

## Development of Malaysian Driver Anger Scale (MDAS): A Pilot Survey and Reliability Analysis

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### ABSTRACT

Anger is a negative emotion and able to present problems on the road because it can cause aggressive driving, violation and can lead to risk of road accidents. Malaysia is one of the countries that records highest number of accident due to aggressive driving. Therefore, this study has proposed Malaysian Driver Anger Scale (MDAS) which is suitable in the context of driving culture in Malaysia by modifying instrument driving questionnaire anger scale (DAS) introduced by Deffenbacher et al. (1994). This study identified research gaps of Driving Anger Scale (DAS) by doing a literature review. Initially, this study attempted to find a suitable primary theory model to describe anger among drivers. After DAS was selected as a reference theory model, this study tried to find out DAS study applied in Malaysia in order to figure out how well this theory model used in Malaysia. Then, based on previous studies, this study drafted a questionnaire and proposed MDAS. Pilot test was run to identify the weaknesses of items in the set of the survey form and to determine the reliability internal consistency of items. A Questionnaire form was selected as an instrument and scoring were based on a 5 point Likert scale. This study was conducted among drivers in Parit Raja, Batu Pahat Johor. A 30 voluntary respondents were selected to answer the survey form. They were approached face to face to determine the weaknesses of items in the set of the survey and all the weaknesses or errors in the survey form were recorded for improvement. All data collected were analyzed using Statistical Package of Social Science (SPSS) to gain Cronbach's Alpha coefficient. The pilot test result analysis showed Cronbach's alpha coefficient for DAS (Discourtesy  $\alpha = .922$ ; Traffic Obstruction  $\alpha = .902$ ; Hostiles Gestures  $\alpha = .896$ ; Slowly Driving  $\alpha = .838$ ; Police Presence  $\alpha = .927$ ; Illegal Driving  $\alpha = .906$ ) and Road Accident Risk Factor ( $\alpha = .776$ ) is acceptable. Only the Psychological Effect ( $\alpha = .576$ ) showed less satisfactory Cronbach's alpha coefficients. Therefore, this study will modify all the items with less satisfactory results in addition to seeking advice from the expert.. This study will proceed with future work by interviewing respondents who have experiences related to road bullying to gather more information on anger driving in Malaysia.

**Keywords:** Anger; Malaysian Driver Anger Scale; Cronbach's Alpha,

### INTRODUCTION

People feel all types of emotions, either positive or negative (Faupel et al. 2017). Positive emotions include love and affection, while negative emotions include hatred, anger and rage (Ahmad et al. 2020). Anger is a negative emotion both in terms of subjective experience and social evaluation (Averill, 1983). Focusing on negative emotions, anger is mostly associated with events that impeded progress, whereas anxiety occurs when the events affected safety

(Mesken et al. 2007) moreover in road events. Aggressive driving is defined as any form of driving behaviour that is intended to injure or harm other road users physically or psychologically (Lajunen et al. 1998; Kovacsova et al. 2016). This behavior happens because an angry driver tends to drive aggressively and dangerously that can lead to increased risk of accident. In addition, Wu et al. (2018) study stated that road rage is the external presentation of a mood involved in driving and is related to the character, driving skill, and psychology of the driver. However, road

anger is not a spontaneous act. It is triggered when proper external conditions exist such as illegally changing lanes, cutting in, blocking the way, overtaking, congestion, speeding, driving too slowly, flashing light, scratching another vehicle, driving the wrong way, suddenly hitting the brakes, running a red light, complaining, aggressive gesturing, and colliding (Deffenbacher et al. 1994, 2001; de Winter and Dodou, 2010; Iverson and Rundmo 2002; Lajunen et al. 1998; Paleti et al. 2010; Zhang and Chan, 2016; Wu et al. 2018). Mohd Kassim et al. (2018) mentioned that among aggressive driving behaviors are speeding and running red light. Besides, the Royal Malaysian Police (2017) statistic also reported that speeding, tailgating, dangerous driving and others have contributed to the number of road accidents in Malaysia.

West & Hall (1997) also stated that speeding is a dangerous driving behaviour and should be considered as one of the most critical contributors to specific kinds of accidents such as a right of way violations, active shunts or reversing, and loss of control. This behaviour shows that anger as a negative emotion could harm road users. However, what is the cause of driver anger in Malaysia? Do Malaysians drive aggressively due to their anger or due to their attitude? Therefore, this study was conducted to evaluate the suitability of MDAS in the context of driving culture in Malaysia.

