Age as the Moderating Variable in the Relationship Between Risk Taker Personality and Aberrant Driving Behavior of Drivers in Semarang City

Manik Mahachandra[1*], Yusuf Widharto[2], Muhammad Andhyka Putra[3], Muhammad Ragil Suryoputro[4], Heru Prastawa[5]
{manik.mahachandra@ft.undip.ac.id[1]}

Industrial Engineering Department, Diponegoro University, 50275, Indonesia[1,2,3,5]
Industrial Engineering Department, Universitas Islam Indonesia, 55584, Indonesia[4]

Abstract. Semarang is one of the cities with a high number of accident cases. The majority of traffic accidents can be attributed to driving behavior. Aberrant driving behavior can arise from the driver's personality and attitude. Accidents among adolescence were caused due to the nature of risk taking rather than the driving skills they possess. Therefore, this study aims to determine whether age can affect the relationship between risk-taking personality and aberrant driving behavior. This research used cross sectional method and applied the Risk-Taking Questionnaire and the Aberrant Driving Behavior Questionnaire. A number of 215 people, who lived in Semarang City, aged 17-45 years, had driving license(s), and had actively driving for the last one year, were participated in this study. Moderated Regression Analysis statistical test was run for young and adult participants to reveal the relationship differentiation between them. The study results show an increase in the coefficient of determination (R2) from 0.078 (df = 1) to 0.222 (df = 3), which indicates that age plays a significant role in influencing the strength of the relationship between risk taker personality and deviant driving behavior.

Keywords: Risk taker personality, aberrant driving behavior, RT-18, DBQ, young driver, moderating variable

1 Introduction

1.1 Background

In this era, the need for transportation is increasing, especially in urban areas [1]. This is seen from the increasing number of motor vehicles that exist to date which also leads to an increase in traffic congestion. Increased traffic congestion and lack of awareness and experience in driving leads to high rates of traffic accidents. The Global Status Report on Road Safety mentioned that every year, around the world, traffic accident is still a serious problem. The report shows that every 24 seconds, one life is lost in a traffic accident. Every year there are more than 1.35 million deaths from traffic accidents [2].

Central Java Police Department data shows that Semarang is one of the cities that recorded a high number of accident cases. Figure 1 shows the number of accidents of several cities in Central Java in the age range of 17-35 years [3].

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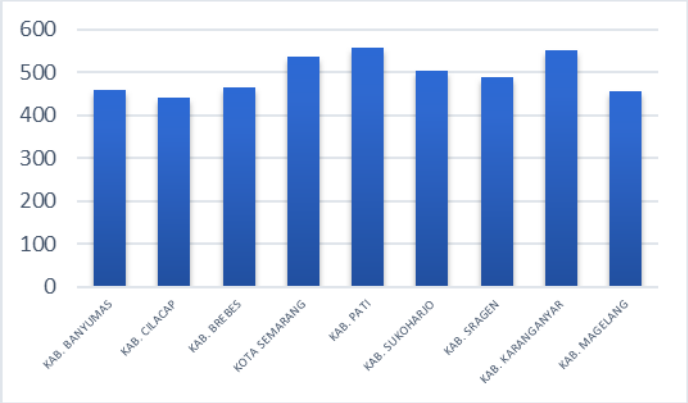

Fig. 1. Accidents cases number in several cities in Central Java.

The increase in the number of traffic accidents is largely due to traffic violation behavior. According to [4] the form of aberrant driving behaviors is divided into three types, i.e. Errors, Lapses, and Violations. Errors reflect errors in driving involving failure in observing traffic signs and misjudgment of traffic conditions. Lapses refer to attention and memory disorders that are relatively harmless. Meanwhile, Violations refer to contraventions made intentionally by the driver.

Because behavior is a form of external response of an individual to his or her mental activity, and it has also been proven that various aberrant driving behaviors can arise from the internal factors of the rider such as the person's particular attitude and psychological traits. Lewin's research in [5] showed that the internal factors of motorists (individual factors), which significantly is close to 90%, were the predictors of the emergence of traffic accidents. Later the [6] research showed that people with high impulsiveness and weak empathy tend to make mistakes while driving. Impulsiveness is strongly related to risk-taker traits. Risk-taking behavior can be useful, necessary, and appropriate under certain conditions, but it can also be dangerous to do. The result of risk-taking behavior is subjective and partly depends on the individual's circumstances; many decisions in life require a balance between risk and anticipated rewards [7].

