Motorcyclists I – Helmet Usage And Speeding Behavior From A Psychological Perspective

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Abstract: This study investigates psychological factors that might contribute to motorcyclists' risky behaviors. Ordinal logistic regression analyses are run, with the behaviors of speeding and negligence of helmet usage used as dependant variables. Psychological variables chosen for analysis are derived from previous studies related to human behaviors. Questionnaire forms were randomly distributed to motorcyclists in selected areas in Malaysia. The sample included 575 respondents, who ranged in age from 15 to 69 years old. The results from this study show that psychological factors play a role in motorcyclists' tendencies to exhibit risky behaviors. Logistic regression analyses found that perception of others' behaviors was the strongest predictor of motorcyclists' neglect of using a helmet and that attitude towards speeding was the strongest predictor of speeding. Other psychological factors such as perceived behavior control, fear of being caught, moral obligation, perceived danger and previous experience are also examined in this study.

Keyword: Motorcyclist, Speeding, Neglect Helmet, Ordinal Logistic Regression, Conformity, Moral Obligation.

INTRODUCTION

The motorcycle has become popular in certain developing and middle-income countries due to its low price, high mobility and to the rapid rise of motorization. This increasing number of motorcycles has led to an increasing number of motorcycle collisions in these countries. In Malaysia, motorcycle safety programs began in 1997 with the establishment of the Road Safety Research Center (RSRC). The RSRC serves to investigate factors contributing to motorcycle accidents. Since its inception, the RSRC has instigated many countermeasures, including engineering and behavior modification (Radin Umar, 2006).

Previous studies have showed that the top cause of motorcycle collision fatalities in Malaysia is head-damage resulting from not wearing a helmet (Pang *et. al.*, 1999). Lui and colleagues (2003) claimed that motorcycle helmets could reduce the risk of head injury up to 72%. In Malaysia, 62.9% of all documented injuries that resulted in death for motorcyclists involved head injuries (Pang *et. al.*, 1999). However, reports of proper helmet usage in Malaysia have varied. As reported in the Research Report for National Road Safety Council, in the absence of police, only 55% of motorcyclists wore helmets properly in 1995 and only 41% did so in 1998 (Krisnan, 1995; Radin Umar *et. al.*, 1998). Another study reported that 54.4% of motorcyclists wore a helmet properly, 13.6% wore a helmet tied loosely, 8.0% wore an untied helmet and 24.0% did not wear the helmet in rural areas (Kulanthayan *et. al.*, 2000).

To further investigate the causes of motorcycle accidents in Malaysia, the factors that influence the occurrence of speeding behavior must be emphasized; this focus from authorities is currently lacking. According to Kalberg and Louma (1996) the higher the speeding acceleration, the greater the velocity change while braking; this increased velocity change while braking increases the severity of injuries. Therefore, it has been suggested that reducing traveling speeds might reduce injury severity during a crash (Pang *et. al.*, 2000). This suggestion is supported by a study that shows that riding over 60 km/h could cause more severe injuries to motorcyclists rather than riding at lower speeds (Ibitoye *et. al.*, 2007).

In developing countries in Asia, the most popular type of motorcycle for daily usage is the *underbone* type, which weighs less than 100 kg and is capable of traveling faster than 100 km/h. In Malaysia, this type of motorcycle is known as a "high performance small motorcycle"(Pang et. al, 2001). This type of motorcycle is different from the motorbikes usually used in western or developed countries in terms of engine capacity and performance. According to Labbert (2003), there is a significant behavioral difference between different groups

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of motorcyclists. However, to date, only a very small number of studies in developing and middle income countries have focused on the relation between psychology and motorcyclists' behavior. Groeger and Rothengatter (1998) claimed that applying psychological understanding to road users is needed to overcome the complexity of human behavior. Therefore, this study was designed to investigate several psychological factors that might influence motorcyclists' speeding and helmet usage behaviors in Malaysia. The paragraphs below give brief explanations of the psychological predictors chosen for this study.

Attitude and Perceived Behavior Control:

Many studies have shown a link between attitude and perceived behavior control and carrying through with intended behaviors. Eagly and Chaiken (1993) defined attitude as a tendency to evaluate the favor or disfavor in cognitive, affective or behavioral reactions. This definition is consistent with Azjen's Theory of Planned Behavior; a study by Ajzen (1991) strongly recommended attitude and perceived behavior control (with the association of subjective norms) as the main components that lead to intention of performing a behavior.