## LITERATURE REVIEW

This study identified a research gap by doing a literature review. Initially, this study attempted to find a suitable primary theory model to describe anger among drivers. After DAS was selected as a reference theory model, it had been trying to search for other studies in Malaysia that had applied DAS in order to figure out how well this theory model had been used in this country. Then, based on the previous studies, this study drafted a questionnaire and proposed a model. The pilot test was conducted to identify the weaknesses of items in the set of the survey form.

### DRIVING ANGER SCALE (DAS)

This study adapted Driver Anger Scale (DAS) as a reference theory model because DAS explores one personality factor potentially related to driver safety and describes the development of a measure to assess driving anger (Deffenbacher et al. 1994). However, this study would modify DAS suitability in the context of driving style in Malaysia. DAS was introduced and developed by Deffenbacher et al. (1994) and first conducted in 1994 at Colorado State University. The sample size of this study

was 1526 respondents, consisted of 724 men and 802 women among new students. DAS produces six factors relating to types of situations likely to provoke anger, which consists: discourtesy, hostile gestures, traffic obstruction, slow driving, police presence, and illegal driving (Ambak et al. 2017). Figure 1 below shows the Driver Anger Scale with six factors that was developed by Deffenbacher et al. (1994).

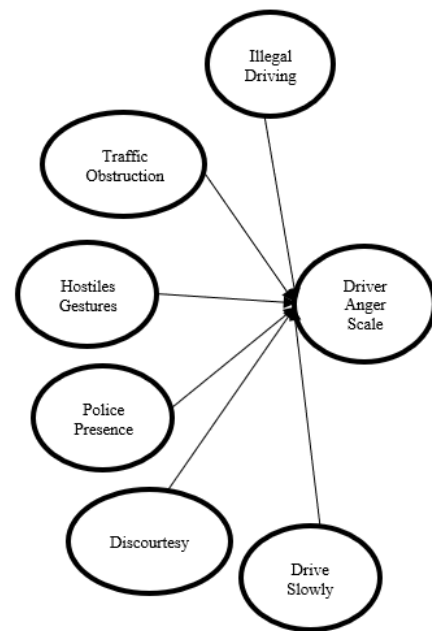


FIGURE 1. Driver Anger Scale (Deffenbacher et al. 1994)

### DRIVER ANGER SCALE (DAS) IN MALAYSIA

There were several studies that had applied DAS to measure anger among drivers and in Malaysia there were three of them.

Ambak et al. (2017) study aimed to identify contributing factors of anger in drivers and to evaluate the Driver Anger Scale (DAS) in Batu Pahat, Johor. The sample size of this study was 250 that randomly selected among car drivers in Batu Pahat, and the questionnaire was used as an instrument to gain information from respondents. This study found that the major contributing factors of anger in drivers were discourtesy, hostile gestures, slow driving, illegal driving and traffic obstruction. Discourtesy was reported as the most dominant factor contributing to anger in drivers. Besides, descriptive factors such as age, driving experience, driving distance, traffic crash involvement and receiving traffic tickets also had influenced the anger. In term of demographic characteristics, this study reported that drivers who were young, less experienced, driving more than 10km, experiencing traffic crashes and receiving traffic tickets were likely to be angry

Sullman et al. (2014) study aimed to examine the types

of situations that cause Malaysian drivers to become angry. Three hundred thirty-nine drivers (339) in Malaysia were selected as respondents. This study applied snowball sampling technique via Facebook Event Page and encouraged them to invite their families and friends who were eligible (hold a valid Malaysian Driving License, driven at least once in the last six months) to join as respondents for this study. The result of this study reported that all original six-factor model was fit, and discourtesy was reported as a contributor to the highest anger among drivers. For demographic and descriptive factors such as gender, age, experience, speed preferences, crash involvement and crash related condition were reported in determining the relationship between anger and aggressive driving. Being females reported the highest propensities for anger due to hostile gestures from other drivers and traffic obstruction. Apart from that, the result indicated that drivers who were young, less experienced, had reported higher speed preferences, recently experienced a near miss and reported losing concentration and minor losses of control while driving tend to become angered. This study verified that DAS was a valid measure of driving anger among non-western countries. Therefore, DAS can be used and applied in Malaysia.

Ismail et al. (2009) study aimed to build several predictive models for first-time accident involvement and penalized traffic offences via logistic regression. The model used several demographic factors, Malaysia Driver Behaviour Questionnaire (MDBQ) and Driver Anger Scales (DAS) as predictors. One thousand eight hundred (1800) respondents responded to the set of questionnaires that was distributed in eight states (Kajang, Johor, Kedah, Kelantan, Perak, Selangor, Terengganu and Kuala Lumpur). This study found that majority of Malaysian drivers experiencing anger while driving. The descriptive analysis result demonstrated that women drivers tend to be aggressive than men did. However, women expressed their anger by verbal or angry thoughts only without expressing it overtly. Beside that, based on model prediction, Model 1 (Lapses, Errors and Violation, Being a male and driving experience) managed to predict 66% of accident involvement.