Risk-taking behavior has been considered a personality characteristic, a learnable behavior, and is a process of the self-development phase. As a characteristic or personality trait, risk-taking distinguishes each individual [8]. According to [9], risk taking behavior is how a person behaves in risky situations, where this situation contains a high degree of uncertainty and possible harm. Furthermore, [10] stated that behavior is the result of a series of processes: the identification of options and the identification of the consequences of each choice. It evaluates the possibilities of each consequence, checks everything that is common to each consequence, and combines all the information obtained to make a decision.

The majority of traffic accidents can be attributed to driver behavior. However, [11] showed that most young driver accidents are due to risk-taking rather than lack of skills. Therefore, the research supports that one of the factors influencing the nature of risk-taking is age. Research shows that teenagers are more likely to be risk-taker compared to adults [12] [13]. This is because teenagers tend to have unstable emotions.

According to [14] behavior is a response or reaction of a person to stimulus (external stimuli). According to National Traffic Law of Indonesia No. 22 of 2009, the driver is the person

driving the motor vehicle on the road who already has a driver's license [15]. According to [16], driving behavior is defined as the behavior of the owner or user of the vehicle in driving and caring for his vehicle. There are several factors that affect driving. Plant [17] stated that factors that influence traffic behavior include: (a) Environmental factors such as potholes and traffic accidents; and (b) Internal factors that are at risk of influencing the driver's behavior, such as behavioral factors, risk-taking, stress, disorders, fatigue, experience, age, alcohol, drugs, and disease.

Aberrant driving behavior will certainly be a threat to other road users. One important factor that causes high number of traffic-related injuries and deaths in teenagers is a lack of experience in driving, including experience in recognizing, assessing, and responding to existing hazards [18]. In this study, we will determine the influence of age on the relationship between risk-taking personality and aberrant driving behavior.

1.2 Problem statement

Figure 2 shows conceptual model explaining the interconnectedness between variables used in this study.

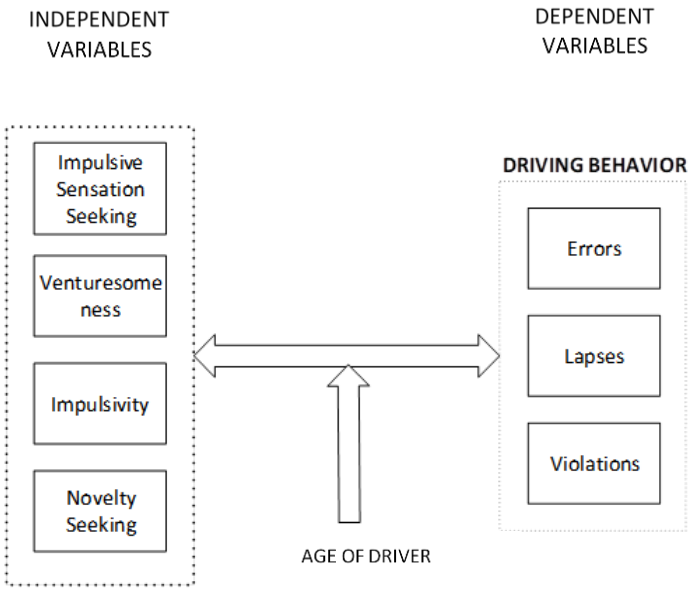

Fig. 2. Conceptual model of this study.

Problems are identified using preliminary studies of previous research, which finds that there is a suspicion that teenagers tend to drive unsafely due to susceptible in controlling emotions and the lack of experience. Risk-taking behaviors that teenagers tend to do also influences unsafe driving behavior. Therefore. the identification of the problem in this study is to understand the effect of age on the relationship between risk-taking and driving behavior.

1.3 Boundaries

Some boundaries applied in this research were as follows:

- Participants were motorcyclists who already have a driver's license either driver's license A or driver's license C.
- Participants were 17-25 years old.
- Research area is limited to city of Semarang.
- Participants were limited to motorcycle and car drivers.
- Risk-taker personality tendencies were measured by the RT-18 Questionnaire, while driving behavior was measured by DBQ which measured the error rate, deviations and violations committed by drivers.

