

Factors that Influences Pedestrian Intention to Cross a Road While using Mobile Phone

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ABSTRACT

Road accident has been identified as a cause of injury and death around the world including Malaysia. Among those who were killed and injured are pedestrian. There were few studies investigated the cause of the accident that involved the pedestrian in the other country. However, in Malaysia, as far as road safety and pedestrian is concerned, the research still at an early stage. The theory of planned behavior (TPB) has been utilized widely in all research areas including road safety and pedestrian. Thus, this theory was used to understand the psychosocial factors that influence pedestrian intentional behavior. In particular, this paper examined the extent to which the TPB influenced pedestrian intention to cross a road while using mobile phone. This research utilized quantitative approach, that is a survey ($n = 107$). The result indicated that subjective norm (SN) and perceived behavioral control (PBC) significantly influenced intention to cross a road when using mobile phone. Thus, based on the result, it was suggested that the safety awareness campaign and education should focus on SN and PBC e.g., Pedestrian Awareness Day.

Keywords: Pedestrian, Intention, Safety, Road Crossing

JEL Classifications: M000

1. INTRODUCTION

A pedestrian is a person traveling on foot, whether walking or running. In the developed country people choose to walk to the nearest place rather than use a car to avoid traffic congestion especially during the peak hour. The increasing number of the pedestrians may lead to the increasing of the accident risk involving them. The accident may cause by the vehicle or because of the pedestrian careless while walking (Hyman et al., 2010).

The situation has been recorded as one of the frequent accidents happened in the world. Especially for the countries that encourage their citizen to use a bicycle and walking as another medium of mobility (Administration, 2009). From the statistics by Fatality Analysis Reporting System, show that 3.0% of the accident

involved pedestrian. According to Polis Di Raja Malaysia (PDRM, 2012), OPS SIKAP 25 statistics show that almost 0.15% accident happened involved pedestrian. Road Safety Department of Malaysia also states that 70% of the accident involved pedestrian happened because of their behavioural while walking.

Almost all develop country in the world are increasing the investigation or research in the factor that involve in a pedestrian accident in order to give an exposing to the citizen about the importance of the pedestrian safety. A pedestrian is more exposed to the dangers while walking because they do not use any mechanism to walk. The impact that they will receive is more than the people that used the vehicles. United State Government also mentions that the pedestrian that involve with the accident normally will end with the bad injury and sometime dead (Administration, 2009).

Unfortunately, given the small percentage of accident involving pedestrian in Malaysia (i.e., 3%), no serious action have been taken. However, in the place where almost everyone walk to do their daily activities, it is important to ensure pedestrian safety.

There were a few studies have been done in order to investigate the cause of the accident that involved the pedestrian in the other country. However, in Malaysia the research or investigation that has been done in order to find the cause and the solution for the pedestrian's accident that happen here still at infancy. It is more about the general research, focusing on engineering. In the current research, evaluated the pedestrian behavioral that influence their intention to cross a road by using these three kinds of the psychological factors that guide human action. The formation of the behavioral intention (BI) is based on the scenario given. A scenario has been developed based on the observation that being done. The research focused on two objectives which is to explore the relationship between attitude, subjective norm (SN) and perceived behavioral control (PBC) with the BI to use mobile phone while crossing a road and to explore the extent to which the attitude, SN and PBC influence BI to use mobile phone while crossing a road. The theory of planned behavior (TPB) has been used for this research to understand the intention behavior of the pedestrian (Ajzen, 2002). The quantitative method that involves questionnaire has been used to collect the data from the students in one of the northern university in Malaysia. Based on the finding, suggestion and recommendation of the best solution to overcome the problem are explained.

2. LITERATURE REVIEW

2.1. BI

Intention is a combination of the attitude toward the behavior, SN, and perception of behavioral control. These three variables will extract the most frequent factor that influences the intention of the pedestrian to cross the road (Ajzen, 2002). Intention refers to something that happened as result as what have been conducted by the human or person that doing the action (Parsons, 2004). Every time a human or person does something, it based on what they actually want. That is the reason why human behavioral is related as one of the factors that influence pedestrian intention to cross a road.