In contrast, in Model 2, prediction of being fined, it was found that violation subscale of DBQ, DAS gender and driving experience able to predict 65.6%. These two models have provided a moderately strong prediction of accident involvement and being fined. Few variables have been identified as a significant contributor in predicting to be involved in road accidents and being fined; these variables are violating traffic laws, less experience in driving and being male and young.

Therefore, Driver Anger Scale was still less applied in Malaysia and this study would modify DAS suitability in context with Malaysian driving style.

#### DEVELOPMENT OF MALAYSIAN DRIVER ANGER SCALE

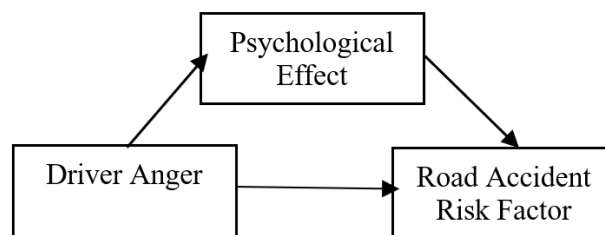


FIGURE 2. Malaysian Driver Anger Scale

Figure 2 shows the proposed Malaysian Driver Anger Scale. Based on the figure, there are relationships between Driver Anger, Psychological Effect and Road Accident Risk Factor. Driver anger is an independent variable and Road Accident Risk Factor is a dependent variable. While, Psychological Effect is the mediating variable between driver anger and Road Accident Risk Factor. Precht et al. (2017) study stated that there was a positive association between driving anger and road accident. When analyzing the mediator, there were two effects involved namely direct effect and indirect effect (Awang, 2014). Therefore, the direct effect is the effect from Driver Anger variable directly to the Road Accident Risk Factor variable, while the indirect effect is the effect from Driver Anger variable to Road Accident Risk Factor variable that goes directly through the Psychological Effect variable.

#### METHODOLOGY

The main goal of this study is to develop the Malaysian Driver Anger Scale in the context of Malaysian driving style or behaviour. However, before conducting the main research project, a pilot study is necessary because it might give advance warning about where the main research project could fail, where research protocols may not be followed, or whether proposed methods or instruments are inadequate or too complex (Van Teijlingen and Hundley 2001).

Besides, the purpose of the pre-test is to verify that the target audience understands the questions and proposed response options as intended by the researcher and is indeed able to answer meaningfully (Perneger et al. 2015). Therefore, this study conducted a pilot study to test and determine the reliability of all items. Reliability means a stable and consistent instrument score (Mohamad et al. 2015; Cresswel, 2005). This study chose to apply the internal consistency approach method and commonly used Cronbach's alpha coefficient. Cronbach's alpha coefficient between .65 to .95 is acceptable, while for low coefficient

indicates that all item's ability to measure the research concept is low. However, Ghazali (2008) stated that in social science study, .60 value is still acceptable. While, the high value of Cronbach's alpha coefficient ( $>.95$ ) shows that all items are similar or overlapping each other (Chua, 2014).

#### PARTICIPANT SELECTION

A total of 30 respondents in Parit Raja were selected to participate in answering the questionnaire form. Perneger et al. (2015) study suggested that 30 participants are reasonable for the pilot study and small samples (5–15 participants) that are common in a pilot test of questionnaires may fail to reveal even common problems. Participants were selected randomly in public areas such as supermarkets. Only respondents who volunteered to answer questionnaire form were approached.

#### LOCATION OF STUDY

Parit Raja was selected as the location of the study because it is an area known to have frequent and highest traffic accidents in Johor (Mohd Solhi & Yusof, 2014).

#### ADMINISTRATIVE OF QUESTIONNAIRE

This study was conducted by approaching the respondents face to face to identify the weaknesses of items in the set of survey forms—all the weaknesses or errors in the survey form were recorded for improvement. Furthermore, respondents were asked directly by the researcher about anger factor during driving because this study would identify more anger factors in Malaysia. Data were analysed using SPSS version 22 to perform an internal consistency reliability analysis result.

#### INSTRUMENT AND MEASUREMENT

This study used a questionnaire form as an instrument to collect the data. The survey form was divided into three parts which were:

- Part A: Respondent background
- Part B: Driver opinion related to their driving skill
- Part C: Malaysian Driver Anger Scale (MDAS)

#### Part A : Respondent Background

In this section, respondents were asked questions related to their demographic characteristics such as age, gender, marital status, educational level, working sector, type of driving license, driving experience, road accidents involved, traffic summons received and average mileage per day.

