Safe Driving Predictor Model among Drivers At Universiti Teknologi Malaysia, Johor Bahru, Malaysia

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Abstract
This study was carried out with the aim of identifying the types of driver attitudes, safe driving behaviour, differences in attitudes based on road user categories - lecturers and students and driving experience as well as factors predicting attitudes towards safe driving behaviour. The study sample was among staff (n=91) and students (n=269). Sample selection was made using simple random sampling. The online questionnaire instrument was distributed openly to all staff and students via email and whatsapp. The responses received were analyzed using descriptive and inferential statistics. The results of the study show that the mean driving attitude is at a fairly satisfactory level (2.93) with the mean response approaching the 'Almost True About Me In Many Situations' scale for staff and students. The mean of safe driving behaviour for staff is higher (2.53) compared to students (2.44). The mean can be interpreted as all samples whether staff or students show poor driving behaviour because the response is in the range of 'once in a while'. Further analysis found that there was no significant difference in driving attitudes based on gender and experience for staff and students. Nevertheless, correlation analysis shows a weak positive relationship between driving attitudes and safe driving behaviour for both sample categories. Analysis of predictors of driving attitudes for staff shows that all dimensions are predictors except haste. However, the six dimensions are predictors of driving attitudes among students. Next, the analysis of the predictors of safe driving behaviour among staff and students showed similar findings that all factors were significant predictors. Therefore, the Safe Driving Model for drivers in UTM related to driving attitudes and safe driving behaviour is proposed to improve driving performance on the road to reduce the risk of loss of life and property.
Keywords: Safe Driving Model, Driving Attitude, Safe Driving Behaviour

Introduction

The World Health Organization reports that the global death rate due to road accidents remains high, at approximately 1.19 million deaths per year (Safety, 2023). To address this issue, initiatives such as those by Bloomberg Philanthropies focus on strengthening national legislation, improving data collection, changing road user behavior, enhancing road infrastructure, and upgrading vehicle safety.

Driving safely on the road is closely related to driver behavior, which plays a pivotal role in road safety, making it imperative to study and understand its intricacies. Unsafe driving habits can significantly increase the risk of accidents, as various studies have shown. For instance, the Global Status Report on Road safety (2023)suggest that driver factors play a significant role in road safety. Consequently, interventions targeting the modification and enhancement of road user behavior are indispensable.

A key determinant of road safety is individual driving behavior, which research has shown to be predictive of road accidents (Ahangari et al., 2019; Baker et al., 2021; Khashayarfard & Nassiri, 2021; Khattak et al., 2021; Oviedo-Trespalacios et al., 2019). Drivers engaging in unsafe behaviors substantially elevate their accident risk.

Safe driving behavior is influenced by various individual factors, including emotional and behavioral control, defensive driving techniques, and responsible decision-making while driving (Sagberg et al., 2015). Additionally, personality traits and demographic factors such as gender, age, driving experience, and physical condition also impact driving behavior (Julia, 2015).

Despite efforts to enhance road safety, Malaysia continues to grapple with significant loss of life and property due to road accidents (Mohammed et al., 2019). The effectiveness of existing measures remains insufficient in addressing this pressing issue (Organization, 2015), necessitating urgent action to prevent further casualties and economic losses.

This study aims to explore safe driving behavior among drivers at Universiti Teknologi Malaysia (UTM), Johor Bahru, by examining the predictor factors influencing their behavior. By analyzing variables such as emotional and behavioral control, defensive driving practices, and individual demographic characteristics, the study seeks to identify key factors impacting safe driving habits. The findings will contribute to existing research on unsafe driving practices and align with the Malaysian government's road safety goals, aiming to reduce fatalities and economic losses. This study supports the goals outlined in Malaysia's 11th Malaysia Plan (2016 – 2020) for road safety and emergency services by promoting public health and safety.

Literature Review

In studies on road accidents in Malaysia, driver negligence has been identified as the primary cause, accounting for 80.6% of all accidents (Malaysian Road Safety Department, 2019). This highlights the crucial role of driver factors in road safety and the need for measures to reduce accident risk. Despite adequate technical standards in road quality and safety measures, the risk of road accidents remains high if drivers do not adopt proactive and safe driving behaviors.

The Impact of Driver Factors on Safe Driving

Driver factors are an important component to safe driving (Bassoo et al., 2017). There are three main components that determine a driver's ability to drive safely, which are emotional and behavioral control, practicing defensive driving techniques, and being responsible for every decision while driving (Sagberg et al., 2015). According to Sagberg et al.