According to the research that has been done by Machin and Sankey (2008), the personality of the person are related to the behavior when do something. Sometime they do not rely the impact of their action to others people. This factor always happens to the teenager. Anger is one of the personalities that could not be avoided when it happened. The interactive effect of the anger is one of the causes that could be happened to the other user of the road if there is a pedestrian that using a phone while cross the road (Schwebel et al., 2006). It will cause a dangerous situation and can create a fight with other road user.

One of the factors that influence the intention of the pedestrian to cross a road is distracting when walking. The pedestrian behavior likes to use the mobile phone while walking rather than pay attention, especially when cross a road. Normally using a

phone is of the distraction to the driver safety, but a few studies examine that it also distracted walking. Especially for the college student that increase the pedestrian injury rates compared to other pedestrian that mostly cause by the used of the phone while walking (Stavrinos et al., 2011).

Although not always of intention causes is valid to be used, but it is something that contribute to the accident because of the pedestrian behavior. The use of the intention has been the subject of intense debate for many years, but no consensus has emerged over whether the intention is morally relevant, or even how it should be understood (Shaw, 2006). This research will examine the related of the intention with the pedestrian behavior.

2.2. Attitude

Behavioral belief is a about the likely outcomes of the behavior and the evaluations of these outcomes and produce the attitude toward the behavior (Ajzen, 2002). In social psychology what is meant by attitude is not so very different. Attitude meant that respond to the various "attitudinal objects" (individuals, social groups, situations, social issues) and this response, it is supposed, is predetermined by their attitude towards that particular object (Howarth, 2006).

The distraction while walking normally includes the using of the mobile phone especially for the new generation that likes to use technology. It is based on the attitude of the pedestrian whether they want to use it while cross a road or not. Teenager or college student like to talking on the phone, texting and listen to the music while walking and also when they cross a road. It will be dangerous to them and other road user. The used of the mobile phone will put pedestrian and other road user in the hazardous environment (Qureshi et al., 2015; Schwebel et al., 2012). American Academic of Pediatrics has done research about the effect of the mobile phone usage and distraction to pedestrian risk injury especially for children.

They have come out with the result shown that mobile phone is the distraction while walking. Pedestrian were less attentive to traffic; left less safe time between their crossing and the next arriving vehicle; experienced more collisions and close calls with oncoming traffic; and waited longer before beginning to cross the street because they been distracted by the phone usage (Stavrinos et al., 2009).

From the research, also state that the attitude of the pedestrian, by using the mobile phone while cross a road is something dangerous to them evens it was important to be done immediately. Phone usage may cause inattention blindness even during a simple activity that should require fewer cognitive resources (Hyman et al., 2010; Khan et al., 2014). Pedestrian attitude is one of the causes contribute to the bad behavior while walking that can cause accidents. However, attitude can be changed and changing based on the several factors and reason. It also depends on the environment of the pedestrian (Finch, 2008).

2.3. SN

SN is one of the factors of intention. SNs refer SN the intention of during the pedestrian crossing a road based on the opinions of the

other people. SN is concerned with the perceived social pressure to perform the behavior or not (Holland and Hill, 2007). SNs are presumed to be predicted by a person's normative beliefs about what significant other groups would expect them to do, combine multiplicatively with their motivation to comply with the opinions of others (Holland and Hill, 2007; Jamshaid and Ahmed, 2014).

So, to measure the normative beliefs related to intention pedestrian while crossing a road, four referees are often used which consists of family, friends, police and drivers. For example, the intent of a pedestrian to crossing a road based on, for what his friends would be thinking and what he should do while crossing a road or the others pedestrian think and want he did when crossing a road.

According to TPB (Ajzen, 2002) SNs is a resulting from normative beliefs about the normative expectations of others and motivation to comply with these expectations. SN is a social pressure from important others to perform or not perform the behavior. SNs are determined by the perceived social pressure from salient referents to perform the behavior weighted by the individual's motivation to comply with the referents (Evans and Norman, 2003). According to the journal of the Factors influencing intentions to use a mobile, SNs is a significant influence in the scenario where the individual time pressure (running late) suggests individuals may be more susceptible to pressure others or normative when the time commitment is involved (Walsh et al., 2008). It means that people who use mobile phone while walking frequently slowing on their way, especially when crossing a road. This will definitely increase the risk of them being exposed to an accident. It thus can cause the pressure to the others, especially for drivers and when the road conditions are very busy. In 6 months, three pedestrians had been killed, and another seriously injured while crossing listening to music (Nasar et al., 2008).

