand, stunt-related behaviors are rarely engaged in. For example, the items on "attempt to do, or actually do, a wheelie" (item 20) and "intentionally do a wheel spin" (item 21) are not surprising, given that the most popular motorcycle type among young riders is the automatic transmission type, which is unable to support riders attempting any kind of stunt. This finding can be explained by the riding control of automatic motorcycles, which do not have a manual clutch and deliver power smoothly, making it difficult to create immediate response needed for stunts such as wheelies. As a result, the motorcycle's design limits these behaviors rather than indicating lower risk-taking by riders.

Given the association between MRBQ and riders' sociodemographic traits, it is possible to associate profiles of riders who are more likely to participate in abnormal behaviors. The sociodemographic variable in this study is the sum of the years of riding and age, and it has a substantial impact on dangerous behavior. Younger motorcyclists with less riding experience are more likely to make mistakes and infractions, as the bivariate association illustrates. According to Leksmono and Anjaya (2014), it is corroborated by earlier research showing that younger drivers with less driving experience either underestimate or accept the danger as a result of their sensory experiences. In the meanwhile, this model can be used to correlate negative influences on societal norms about safety, which have a substantial impact on errors and violations. The results of Normative Social Theory, which contends that social influences and how people perceive the behavior of others can affect an individual's behavior, are comparable.

CONCLUSIONS

This study confirms that the Motorcycle Rider Behaviour Questionnaire (MRBQ) demonstrates a context-specific four-factor structure among Indonesian young adult motorcyclists, consisting of errors, violations, safety gear violations, and stunts, rather than the five-factor model reported in studies of experienced riders in the UK and Turkey (Elliot et al., 2007; Ozkan et al., 2012). Exploratory factor analysis using PAF supported this structure with strong sampling adequacy (KMO = 0.965) and meaningful item loadings, while CFA results indicated that previously established models did not adequately fit this population. The merging of traffic and control errors into a single error factor, the significant portion of violation-related behaviors, and the weak role of stunts reflect local riding conditions, vehicle characteristics, and rider experience. Overall, these findings suggest that the MRBQ is psychometrically valid for Indonesian young riders when adapted to their riding context, and that factor structures derived from experienced riders in high-income countries may not be directly transferable without further validation.

The participants' biased responses as a result of the online data collection process are another drawback of the current findings. Their consistency in providing genuine answers to the questionnaire may be impacted by the large number of MRBQ items and other questionnaire items. Therefore, it will be helpful to validate the results by direct participant teaching and paper-based methods for future study. Additionally, before the MRBQ instrument is widely used, it will be helpful to improve the

validity of the items for young adult riders in Indonesia. Enhancing the measurement of errors, infractions, and the use of safety gear is especially necessary because these behaviors are frequently displayed in the context and have been shown to cause crashes.

Because advanced road safety technologies are still limited in Indonesia, behavioral research remains the most effective way to understand traffic psychology. This study recommends adopting a graduated licensing system in the future that allows young riders to gain experience in stages under supervision, restrictions, and consistent safety enforcement.

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