(2015), safe driving practices include respecting other drivers, always being aware of driving, the concept of sharing the road with other drivers, always being aware of road conditions, always adopting a positive attitude and drive according to the situation.

Driver Behavior and Accident Risk

Research demonstrates a correlation between drivers' understanding of safe driving and accident risk (Yoh et al., 2019). Risky driving behavior is linked to drivers' physical condition Almigbal et al (2018), fatigue Hinkle et al (2003); Sagberg (1999); Taylor & Dorn (2006), distraction Ahangari et al (2019), and driving experience (Day et al., 2018; De Winter et al., 2015).

Driver Attitudes and Behaviors

Some previous studies indicated that drivers' attitudes significantly influence their safe driving behavior. Drivers' attitudes toward road safety are shaped by their emotions, personality traits, and role models (Julia, 2015; KUAN, 2007). Therefore, to mitigate accident risk, it is essential to focus not only on drivers' attitudes but also on their physical condition.

Aggressive Driving and its Association with Accidents

Harris et al (2014) found a correlation between aggressive driving behavior and the frequency of traffic violations. Batool and Carsten (2017) showed a link between accidents and drivers' personal factors, including aggressive driving, reckless driving, dangerous driving behavior, and selfish driving habits. Similarly, Mohamed and Bromfield (2017) discovered a connection between aggressive driving, speeding, and road accidents. Drivers who neglect the importance of safe driving often exhibit aggressive driving behavior, resulting in frequent traffic violations and accidents.

Other Contributing Factors

According to the research by Morad et al (2009), the risk of accidents increases when drivers lack sleep, experience fatigue, or are under the influence of prohibited substances. Additionally, the research found an association between fatigue and a decline in drivers' performance while driving (Di Milia et al., 2011). Mattsson et al (2015) also discovered a relationship between the driver's age and traffic violations as well as aggressive driving behavior. Research by Olandoski et al (2019) further indicates that anger, danger, excitement, and aggressive behavior are associated with errors during driving and the risk of accidents.

Impact of Cognitive and Personality Traits on Driving Performance

Vetter et al (2018) also linked cognitive and personality aspects with safe driving performance. It was found that the driver's driving performance is determined by various things such as reaction time, concentration, fatigue reaction, logical reasoning, and personality traits related to safety. The skill of logical reasoning about the cause and effect of an accident was found to be the most significant skill in determining the driver's safe driving performance. The effects of failure to reason about the cause and effect of accidents influence drivers to perform certain behaviors such as speeding (Lewis-Evans et al., 2010).

Methodology

The study employs a correlational design and involves several stages. The primary source of information comes from a questionnaire, which was developed in the first phase of

the study. In the next phase, potential participants were contacted. Due to the constraints and limitations on movement during the COVID-19 pandemic, the questionnaire was distributed online to all staff and students at Universiti Teknologi Malaysia (UTM). This online distribution method allowed for simple random selection and offered participation opportunities to all staff and students.

The sample consisted of 360 drivers at UTM, made up of 91 staff members and 269 students. Participation in the study was voluntary. Once the data were collected, the final phase involved processing and analyzing the data to answer the research questions. Descriptive and inferential statistics were used to analyze the data. This approach allowed the researchers to efficiently collect and analyze data while ensuring the safety and convenience of participants during the pandemic.

The study utilized the UTM Safe Driving Questionnaire, which was administered to the participants. The questionnaire is divided into three sections: Part A, Part B, and Part C. Part A collects information on socio-demographic factors such as gender and driving experience. Part B measures dimensions of driving attitudes across six constructs, while Part C assesses the dimension of safe driving behavior across five constructs, as illustrated in Table 1.

Table 1

Constructs for Driving Attitude and Safe Driving Behaviour

Driving Attitude		Safe Driving Behaviour	
Perfection (SK):	attitude of perfectionism	Speed (KL):	always drive slowly
People Pleasing Attitude (SM):	attitude of pleasing others	Serenity (KT):	always calm while driving
Haste (ST):	attitude of not rushing	Focus (FO):	always focus while driving
Self-Reliance Attitude (SKM):	attitude of self-reliance	Planning (PR):	always plan before driving
Hard Work Attitude (SKK):	attitude of working hard	Understanding of Road Rules (PJR):	have a good understanding of road rules
Openness (STB):	open attitude		

The driving attitudes were measured using a 4-point Likert scale, allowing participants to rate statements as (1) Not True About Me in Many Situations, (2) A Little True About Me in Many Situations, (3) Almost True About Me in Many Situations, or (4) True About Me in Many Situations. Similarly, the safe driving behavior was assessed using a 4-point Likert scale, where respondents rated their frequency of engaging in various safe driving behaviors as (1) Never, (2) Once in a while, (3) Many times, or (4) Always.