SN is one influence that affects the intention of a pedestrian. For instance, pedestrian which is use mobile phone while walking definitely gives effect to their safety, especially when crossing a road? Pedestrians talking on phone have impaired visual attention while crossing the street to such an extent that most pedestrians on cell phones did not see a clown riding on a unicycle nearby (Galván et al., 2013).

The use of mobile phone while crossing a road caused this pedestrian engrossed with their mobile phone and ignoring the environmental conditions at the time. It is one of the causes that lead to accidents, which resulted pedestrians. Holding a phone results in a pedestrian's movement being awkward because they are carrying other things, then it may decrease their walking, their speed, and so increase their risk of conflict with a vehicle (Hatfield and Murphy, 2007). A pedestrian is less attention to the traffic; leaving less time at the intersection and the next arriving vehicle; suffered more collisions and close calls with oncoming traffic; and wait longer before starting crossing the roads because they were distracted by the use of (Stavrinos et al., 2009).

Thus, it clearly shows that, it is a very serious situation that not only can cause accidents to pedestrians, but also to the driver and also to other people. Conner et al. (2003) found that normative

beliefs were particularly influential for men. The effect of age, gender and driver status on pedestrians' intentions to cross the road in risky situations (Holland and Hill, 2007).

2.4. PBC

Ajzen highlights the issue of control in the success of intention actually predicting behavior in that people can only do what they intend if their behavior is under their own volitional control (Ajzen, 2002). This PBC of the ease or difficulty of performing a behavior may be expected to vary as a function of the situation as perceived by the person (Holland and Hill, 2007). PBC is one of intention. Perception of control is based on the considerations of power is seen as an important control to prevent or facilitate the performance of behavior and their perceptions of the frequency of the incident (Evans and Norman, 2003; Khan et al., 2014). So that, it is refers to perception of the pedestrian control by their own behavior while crossing a road.

PBC may also have an impact on the age and sex of a pedestrian. PBC can account for situations where behavior of choice may not be carried out due to lack of volitional control, an important factor in a study involving older people whose road crossing decisions may be affected by mobility constraints (Holland and Hill, 2007). For example, the younger pedestrians may have a stronger intention to cross a road and have a positive attitude that it is easy to cross a road. It is different by the older pedestrians because he felt that it is difficult for them to cross the road. This may be particularly true for elderly pedestrians.

Thus, cognitive distraction may result in slower walking and so greater exposure to risk. The longer a pedestrian takes to cross, the longer they are exposed to risk, and the less likely they are to complete their crossing in the time allowed at signalized intersections (Hatfield and Murphy, 2007). Diaz (2002) also found that younger people had a more positive attitude towards crossing in such risky situations than the older group (Holland and Hill, 2007). Therefore, younger pedestrian perceived that they had greater control over their performance of the behavior (perceived control) than did older pedestrian (Evans and Norman, 2003). Analyses were conducted separately for females and males because of likely differences in crossing behavior and mobile phone effects. Female pedestrians typically display more cautious crossing behavior than males (Hatfield and Murphy, 2007; Qureshi et al., 2014).

In the present context, it can therefore be argued that the extent to which an individual thinks of himself or herself as a "safe pedestrian" should predict road crossing decisions and behavior (Evans and Norman, 2003). According to the TPB, adolescents who decide to cross the road in a relatively risky manner are more likely to evaluate such behavior in a positive light, believe that important others would approve of the behavior and perceive the behavior to be easy to perform (Evans and Norman, 2003).

3. METHODOLOGY

Students in one of the northern university in Malaysia were chosen as a sample in this research. The researcher chooses a university

as a research location because almost all students in university were pedestrians. In the university, there are some places that are identified frequently traveled by pedestrian and have a high accident risk when they are using a mobile phone while to cross a road. Sample selected involved 107 respondents... to determine the number of respondents, researchers were used the formula ($n = 104 + m$). This formula has been used for testing the individual predictors (Van Voorhis and Morgan, 2007). All of the respondents taken as samples were randomly selected by researchers.

This research uses a quantitative approach, which is a questionnaire that combines the method of nominal and Likert scale. A questionnaire is divided into several sections to measure each variable. Demographic questions included gender and age. There were also questions related to attitude, SN, PBC and intention.

