ORIGINAL ARTICLE

An application of a theory of planned behaviour to determine the association between behavioural intentions and safe road-crossing in college students: perspective from Isfahan, Iran

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Abstract

Objective: To identify the determinants of behavioural intention towards safe road-crossing among college students.

Methods: The cross-sectional study was conducted in 2013-14 and comprised students of Isfahan University of Medical Sciences, Isfahan, Iran. A self-administrated questionnaire was distributed among the subjects related to road-crossing based on the theory of planned behaviour. Data was analysed using SPSS 21.

Results: Of the 300 questionnaires distributed, 278(92.66%) were returned completed. The mean age of the subjects was 23.16±3.66 years. There were 149(53.6%) females and 129(46.4%) males, with females crossing the street more safely than the males. There was a significant difference between the genders for subjective norms (p=0.001), perceived behavioural control (p=0.002) and behavioural intention (p=0.001), but no differences were traced with respect to attitude towards safe crossing (p=0.597). Results showed a direct and positive correlation between attitude towards safe crossing (r=0.276; p=0.001), subjective norms (r=0.368; p=0.001) and perceived behavioural control (r=0.419; p=0.000) with behavioural intention to safe crossing.

Conclusion: The attitude towards safe crossing and perceived behavioural control had significant effect on behavioural intention among college students.

Keywords: Road crossing behaviour, Theory of planned behaviour (TPB), pedestrians. (JPMA 65: 742; 2015)

Introduction

It is a well-established truth that traffic accidents are the major cause of injury, disability and premature death among adults worldwide.[1-3] Previous studies have highlighted that 83% of deaths from traffic accidents occur in countries with low and middle income and 27% in high-income countries.[4] The incidence rate of fatal road traffic accident (RTA) injuries is 26.4 per 100000 in the Eastern Mediterranean Region, 17.4 per 100000 in the European Region and 19 per 100000 worldwide.[5] Crossing is a hard task, specially in developing countries, as the roads in these countries have limited pedestrian facilities. The traffic flow is complex and pedestrians do need appropriate decision-making skills to cross safely.[6] In Iran, for example, growth of motor vehicles, increased traffic volume and also non-compliant drivers and pedestrians lead to many deaths every year.[3,7] The reported death rate from RTAs in Iran was 38.2 per 100000 in 2004 and 31.8 in 2011 (OR=0.83; 95% Confidence Interval [CI] = 0.82-0.85). Based on the number of vehicles, the death rate per 10000 vehicles also was 38 and 12 (OR=0.56; 95% CI = 0.55-0.57) respectively. The mortality rate increased from 51 to 65 cases per 1000 accidents from 2004 to March 2011.[7] A study in the capital of Iran demonstrated that the annual incidence of traffic injuries in 2008, for 1000 population, was 13.1 (95% CI: 10.8 - 15.6) and incidence of collision traffic injury for 1000 motorcycles was 95.[5] The most vulnerable people in road accidents are pedestrians, cyclists and motorcyclists.[8] Many people walk as pedestrians on the street and most of them do not comply with traffic legislation and cross illegally in intersections.[9,10] Non-compliance with traffic legislation is the most important factor that causes damage or injury to the pedestrians.[9] An observational survey studied pedestrian behaviours at signalised intersections in the Brisbane central business district (CBD) in Queensland, Australia, using behavioural categories. It showed that the majority of pedestrians crossed the street with no regard to traffic rules and red signals. The relative risk (RR) in pedestrians who crossed illegally and without regard to red signals were 8 times more than those who were legally crossing the street.[9] There are several factors that affect the pedestrians' road-crossing behaviours.