The study used SPSS version X for data analysis. T-tests and ANOVA were employed to examine whether there were differences in driving attitudes and safe driving behavior among staff and students based on gender and driving experience. Correlation analysis using Pearson Product-Moment was conducted to identify relationships between driving attitudes and safe driving behavior. Pearson correlation was also used to assess these relationships in greater

detail. The level of statistical significance was set at $P < 0.05$ to ensure rigorous analysis and interpretation of results.

Data analysis was done based on the research questions that have been set as follows:

i. What is the driving attitude of the drivers at UTM (staff and students) based on the 6 constructs of perfectionism, pleasing others, hurry, independence, hard work and openness?

ii. What is the safe driving behaviour of UTM drivers (staff and students) based on 5 constructs, namely speed, calmness, focus, planning and understanding of road rules?

iii. Is there a mean difference in driving attitudes of staff and students based on gender and driving experience?

iv. Is there a relationship between the driving attitudes of staff and students with their safe driving behaviour?

v. What are the predicting factors for the driving attitude of staff and students at UTM?

vi. What are the predictive factors for the safe driving behaviour of staff and students at UTM?

Results and Discussion

The study included a total of 360 participants, comprising 91 staff members and 269 students. Among these participants, females made up the majority at 59%, while males accounted for 41%. Figure 1 provides a detailed breakdown of the gender distribution between staff and students.
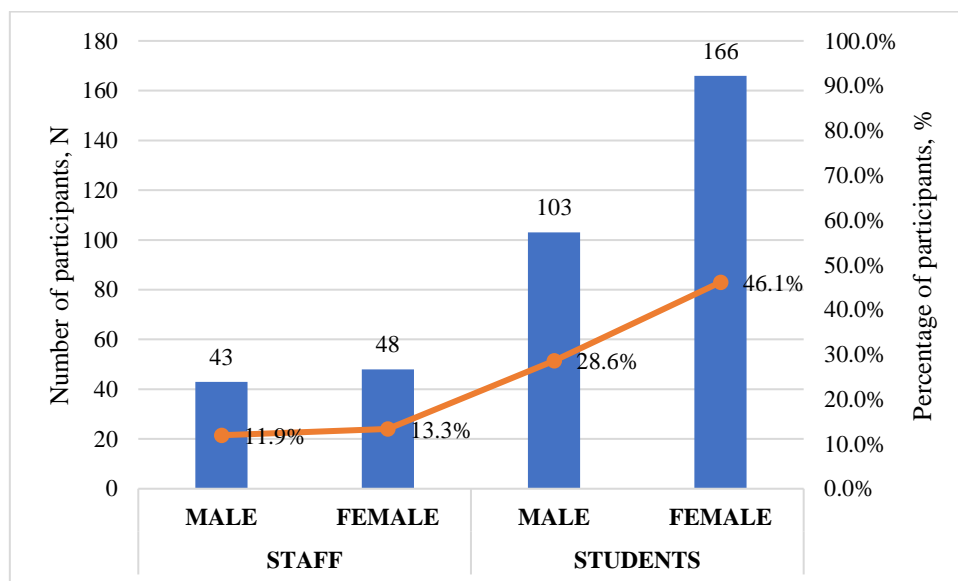