2 Methods

2.1 Risk-taking questionnaire 18 items (RT-18)

In this study, risk taker was quantified by Risk-Taking Questionnaire-18 from [19]. This questionnaire consisted of 18 question items that adopt several sub scales of the previous risk-taking questionnaire, while the sub-scale was impulsiveness and venturesomeness, novelty seeking, and impulsive sensation seeking. These sub-scales were selected from different types of scales and questionnaires, as they reflected the properties associated with risk-taking. This questionnaire was measured by 6 points of ordinal scale starting from 1 (strongly disagree) to 6 (strongly agree).

2.2 Driving behavior questionnaire

DBQ Questionnaire of [20] was used in this study. This questionnaire was useful for measuring aberrant driving behavior in the form of errors, lapses or violations. This questionnaire consisted of 40 statements that include 3 variables namely Error (E), Lapses (L), and Violation (V). This questionnaire was measured by 6 points of ordinal scale starting from 1 (never) to 6 (always).

2.3 Data processing

To find out if age can affect the strength of the relationship between risk-taker personality and aberrant driving behavior, Moderation Regression Analysis was used. A particular implementation of linear multiple regression was the Moderated Regression Analysis (MRA) or interaction evaluation, where the regression equation includes an aspect of interaction (multiplication of two or more independent variables) with the following equation formula [21]:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_1X_2 + e \quad (1)$$

Variable multiplication between X_1 and X_2 was called a moderate variable because it described the effect of moderating X_2 variables on the relationship of X_1 and Y. While variables X_1 and X_2 are a direct influence of variables X_1 and X_2 on Y. A moderating variable was an

independent variable that served to strengthen or weaken the relationship between an independent variable to a dependent variable [21].

3 Results and Discussion

3.1 Demographic data overview

The recapitulation of the demographic data of participants who filled out this research questionnaire is shown in Table 1.

Table 1. Demographic data recapitulation of participants

Characteristics		Frequency (Person)	Percentage (%)
Age (years)	17-25	112	52%
	26-35	66	31%
	36-45	37	17%
Gender	Male	111	52%
	Female	104	48%

Some demographic characteristics of drivers could affect driving safety behavior. Some included age, gender, and driving experience [22]. Based on Table 1, it could be implied that the majority of participants were teen drivers with a range of ages 17-25 years. The data supported participants' focus on this study, which is teenagers. By gender, male respondents were 111 while women were 104.

3.2 Age influence

Output comparison of regression test results before and after added variable moderating age is presented in Table 2.

Table 2. Regression test result comparison output

Output	Before adding "age" as moderate variable	After adding "age" as moderate variable	Conclusion
R	0.280	0.472	An increase in the value of the determination coefficient occurs
R square	0.078	0.222	
Sig.	0.000	0.000	
df	1	3	

So, here was the linear regression equation before a moderating variable was added:

$$Y = a + b_1 X_1 \tag{2}$$

$$DBQ = 1.525 + 0.197\ RT \tag{3}$$

and after adding moderate variables, the equation became as follow:

$$Y = a + b_1 X_1 + b_2 Z + b_3 X_1 Z \tag{4}$$

$$DBQ = -2.627 + 0.125\,RT - 0.262\,age - 0.123\,RT \times age \quad (5)$$

Based on Table 2, it could be inferred from linear regression test results in significance less than 0.05 both before and after added moderating variables which means significant regression test results. The R value was a symbol of the correlation coefficient, from Table 2 it showed that the value of R before adding a moderating variable of 0.280 which indicated the relationship of the two research variables was in the low or weak category and after added a moderating variable of 0.472 indicating the relationship of the two research variables existed in the moderate category, then the value of the determining coefficient of R Square which indicated how well the regression model was formed by the interaction of free variables and bound variables. The R Square value obtained from the regression test results before the moderating variable was added by 7.8% which could be interpreted that the risk taker personality variable (X_1) had a 7.8% contribution influence to the driving behavior variable (Y) and after being added a moderating variable of 22.2% which meant an increase in the influence of contributions to 22.2% between risk taker personality variables (X_1) on driving behavior (Y) and the rest was influenced by other factors. With the increase in the value of R Square in the first regression by 0.078 to 0.222 in the second regression, it could be concluded that the age (Z) influenced the personality relationship of risk taker (X_1) to driving behavior (Y). The greater the value of R square, the stronger the relationship between the two variables. Then judging by the regression equation, there was a regression coefficient value of minus (-), so it could be said that age (Z) negatively affects the relationship between personality risk taker (X_1) and driving behavior (Y).