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Environmental factors such as street type (one or two way), signalised and non-signalised is one of them. Many studies demonstrated that street type has a significant impact on pedestrian behaviours.[10,11] For example, an observational study reported that pedestrian crossing behaviour in a two-way street is unsafe than crossing one-way streets.[12] Demographic factors such as age, gender and personal characteristics such as lack of decision-making skills, risk perception, risk-taking and violation of traffic regulations directly or indirectly affect the pedestrians' behaviours.[3,13,14] Female pedestrians wait for red signals more than males do and they prefer crossing signalised intersections.[4] Crossing waiting time in elder pedestrians is more than the others. Males have higher intention compared to females to violate traffic rules and engage in risky behaviours.[10,11] However, the burden of integrating all these variables into a model to predict pedestrian's intention and street crossing behaviour in risky situations is very critical. Several studies have indicated that an appropriate model to evaluate road crossing behaviour is the theory of planned behaviour (TPB). According to behaviour TPB, the intention is the major predictor of actual behaviour in certain situations, and it is determined by the attitude towards the behaviour, subjective norms and perceived behavioural control.[14-17] Attitude is another predictor of human behaviour that indirectly gets involved in traffic accidents because of its effects on risk perception and behaviour in high-risk situations.[2] Other factors that affect crossing behaviours are subjective norms and perceived behavioural control.[3,11,14] Several studies have revealed that people are more willing to cross in high-risk places if other pedestrians are also waiting to cross and the time to cross decreases with an increase in the number of pedestrians (subjective norms).[9,14] Behavioural intention to crossing at high-risk situation has an important role in traffic accidents and injuries in pedestrians, and it is modified by personality traits, attitudes, subjective norms and perceived behavioural control.[14] A study on adults' road-crossing intentions in risky situations showed that attitude, subjective norms and perceived behavioural control were strong predictors of road-crossing intention.[18] One study applied behaviour TPB to identify the demographic differences in intention to cross roads, and the model in that study predicted 56-65% variance of intention of road-crossing.[19] People's perceptions from internal and external factors that facilitate or inhibit behaviour and individual perceptions about how to implement that behaviour in any situation according to personal beliefs are defined as perceived behavioural control.[20] Perceived behavioural control predicts behavioural intention to safe crossing among pedestrians and directly or indirectly affects people's crossing behaviour.[14]

The current study planned behaviour to apply TPB to identify determinants of behavioural intention to safe crossing among college students.

Subjects and Methods

The cross-sectional study was conducted in 2013-14 and comprised students from nine faculties of Isfahan University of Medical Sciences, Iran. The sample size was worked out in line with literature[14,21] and was calculated to be 285. At the time of the study, 8500 students were enrolled at the university. Probability proportional to size was used to allocate students to the study sample after determination of proportion of each faculty. The participants were assured about the voluntary nature of their participation and the anonymity of their responses. They were handed a road-crossing questionnaire which was designed on behaviour TPB. The questionnaire's validity was confirmed by an expert panel of 10 health education assistant professors from four medical universities in Iran. The goal was to identify and resolve inadequate expressions/concepts. To enhance the validity of the questionnaire, the panel rendered some words or expressions ineffective and suggested alternatives. Also, all items were examined based on criteria like simplicity, comprehension and relevance. Finally, according to the experts, 9 items were modified and 4 items were removed. Content validity ratio (CVR) was calculated and each item with a CVR of less than 0.62 was removed.[22] After CVR calculation, 4 items were removed and then content validity index (CVI) was calculated for the other items. After CVI calculation, all items remained and the CVI for the entire scale was 0.92. We assessed the questionnaire's reliability through developing a pilot study with 30 college students.[23] The questionnaire came in two sections and took approximately 10 minimums to complete. The first section was designed to evaluate demographic variables such as age, gender and degree. The second section was designed based on behaviour TPB to evaluate attitude toward safe crossing (11 items), subjective norms that affect crossing behaviours (7 items), perceived behavioural control in safe crossing (6 items), behavioural intention to safe crossing (7 items) and crossing behaviours (7 items) (Table-1). Seven main crossing behaviours were selected to assess the pattern of crossing among the subjects. All items were scored using 5-point Likert Scale. Attitude, subjective norms and perceived behavioural control items were scored from 'strongly agree' to 'strongly disagree'. Behavioural intention items were scored from 'very likely' to 'very unlikely'. Minimum and maximum score for attitude was

11-55, while it was 7-35 for subjective norms, 6-30 for perceived behavioural control and 7-35 for behavioural intention. In all the TPB constructs, high score was considered good. Data was analysed using SPSS 21. Pearson Correlation Coefficient test was used to detect the relation between behaviour TPB constructs and behavioural intention to safe crossing. Linear regression analysis was performed to identify predictors of behavioural intention. In all calculations, $p<0.05$ was considered significant.

Results

Of the 300 questionnaires distributed, 278(92.66%) were returned completed. The mean age of the subjects was 23.16±3.66 years (range: 17-37 years). There were 149(53.6%) females and 129(46.4%) males. Overall, 131(47.1%) were undergraduates (Bachelor of Science), 55(19.8%) were graduate students, 69(24.8%) were medical students and 23(8.3%) were Ph.D candidates. Further, 32(11.5%) reported accident histories as a pedestrian and 246(88.5%) did not report any accident history. Besides, 79(28.4%) participants' fathers and 35(12.6) of their mothers had received university education.

Table-3: Linear Regression analysis predicting behavioural intention.