Figure 1: Gender of Participants

Figure 2 illustrates the distribution of participants' years of driving experience. The data reveals a clear distinction between the two groups: students tend to have fewer years of driving experience, while staff members generally have more extensive driving experience. This finding aligns with expectations, as students are typically younger and may have less time on the road compared to staff members, who are likely to have been driving for a longer period.
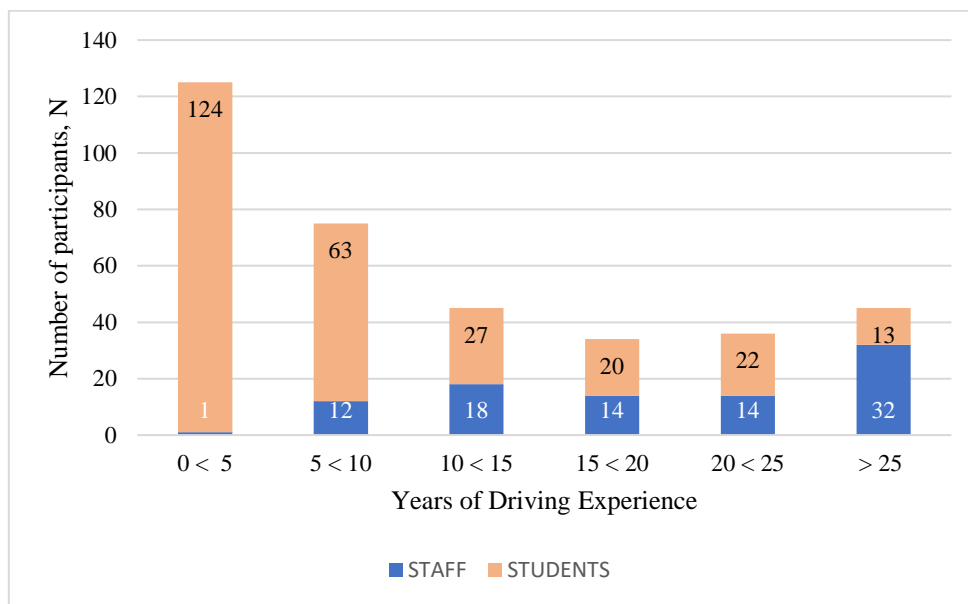
Figure 2: Driving Experiences of Participants

Table 2

Descriptive Statistics of Driving Attitude and Safe Driving Behaviour for Staff and Students

Driving Attitude	Staff	Student
	Mean (SD)	Mean (SD)
Love Perfection (SK)	3.30 (0.17)	3.30 (0.47)
People Pleasing Attitude (SM)	3.08 (0.62)	2.95 (0.46)
Haste (ST)	3.01 (0.32)	2.86 (0.56)
Self-Reliance Attitude (SKM)	2.70 (0.33)	2.81 (0.50)
Hard Work Attitude (SKK)	2.91 (0.81)	2.93 (0.47)
Openness (STB)	3.08 (0.27)	2.72 (0.53)
Overall Mean	2.93 (0.42)	2.93 (0.50)
Safe Driving Behaviour		
Speed (KL)	2.29 (0.38)	2.04 (0.62)
Serenity (KT)	2.29 (0.48)	2.51 (0.47)
Focus (FO)	2.56 (0.75)	2.27 (0.50)
Planning (PR)	3.21 (0.24)	3.28 (0.59)
Understanding of Road Rules (PJR)	2.28 (0.92)	2.12 (0.36)
Overall Mean	2.53 (0.44)	2.44 (0.51)

Descriptive statistics in Table 2 shows the level of particpant's driving attitude and safe driving behaviour. It appears that both staff and students show both a moderate level of driving attitude (staffs at mean = 2.93; SD = 0.42 and students at mean = 2.93; SD = 0.42 respectively). However, it was recorded the level of safe driving behaviour for both are slightly different (staffs at mean = 2.93; SD = 0.44; and students at mean = 2.44; SD = 0.51 respectively). Staff exhibit higher safe driving behaviour compared to students with mean 2.53 and 2.44 respectively. This could be related to the years of driving experience. Planning

dimension in the safe driving behaviour was the only dimension with satisfactory findings with mean 3.21 and 3.28 for staff and students, respectively.

The Influence of Gender and Driving Experience on Driving Attitudes and Safe Driving Behaviors

A t-test was conducted to examine whether there were any significant differences in driving attitudes between male and female staff and students. It was found that men and women were very similar on driving attitudes measures. Findings show that there is no significant difference in driving attitude between men and women for both staff (Men: mean=2.98, SD=0.28; Women: mean=3.02, SD=0.28; t (89) = -0.572, p=0.57 (two-tailed)) and students (Men: mean=2.95, SD=0.35; Women: mean=2.92, SD=0.34; t (267) = -0.502, p=0.62 (two-tailed)).

Next, an ANOVA test was conducted to compare the mean differences in driving attitudes among staff and students based on their driving experience. Staff and students were similar in driving attitudes regardless of their driving experiences. Findings show that there is no significant mean difference in driving attitude for various driving experiences for staff (p=0.70) and students (p=0.32) categories. The results are shown in Table 3 and 4, respectively.