Age variables were moderator between personality level and driving behavior. Because it directly influenced driving behavior, and so did the interaction between those variables, therefore age variables were quasi-moderators. Quasi moderator was a variable that moderates the relationship between an independent variable and a dependent variable in which a pseudo moderation variable interacts with an independent variable while being an independent variable. It meant that the older the person, the stronger the personality effect on driving behavior.

The data processing showed that age influenced the strength of the relationship between personality risk taker to aberrant driving behavior. The older the age was, the lower the influence of taker risk behavior on aberrant driving behavior. These results were in line with [23] findings, which found that age negatively affects traffic violations. Older drivers were more aware and cautious of the value of safety, particularly in situations where they no longer consider themselves as young, so sight and hearing and attention started to decline as the physical state was no longer productive, making them more attentive in driving. The results of [24] found that older people displayed improved driving behavior (driving slowly and comfortably and retaining the idea of better slow origin survive) while his physical strength and mental well-being started to decline as a person grew older (e.g. vision, hearing and emotional) so that he became more vigilant in driving.

The findings in this study explained that age differences can provide personality differences, as well as influence driving behavior. This meant that the same personality can have implications on driving behavior at different age levels towards different motorists. At a young age, riders who are patient, calm, friendly, tolerant, and happy to avoid conflict could act carelessly when on the road and were happy to commit traffic violations until an accident, which is also potentially involved in legal problems, as well as financial losses. Conversely, older motorists were more likely to commit speed and traffic offences, so the likelihood of an accident, and legal problems with traffic accidents and the effect of material harm will be smaller.

3.3 Solution recommendations

Based on the results of the discussion, age can affect the relationship between personality risk taker and aberrant driving behavior, the results also showed that age negatively affects the relationship. This meant that the older the age is, the lower the risk of aberrant driving behavior. Therefore, it could be said that in teenagers have the highest likelihood of having a personality risk taker and aberrant driving behavior. The solution that can be provided on this issue is the provision of education and training through educational institutions as a form of new safety plan policy to improve the driving safety in Indonesia.

The teenager's behavior can be due to a lack of experience and knowledge about driving and in dealing with risks arising from their personality or behavior. Knowledge of driving safety is gained by a person through both personal and other experiences and literature. Drivers with minimal experience and lack of safe driving skills are at high risk for accidents and high risk for accidents and injuries [25]. Knowledge of the high risk of an accident in a motorcyclist who is in teen age can make the driver rethink when wanting to ride a motorcycle [26]. This understanding not only applies to motorists, but also applies to parents of motorists, especially to educate their children to always drive safely [27].

Alternative intervention strategies which can be implemented are to let the teen driver know that they need to change their behavior and give them the opportunity to understand how to change it. In the research conducted by [28] the group which implement this strategy has proven to decrease the number of accidents up to 50%, compared to the one in the control activities group. The implementation of this strategy has benefitted that the decision is made personally and individually. The disadvantage will be if the implementation is done unsupervised, then there will be unwanted consequences regarding the aberrant driving behavior. In driving, this solution may applicable when driver is accompanied by passenger(s). However, one must make sure that actively speaking passenger maybe lead into higher risk in traffic accident due to decreasing driver attention [29]. Considering the personality, risk-accepting passenger would higher the probability of risky driving [30].

4 Conclusion

Based on the results of the analysis, it could be concluded that there was an increase in the coefficient of determination in the linear regression test between personality risk taker to aberrant driving behavior from 0.078 (df = 1) to 0.222 (df = 3). It is indicating that age played a significant role in influencing the strength of the relationship between risk taker personality and deviant driving behavior. The older the driver, the lower the influence of risk taker behavior on deviant driving behavior which resulted in positive implications on driving behavior and will ultimately lead to improved driver safety.

The solution recommended is to implement a new safety plan policy according to the age of the driver to improve the safety in Indonesia in the form of providing knowledge and education on how to drive safely, as there should be restrictions for teenage drivers to control risky personalities that impact their driver's safety awareness.

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