#### Part B : Driver opinion related to their driving

Respondents were asked about their opinions related to their driving. In this section, respondents had to answer 10 items provided. All items in this section were adapted based on Driver Behaviour Questionnaire (Reason et al. 1990). Only items related to emotional on the road, driving behaviour and aggressive driving behaviour were adapted for this section.

#### Part C : Malaysian Driver Anger Scale (MDAS)

33 items of Driver Anger Scale by Deffenbacher (1994) were adapted for Driver Anger variable. In addition, there were 8 items added for Psychological Effect and 5 items for Road Accident Risk variable. These items were adapted from Dimensions of Anger Reactions (DAR-5) by Novaco (1975), The Dula Dangerous Driving Index (DDDI) by Dula and Ballard (2003) and Driver Behaviour Questionnaire (DBQ) by Reason et al. (1990). Only items related to psychological and risk accident such as anger and aggressive behaviour were adapted. All items were scored on a five-point Likert Scale.

## RESULT AND DISCUSION

#### RELIABILITY ANALYSIS

This study applied internal consistency reliability to determine the scores in the Driver Anger, Psychological Effect and Road Accident Risk factor.

#### DRIVER ANGER SCALE

For Driver Anger Scale, there were 33 items representing discourtesy, traffic obstruction, hostile gestures, slowly driving, police presence and illegal driving. Table 2 shows Cronbach's Alpha coefficient for DAS factors items.

TABLE 1. Cronbach's Alpha coefficient for DAS factors items

No.	Factors	Cronbach's Alpha Coefficient	Description
1	Discourtesy	.922	Acceptable
2	Traffic Obstruction	.902	Acceptable
3	Hostile Gestures	.896	Acceptable
4	Slowly Driving	.838	Acceptable
5	Police Presence	.927	Acceptable
6	Illegal Driving	.906	Acceptable

Based on Table 2, the result shows that all items in DAS were acceptable and satisfactory.

## PSYCHOLOGICAL EFFECT

The psychological effect is the effect caused by environmental/surrounding and/or biological factors on an individual's social and/or psychological aspects (de Oliveira et al. 2013).

Table 3 showed Reliability analysis scale for Psychological Effect. Based on result obtained Cronbach's Alpha coefficient was .576 and this result demonstrated that all items in psychological were less satisfactory. However, with the value of "Alpha if item Deleted" it is found that if item 7 is removed, the Alpha reliability coefficient will change to .608. This can be explained by the correlation value between these items and the weak index of instrument that is .061. This low correlation shows that this item is less uniform with other items. Therefore, this study had decided to improve and modify all items in the Psychological Effect in addition to eliminating the items that had lower correlation, adding new suitable items and conducting reliability test again.

TABLE 2. Reliability analysis scale for psychological effect

No.	Item	Corrected Item-Total Correlation	Alpha if Item Deleted
1.	I found myself getting angry at people or situations	.406	.591
2.	When I got angry, I got really mad	.269	.549
3.	When I got angry, I stayed angry	.498	.562
4.	When I got angry at someone, I wanted to hit them	.360	.534
5.	My anger prevented me from getting along with people as well as I'd have liked to	.490	.451
6.	I lose my temper when driving	.367	.531
7.	I drive when I am angry or upset	.061	.608
8.	I consider the actions of other drivers to be inappropriate or 'stupid'	.505	.443

Reliability Coefficients (N=8)  
Alpha = .576 Standardized item alpha =.598

## ROAD ACCIDENT RISK FACTOR

In a road traffic accident, the risk is a function of four elements which are the exposure the amount of movement or travel within the system by different users or a given population density, underlying probability of a crash, given a particular exposure, the probability of injury, given crash and lastly is the outcome of injury (World Health Organization, 2004). Based on Royal Malaysian Police statistics (2018), aggressive driving behaviours such as careless driving, dangerous driving, and too close driving, speeding and dangerous overtaking have contributed to the number of road accidents in Malaysia.

TABLE 3. Cronbach's Alpha coefficient for road accident risk factor

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of items
.776	.782	6

For the road accident risk factor, Cronbach's alpha coefficient was .776 and this result demonstrated that all items in road accident risk factor were acceptable and satisfactory.

## CONCLUSION

This study will proceed by interviewing respondents who have previous experiences related to road bullying in order to obtain more information on driver anger. Furthermore, this study will modify items with less satisfactory results in addition to seeking advice from the experts. Therefore, this study will produce a new significant finding that is a developed MDAS instrument oriented to Malaysian driving style, which can evaluate the level of anger of local driving and can identify the psychological factors that contribute to the major cause of anger driving.

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## DECLARATION OF COMPETING INTEREST

None

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