This questionnaire was divided into two parts. Part A relates to personal information consist of demographic characteristics. While Part B is associated with factors that affect pedestrian is intention to cross a road using the mobile phone such as BI, attitude, and SN and perceive behavioral control. Researcher used "Statistical Package for Social Sciences" as a systematic tool in the analysis of the finding. The analysis of descriptive, reliability test, Pearson correlation and multiple linear regression was conducted to evaluate the significance of the contributing factors (Figure 1).

3.1. Respondents Demography

A total of 107 respondents, aged 19-26 years, participated in the research. They were approximately balanced by gender and age group, as shown in Tables 1 and 2. Each respondent was approached in the campus by researcher. They were asked to

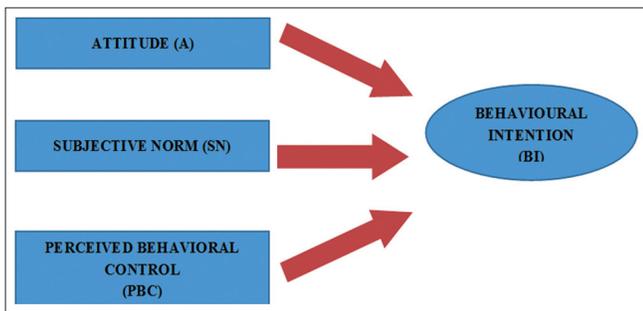
answer and completed the questionnaire. Respondents were ensured that their participation was voluntary and their responses would be anonymous. The questionnaire took approximately 15 min to complete.

3.2. Questionnaire

Respondents were asked to answer the questionnaire based on the scenario given. The scenario is "You are standing at the bend on a street which has poor visibility either side. At the same time you are using your phone either to answer the important call or to reply an important message. There appears to be no traffic so you walk across the road." The respondents were asked to answer questions for dependent variable and three part of independent variable, which is the attitude, SN and PBC. Before that respondents were asked about demographic (i.e., gender, age, race, semester). The items were rated at five-point scale which is from strongly disagree to strongly agree and one part from PBC was rated from very difficult to very easy.

For the dependent variable, which is BI, was assessed by a mean of five items. For example, "I would cross the road as describe in the scenario." The three parts of independent variables in the questionnaire firstly attitude was assessed by a mean of five items such as "crossing the road in this way would get me to my destination more quickly." For SN also been assessed by a mean of five items such as "my friend would think that I could take a chance and cross the road as depicted in the scenario." For the PBC there are two parts of the question and in the first part was assessed by mean of three items for instance "For me crossing the road in this way would be" (very difficult to very easy). The second part was assessed by a mean of four items such as "I believe that I have the ability to cross the road in this way as described in the scenario given" (strongly disagree to strongly agree).

Figure 1: Research framework. Adopted from Ajzen (1991)



4. RESULTS

4.1. Descriptive and Reliability Analysis

The Table 3 had shown the descriptive analysis of factors that influences the pedestrian BI toward attitude, SN and PBC. The result for this analysis shown that frequency for the attitude is (Mean: 3.62 standard deviation [SD]: 0.61) where it is the highest between PBC (Mean: 3.16 SD: 0.44) and followed by SN which is (Mean: 2.88 SD: 0.58). Cronbach's alpha values for all variables are acceptable (Nunnally, 1978).

4.2. Correlation Analysis

Table 4 shows all constructs are significantly positively corelated with each other.

Table 1: Number of respondents by gender

Gender	N (%)
Male	12 (11.2)
Female	95 (88.8)
Total	107 (100)

Table 2: Number of respondents by age

Age	N (%)
Below 20	7 (6.5)
21-23	73 (68.2)
24-26	27 (25.2)
Total	107 (100)

Table 3: Descriptive and reliability analysis (N=107)

Model	Mean	Standard deviation	Item	Range	Cronbach alpha
BI	2.76	0.94	5	1-5	0.91
A	3.62	0.61	5	1-5	0.78
SN	2.88	0.58	4	1-5	0.82
PBC	3.17	0.44	7	1-5	0.76

BI: Behavioural intention, A: Attitude, SN: Subjective norm, PBC: Perceived behavioural control

4.3. Multiple Linear Regression Analysis

R² value is 0.195. This indicates that the independent variables which are SN and PBC have significantly explained the variance of dependent variable which is BI at 19.5% (Table 5).