Perceived behavior control is defined in the Theory of Planned Behavior as a person's capability to perform a behavior. This theory also suggested that the high level of perceived behavior control should strengthen a person's intentions to perform a behavior. Based on the Theory of Planned Behavior , it was hypothesized that having low attitude and high perceived behavioral control regarding non-risky behavior will predict a greater likelihood of risky behaviors.

Moral Obligation:

Another important psychological variable for this study is the effect of moral obligation on the formation of behaviors. Moral obligation in this study is defined as altruism, which has been discussed in detail in the Norm Activation Theory by Schwartz (1977). This theory defined altruism as motivation for behavior that is performed for others' benefit rather than for self-administered rewards. Previous studies by Ullberg (2003) and Chen (2009) stated that altruism is the human personality factor that most influences the formation of risky behaviors. Based on this theory, it was hypothesized that those who have strong moral obligations to not perform risky behavior would be less likely to engage in risky behavior.

Perceived Behavior Of Others:

In his Normative Social Influence Theory, Asch (1951) discussed the process of how others' behaviors could affect beliefs, personal norms and one's own behaviors. This theory defined conformity as the process by which an individual's attitudes, beliefs and behaviors are influenced by other people's pressure and actions. The perceived behavior of others variable in this study was adapted from the authors' understanding of this theory. It was hypothesized to be a determinant of the occurrence of risky behaviors.

Fear Of Being Caught And Perceived Danger:

Other psychological factors hypothesized as determinants in this study were fear of being caught and perceived danger. Fear of being caught was used to investigate how enforcement could influence the traffic offense behavior. Perceived danger is believed to be linked with the perception of risk (Slovic *et al*, 1984). It was hypothesized that persons with low perceived danger would have a higher tendency to engage in risky behaviors than those with lower perceived danger.

Based on reviews of psychological theories linked to the behaviors mentioned above, this study was designed to investigate any potential psychological factors that might influence the occurrence of motorcyclists' risky behaviors in Malaysia, as measured by speeding and not wearing a helmet. Among the psychological determinants investigated, the effects of conformity and moral obligation have not explicitly been applied to motorcyclists' risky behavior. As mentioned above, motorcycle accidents are one of the most serious problems in developing countries. Therefore, the findings from this study are expected to be substantially helpful for traffic safety mitigation, especially regarding motorcyclists in developing countries.

Methodology:
Sample:

A self-completed questionnaire survey was carried out in selected areas in Malaysia (Shah Alam, Selangor and Parit Raja, Muar) from June to August 2009. Both areas are representative of conditions in urban and rural Malaysia. Questionnaires were completed by 600 respondents; after excluding the missing data, only 575 respondents' data were suitable for analysis.

Questionnair:e
Table 1 is About Here:

The main objective of this study was to understand the association between psychological determinants and motorcyclists' risky behaviors. To report their risky behaviors, the respondents were asked to state their

frequency of speeding and not wearing a helmet in the past month. To assess speeding behavior, respondents were asked the following question: "My frequency of riding with speed exceeding 60 km/h for past a month is…" with response scale "1=Never, 2= Seldom, 3=Always, 4=Every time." The following question was used to assess helmet usage: "My frequency of riding without using a helmet for past a month is…"with response scale "1=Never, 2=Once, 3=More than once, 4=More than 5 times." The essential part of the questionnaire was questions assessing the psychological determinants (Table 1). These questions were constructed based on the authors' understanding of the psychological theories briefly described in the introduction. Respondents answered these questions according to a 4-point Likert scale, ranging from 1=strongly agree to 4=strongly disagree. One exception was perceived behavior of others; for these questions, respondents were asked to state the answer in percentages. Lastly, several questions on socio-demographic factors and motorcycle riding experiences were also asked.

Logistic Regression Analysis:

In this study, the response categories for the dependent variables were formed in an ordered way. The stepwise method for ordinal logistic regression was applied to measure the association between the risky behaviors and the psychological determinants. In addition to the psychological determinants, the influence of other demographic factors, such as age, gender, respondents' history of motorcycle accidents, the history of motorcycle accidents of respondents' friends or relatives and respondents' ticketing experience on risky behaviors, were also investigated.

Ordinal logistic regression is the extension of logistic regression for dichotomous outcomes. The equation for ordinal logistic regression takes the following form:

$$logit\ (Y \leq i) = ln \left(\frac{P(Y \leq i)}{1 - P(Y \leq i)} \right) = \alpha_i + \beta_1 \chi_1 + \beta_2 \chi_2 + \ldots \ldots \ldots \beta_{im} \chi_m, \ \ i = 1, \ldots, k$$

P (Y) in this study is the probability that a motorcyclist is involved in a risky behavior, which is the function of a vector of independent variables X .The constant in the equation is α_i, and β_i is the coefficient of the *m*th independent variable.