Table 3
Results of Anova Analysis of Driving Experience for staff

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.240	5	.048	.596	.703
Within Groups	6.858	85	.081		
Total	7.099	90			

Table 4
Results of Anova Analysis of Driving Experience for students

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.711	5	.142	1.182	.318
Within Groups	31.644	263	.120		
Total	32.355	268			

P<0.05, Ho rejected

Relationship Between Driving Attitudes and Safe Driving Behaviour of Staff and Students

Through Pearson Product Moment analysis, it was found that driving attitudes and safe driving behaviours have a weak positive relationship. The correlation coefficient is r=0.08 and r=0.25 for staff and students respectively, as shown in Table 5.

Table 5
Correlation Analysis

Category of respondent			Mean Driving Attitude	Mean Safe Driving
Staff	Mean Driving Attitudes	Pearson Correlation	1	0.08
		Sig. (2-tailed)		0.451
		N		91
Students	Mean Driving Attitudes	Pearson Correlation	1	0.250
		Sig. (2-tailed)		0.000
		N		269

Correlation findings for research questions 4, 5 and 6 were made based on the recommendations of Hinkle et al. (2003) as shown in Table 6.

Table 6
Interpretation of Correlation Coefficient

Coefficient	Interpretation
.90 to 1.00 (-.90 to –1.00)	Very Strong Positive (negative)
.70 to .90 (-.70 to -.90)	Strong Positive (negative)
.50 to .70 (-.50 to -.70)	Moderate Positive (negative)
.30 to .50 (-.30 to -.50)	Weak Positive (negative)
.00 to .30 (.00 to -.30)	Very Weak Positive (negative)

Source: Hinkle, Wiersma, & Jurs (2003). Applied Statistics for the Behavioral Sciences (5th ed.)

Predictors of Driving Attitudes for Staff and Student at UTM

Pearson correlation analysis was then conducted to determine the association of each of the six (6) dimensions of driving attitude for staff and students. Standard Beta values were used to determine the significant predictors. The analytical interpretation for research questions 5 and 6 is based on the recommendations of Pallant (2013). The following is an interpretation table of Standard Beta (β) values for multiple regression tests.

Table 7
Interpretation of Standardized Beta values

B value	Interpretation
< 0.05	Too small but significant
0.05 ≤ β ≤ 0.10	Small but signifikan
0.10 ≤ β ≤ 0.25	Moderate and significant
> 0.25	High and significant

Source: Pallant (2013). *SPSS survival manual*: McGraw-Hill Education (UK).

Table 7
Pearson Correlation Analysis for staff

		Mean Driving Attidtudes	Mean SK	Mean SM	Mean ST	Mean SKM	Mean SKK	Mean STB
Pearson Correlation	Mean Driving Attidtudes	1.000	.672	.622	.719	.712	.667	.719
Sig. (1-tailed)		.000	.000	.000	.000	.000	.000	.000
N		91	91	91	91	91	91	91

Coefficients^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.183	.054		3.382	.001
	MeanSK	.154	.015	.228	10.323	.000
	MeanSM	.170	.015	.248	11.489	.000
	MeanSKM	.226	.013	.357	16.974	.000
	MeanSKK	.170	.016	.238	10.755	.000
	MeanSTB	.214	.013	.349	16.376	.000

Table 7 shows the results of Pearson Correlation analysis for staff driving behavior. As indicated in Table 9, the correlation between the six (6) dimensions of driving attitude among staff is moderate-strong (range between 0.622 and 0.719), with the most significant predictor being self-reliance (0.357), followed by openness (0.349), pleasing others (0.248), hard work attitude (0.238), and perfectionism attitude (0.228). Urgent attitude is not a predictor that affects driving behavior among staff at UTM.

Accordingly, based on the multiple regression test conducted, the proposed driving attitude model for staff is 0.183 + (0.226) SKM + (0.214) STB + (0.170) SM + (0.170) SKK + (0.154) SK.

Table 8
Pearson Correlation Analysis for students

		Mean Driving Attitudes	Mean SK	Mean SM	Mean ST	Mean SKM	Mean SKK	Mean STB
Pearson Correlation	Mean Driving Attitudes	1.000	.718	.674	.709	.758	.668	.632
Sig. (1-tailed)		.	000	.000	.000	.000	.000	.000
N		269	269	269	269	269	269	269

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.006E-013	.000		.000	1.000
	MeanSK	.156	.000	.211	123557418.759	.000
	MeanSM	.156	.000	.208	125771831.709	.000
	MeanST	.188	.000	.303	188543465.314	.000
	MeanSKM	.188	.000	.269	154937782.452	.000
	MeanSKK	.188	.000	.252	156987926.626	.000
	MeanSTB	.125	.000	.192	120400028.946	.000
Note: SK = Love Perfection, SM = People Pleasing Attitude, ST = Haste, SKM = Self-Reliance Attitude, SKK = Hard Work Attitude, STB = Openness						

Table 8 shows the Pearson correlation analysis for students driving behaviour. Students show a medium-strong of correlation between the six (6) dimensions of driving attitude (range between 0.632 and 0.758). The significant predictor is the attitude of urgency (0.303), followed by the attitude of survival (0.269), the attitude of hard work (0.252), the attitude of perfection (0.211), pleasing others (0.208) and openness (0.192). All dimensions affect driving attitudes among students at UTM.