1. Attitude was not significantly influence pedestrian BI, $r = 0.201$ ($P > 0.05$)
2. SN ($r = 0.330$ [$P < 0.05$]) and PBC ($r = 0.392$ [$P < 0.05$]) was significantly influence pedestrian BI.

5. DISCUSSION AND CONCLUSIONS

The result for the research show that the psychological factors that influence the pedestrian intention to cross a road while using mobile phone is SN and PBC. The attitude factor does not show the influences of pedestrian BI. This may happen because of the environmental and cultural at the research location. The respondents know that it will put them in the danger situation if used a mobile phone while cross a road. But in the different situation they may influences by the other two factors. Such as for the SN factor, respondents were influences of the other people thought as an example they can cross the road while using a mobile phone.

This research strength is it is the first research that studies about the psychological factors that influence the pedestrian intention to cross a road while using mobile phone in Malaysia. The research has been made based on the scenario about the using of mobile phone while crossing a road.

5.1. Research Limitations

The time given to complete this research is very limited. Researchers need to find the specific time to distribute the questionnaires to the students. It is intended to not disrupts and give a pressure to the respondents when answering the questionnaire. In fact, the researchers also face a time constraint from the other parties to obtain the data, such as student population, the number of pedestrian's accident happen in the university. This is because; the researchers had to wait a long time to get feedback from the

parties involved. Researchers have spent costs to complete this research as the cost of issuing questionnaires and other additional costs. Most respondents also did not cooperate as expected by researchers while answer the questionnaires had been given.

5.2. Recommendation and Conclusions

Researchers suggest that in order to reduce the risk of pedestrian accidents, student should be alert about their safety. They need to have knowledge about safer way while walking, especially when cross a road like a walk in the opposite lane with vehicles and especially do not use a mobile phone while cross a road. Drivers should be aware the presence of pedestrians, especially in the sharp corners that block their view of the pedestrian who was crossing a road. The risk of accidents will definitely occur when there are some drivers who often ignore the pedestrians. In fact, it will certainly increase the risk of accidents if the pedestrians also not aware the presence of the vehicle while cross a road, especially when use a mobile phone.

Apart from that, pedestrian awareness safety campaigns can be organized in order to improve the awareness of the younger people, especially university students about the risks of using mobile phone while cross a road. Pedestrian Awareness Day can be organized by the public and private universities throughout the country. Therefore, with the availability of Pedestrian Awareness Day, it will enable to provide awareness to the students about safety precautions during walking in the vicinity of the university. With the availability of this campaign, students might more clearly about the dangers that they may face when walking distance or crossing the road. This is because according to the information from the respondent, they are less and does not know the dangers that they might face while walking. Pedestrians Awareness Day definitely can help them to identify the techniques that can be followed to prevent the accident involving the pedestrians.

As a conclusion, SN and PBC have significant influence to pedestrian intention crossing a road while using a mobile phone. As far as safety is concerned, some people do not aware that the use of mobile phone while walking and crossing a road create a risk of accident for them. Thus, as mentioned before, pedestrian awareness campaign that targeted the pedestrian's norm and behavioral control could increase awareness and reduce the risk of road accidents.

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Table 4: Correlation analysis

Model	BI	A	SN	PBC
BI	1	0.201*	0.330**	0.392**
A	0.201*	1	0.314**	0.300**
SN	0.330**	0.314**	1	0.371**
PBC	0.392**	0.300**	0.371**	1

*Correlation is significant at the 0.05 level (two-tailed), **Correlation is significant at the 0.01 level (two-tailed). BI: Behavioural intention, A: Attitude, SN: Subjective norm, PBC: Perceived behavioural control

Table 5: Multiple linear regression analysis

Model	Unstandardised coefficient		Standardised coefficient	t	Significant
	B	Standard error	Beta		
A	0.072	0.146	0.047	0.495	0.622
SN	0.328	0.158	0.203	2.078	0.040
PBC	0.645	0.207	0.302	3.108	0.002

*Significant at ($P < 0.05$), BI: Behavioural intention, A: Attitude, SN: Subjective norm, PBC: Perceived behavioural control

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