Results:
Descriptive Analysis:

Table 2 shows the percentages of demographic factors for the respondents in this study. Of the total respondents, 78% were male and 22% were female. The average age was 28 years, with a range of 15 to 59 years. These percentages are consistent with previous research, which has indicated that singles and young males are the highest group of motorcyclists in Malaysia (Pang *et. al.*, 2000). For road accident experience, most of the respondents (54.5%) reported they had never been involved in an accident, while 41.2% stated that their relatives or friends had been involved in accidents 1 or 2 times. More than one-third (34.1%) of the respondents reported receiving a ticket, and 65.8% said they had not.

Table 2 is About Here:
Table 3 is About Here:

Table 3 presents the proportion analyses for self-reported risky behaviors investigated in this study. The mean value for not wearing a helmet differed slightly for male and female respondents. Male respondents were more likely to not wear a helmet, as compared to female respondents. Two-thirds (66.1%) of female respondents claimed they never neglected to wear a helmet in the past month, while only 55.5% of male respondents stated that they never did so. In contrast, a slightly higher percentage of female respondents reported neglecting to wear a helmet more than 5 times in the past month, as compared to male respondents. The mean value for speeding behavior revealed that male respondents tended to ride over the speed limit more often than female respondents. For male respondents, 14.3% claimed that they always rode over the speed limit, while only 9.8% of the female respondents claimed that they were always speeding in the past month. Meanwhile, only 11.2% of male respondents claimed they never sped over the limit, as compared to 24.1% of female respondents.

Table 4 Is About Here:

Table 4 presents the proportion scores, means and standard deviations for psychological determinants of motorcyclists' not using helmet and speeding behaviors. For the behavior of not wearing a helmet, most of the respondents did not endorse that they enjoyed not wearing helmet. The respondents also overwhelmingly did not endorse that helmet usage was a burden. A high percentage of motorcyclists indicated *strongly agree* for perception of danger, fear of being caught and moral obligation toward helmet usage. These findings are thought to be consistent. Moreover, respondents perceived that less than 50% of other motorcyclists did not wear a helmet.

For speeding behavior, the mean values for most of the responses were in between values representing *agree* and *disagree*. A slightly higher percentage of respondents indicated *agree* for attitude and perceived behavior control. This indicates that most respondents enjoy speeding and do not able to restrain themselves from speeding. In addition, a higher percentage of respondents indicated that they disagreed that speeding is a dangerous event and that they were not afraid of being caught by police while speeding. Furthermore, a slightly higher percentage of the respondents disagreed with moral obligation toward the speed limit than agreed. Respondents perceived that 51.38% of other motorcyclists engaged in speeding

Ordinal Logistic Regression Results:

In ordinal logistic regression, a positive sign for the coefficient relates to the higher score for the dependent variable; a negative sign of coefficient relates to the lower score. In this study, the effect of age, gender, psychological determinants, accident experience and ticketing experience on motorcyclists' risky behaviors was examined using stepwise ordinal logistic regression. By using the stepwise process, any variables found not to be significant could be eliminated from the analyses.

Table 5 is About Here:

The predictor variables that contribute to motorcyclists' not wearing a helmet are shown in Table 5. The overall model proposed for explaining not wearing a helmet was significant ($p<0.001$; χ^2 (6) = 1987.33); thus the null hypothesis is rejected. Table 5 shows the results of the psychological determinants investigated. Perceived behavior of others is the strongest predictor of wearing a helmet. The less motorcyclists perceived others' wear helmets, the more likely they were to violate the helmet law. The next strongest predictor is the effect of attitude towards not wearing a helmet. Respondents most likely to agree that they did not enjoy wearing a helmet were also likely to neglect wearing a helmet. Another psychological factor that contributed to the violation of helmet usage is perceived behavior control of not wearing the helmet. Motorcyclists who felt wearing a helmet was hard were likely to neglect wearing a helmet while riding a motorcycle.

Motorcyclists' ticketing experience also significantly influenced likelihood of wearing a helmet. Respondents that had received at least one ticket were less likely to neglect to wear a helmet. Results also indicate that younger motorcyclists are more likely than older motorcyclists to not wear a helmet.