Accordingly, based on the multiple regression test conducted, the suggested Driving Attitude model for students is as suggested is 1.006e-0.13 + (0.188) ST + (0.188) SKM +(0.188) SKK+(0.156) SK + (0.156) SM + (0.125) STB.

Predictors of Safe Driving Behaviour for Staff and Students at UTM

The Pearson correlation analysis shows a weak-strong relationship between the five (5) dimensions of safe driving behavior (range between 0.47 and 0.71) among UTM staff as indicated in Table 9.

Table 9
Pearson Correlation Analysis for Safe Driving for Staff

		Mean Safe Driving	Mean KL	Mean KT	Mean FO	Mean PR	Mean PJR
Pearson Correlation	Mean Safe Driving	1.000	0.626	.650	.605	.473	.708
Sig. (1-tailed)		.	000	.000	.000	.000	.000
N		91	91	91	91	91	91

Coefficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.003	.002		1.215	.228
	MeanKL	.147	.000	.354	402.293	.000
	MeanKT	.176	.001	.292	320.696	.000
	MeanFO	.146	.000	.278	314.515	.000
	MeanPR	.117	.000	.293	346.601	.000
	MeanPJR	.413	.001	.399	447.990	.000
Note: KL= Speed. KT = Serenity, FO = Focus, PR = Planning, PJR =Understanding of Road Rules						

As shown in Table 9, it was found that the most significant predictor to the safe driving behaviour is being understanding of road rules (0.399), followed by speed (0.354), planning (0.293), tranquility (0.292) and finally focus (0.278).

Accordingly, based on the multiple regression test conducted, the recommended Safe Driving Behaviour model for staff is 0.003 + (0.413) PJR + (0.147) KL +(0.117) PR +(0.176) KT + (0.146) FO.

Table 10
Pearson correlation analysis for safe driving for students

		Mean Safe Driving	Mean KL	Mean KT	Mean FO	Mean PR	Mean PJR
Pearson Correlation	Mean Safe Driving	1.000	.678	.716	.744	.449	.844
Sig. (1-tailed)		.	000	.000	.000	.000	.000
N		269	269	269	269	269	269

Coefficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.027E-013	.000		1.215	.228
	MeanKL	.147	.000	.274	403.295	.000
	MeanKT	.176	.000	.250	317.666	.000
	MeanFO	.147	.000	.218	311.511	.000
	MeanPR	.118	.000	.210	341.599	.000
	MeanPJR	.412	.000	.448	443.991	.000

From Table 10, it is shown that the five (5) dimensions of safe driving behavior among students are weak-strong with range of correlation between 0.449 and 0.844. The most significant predictor of the safe driving behaviour among students is being understanding of

road rules (0.448), followed by speed (0.274), calmness (0.250), focus (0.218) and finally planning (0.210).

Accordingly, based on the multiple regression test conducted, the recommendation of the Safe Driving Behaviour model for students is -1.027E-013 + (0.412) PJR + (0.147) KL + (0.176) KT (0.147) FO + (0.118) PR.

Conclusion

The study found that safe driving behavior among drivers at Universiti Teknologi Malaysia (UTM) is influenced by a range of fundamental factors. These factors can be grouped into driver attitude attributes and safe driving practices.

From the perspective of driver attributes, a perfectionist attitude, a desire to please others, diligence, patience, independence, and openness to change were found to be key determinants of safe driving behavior among UTM drivers. Neglecting these attributes can lead to a decrease in safe driving habits. In terms of safe driving practices, consistently planning trips, maintaining calmness while driving, adhering to road rules, and avoiding speeding were identified as characteristics that contribute to safe driving behavior among UTM drivers. Upholding these practices increases the likelihood of exhibiting safe driving habits.

In conclusion, the predictive factors for safe driving among UTM drivers are linked to their attitudes and driving practices. To cultivate safe driving behavior, it is crucial to emphasize both these aspects. Ignoring these factors can lead to a higher risk of unsafe driving behavior.

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