Table 6 is About Here:

Table 6 shows the regression standardized coefficient results for the psychological determinants investigated. Attitude toward speeding behavior was found to be the strongest predictor of speeding. Motorcyclists who agreed that they enjoyed speeding were more likely to report having engaged in speeding over 60 km/h in the past month. The next strongest predictor of speeding was motorcyclists' perception of others' speeding behaviors. The more motorcyclists' perceived that others' engaged in speeding, the more likely they were to speed themselves..

Having been ticketed was related to a lower likelihood of engaging in speeding; respondents who had been ticketed were less likely to speed excessively. Having been in accident was also found to be a significant predictor in this study; motorcyclists who had experienced an accident were less likely to speed. The overall model chi square (χ^2(4) = 82.15) was significant ($p<0.001$), which indicates that the null hypothesis can be rejected.

Discussion:

The ordinal logistic regression analyses in this study reveal the impact of psychological factors on motorcyclists' speeding and helmet usage behaviors in Malaysia. Perceived behavior of others was found to be the strongest predictor of not wearing a helmet. The next strongest predictor was motorcyclists' attitude toward helmet usage. The regression results revealed that both psychological determinants significantly predicted neglecting to wear a helmet.

Attitude towards speeding and perception of others' speeding behaviors were found to significantly predict speeding behavior. The findings are consistent with previous studies revealing that perceptions of others' behaviors are used as benchmarks in uncertain conditions (Huglund and Aberg, 2000, Pelsmacker, 2007 & Rosenbloom, 2009). The present study reveals that motorcyclists who perceived that high percentages of others did not wear a helmet and did engage in speeding were more likely to engage in the same behavior.

Thus, it is suggested that a conformity strategy is one way to counter motorcyclists' behaviors of not wearing a helmet and speeding. Motorcyclists need to be convinced that other road users are actually obeying the speed limit and helmet legislation. Other fields previously have used this idea of a conformity strategy (Schultz et al., 2007).

Meanwhile, the affect of attitude on intentional behaviors has been explained robustly in many studies, especially as related to the Theory of Planned Behavior (Elliot et al, 2003, Elliot, 2010, Forward, 2009). This study supports those previous findings by revealing that the more motorcyclists enjoyed not wearing a helmet

and speeding, the more likely they were to engage in those risky behaviors.

In addition to not wearing a helmet, motorcyclists' perceived behavior control also significantly affected behavior. Perceived behavior control is another element in the Theory of Planned Behavior. According to the theory, perceived behavior control is a co-determinant, along with ease or difficulty belief, in performing a behavior. Thus in this study, the motorcyclists who stated a higher sense of difficulty related to wearing a helmet were more likely to neglect to wear a helmet. This result implies that motorcyclists would wear a helmet more often if they found wearing a helmet easier; this could be accomplished by increasing helmet comfort, for example. Findings from this study also imply that motorcyclists would be more likely to wear a helmet if they do not find it difficult to put on the helmet; helping motorcyclists become accustomed to wearing a helmet is one way to accomplish this.

Motorcyclists' ticketing experience and age were also found to significantly influence helmet usage; motorcyclists who had been ticketed were less likely to neglect wearing a helmet. Older age was associated with an increased likelihood of wearing a helmet. This is thought to be due to the maturity of the motorcyclists, where older motorcyclists are more likely than younger motorcyclists to comply with helmet usage legislation. Ticketing experience was also found to significantly influence speeding. The motorcyclists' that had reported previously being ticketed were less likely to speed. The influence of previously being in an accident also significantly influenced the likelihood of motorcyclists' engaging in risky behavior. This has been found previously by Rutter and Quine (1996). Motorcyclists who had previously been involved in an accident were less likely to engage in speeding.

The limitations of the study should be acknowledged. For this study, the element of subjective norm in Theory of Planned Behavior was replaced with additional psychological factors that seemed appropriate to examine as related to motorcyclists' risky behaviors. This is consistent with Elliot (2010), who omitted the subjective norm from his research because it failed to demonstrate the strong influence on intention toward behavior. In addition due to funding constraints, we were unable to observe motorcyclists' risky behaviors ourselves to compare observed behaviors with their self report. However, observing motorcyclists' helmet usage has been investigated previously in several studies (Krisnan, 1995; Kulanthayan, 2001). Despite these limitations, this was the first study that explicitly relates psychological determinants such as conformity and moral obligation to motorcyclists' risky behaviors.

In conclusion, the present study has revealed several potential psychological factors that influence motorcyclists' speeding and helmet usage behaviors. Further empirical research is still required to explore other psychological variables that could be manipulated to reduce motorcyclists' risky behaviors, especially in developing and middle income countries.

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