Model	Unstandardised Coefficients		Sig.
	B	Std. Error	
Age	0.065	0.036	0.074
Gender	0.671	0.393	0.089
Attitude	0.146	0.027	0.000
Subjective Norms	0.012	0.132	0.926
Perceived behavioural intention	0.294	0.132	0.026

Comparing gender groups indicated that the mean of attitude (male: 31.27±4.90 vs. female: 31.29±4.88), subjective norms (male: 17.14±1.35 vs. female: 19.52±1.79; p=0.001), perceived behavioural control (male: 16.13±1.47 vs. female: 19.83±1.73; p=0.002) and behavioural intention (male: 18.67±2.63 vs. female: 20.53±1.88; p=0.001) in females were significantly higher than in males. No significant difference was found in attitude towards safe crossing between the gender groups (p=0.597).

The TPB constructs related to safe crossing showed there was a significant correlation between them. A positive and direct correlation was traced in attitude toward safe

Table-1: Summary and samples of questionnaire variables based on the theory of planned behaviour (TPB) construct, including results of Cronbach's alpha.

TPB Constructs	Description	# Items	Cronbach's Alpha	Sample item
Attitude	Beliefs about the likely outcomes of the behaviour and the evaluations of these outcomes	11	0.70	"I believed that Talking on a cell phone while crossing distracted me"(score 1 strongly disagree to 5 strongly agree).
Subjective norm	Beliefs about the normative expectations of others and motivation to comply with these expectations	7	0.63	"My friends believes that the use of pedestrian bridge is a waste of time and energy"(score 1 strongly disagree to 5 strongly agree).
Perceived behavioural control	Beliefs about one's ability to perform (or not to perform) the behaviour	6	0.85	" I am confident that I never use my phone while crossing the street" (score 1 strongly disagree to 5 strongly agree).
Behavioural intention	Reflects the motivation to perform the behaviour and the likelihood they will perform it in the future	6	0.72	"How likely is it that you would cross the road next month;" I would expect to cross the road when the light is green" (score 1 very unlikely to 5 very likely).

Table-2: Correlation between TPB constructs related to safe crossing.

TPB constructs[a]	Mean	SD	Minimum	Maximum	Attitude	Subjective Norm	Perceived Behavioural Control	Behavioural Intention	Safe Crossing (Behaviour)
Attitude	31.44	4.88	15	43	1.000				
Subjective norm	18.42	1.99	14	26	0.047	1.000			
Perceived behavioural control	18.11	2.45	12	25	0.006	0.871**	1.000		
Behavioural intention	19.66	2.44	14	25	0.276**	0.368**	0.419**	1.000	
Safe crossing (behaviour)	20.56	3.25	11	29	0.166**	0.194**	0.280**	0.130*	1.000

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

[a]Possible Minimum and maximum score for attitude 11-55, subjective norm 7-35, perceived behavioural control 6-30 and behavioural intention were 7-35.

TPB: Theory of Planned Behaviour.

crossing (r=0.276; p=0.001), subjective norms (r=0.368; p=0.001) and perceived behavioural control (r=0.419; p=0.000) with behavioural intention to safe crossing (Table-2).

Besides, perceived behavioural control and positive attitude toward safe crossing were able to predict behavioural intention (Table-3).

Discussion

The study tried to identify the determinants of behavioural intention to safe crossing based on the TPB in male and female students of Isfahan University of Medical Sciences, aged 17-37 years old. The institutional review board wanted all students to have an equal chance of being selected, and we therefore selected a wide age range. The selected age range in our study is a potential limitation in itself and it is suggested that future studies shall use appropriate age groups to better understand road-crossing behaviours. For sample size calculation, we used an earlier study which was conducted on a wide age-range population (18-81 years old) and had applied a similar theory.[14] Also, at the time of the study, there were no published documents available on the Iranian pedestrians' crossing behaviours. Accident history as a pedestrian in males was more than females. Compared to males, females more often engaged in behaviours that were related to safe crossing. Therefore, gender may affect the behaviour of pedestrians to cross a street. One study reported that pedestrian crossing behaviour was related to demographic characteristics such as gender. Time to cross signalised and marked intersections in females was higher than males, and also they prefer these areas to cross a street.[4] Although in females, the mean score of TPB constructs except subjective norms was higher than males. Females showed higher behavioural intention and believed that safe crossing is controllable, and it is not very difficult to do. These results are consistent with earlier findings.[14,24,25] The study results are consistent with TPB principles as well. A positive and direct correlation between the theory constructs was found. Safe crossing was associated with positive attitude, persuasive subjective norms to safe crossing; perceived behavioural control and behavioural intention. The strongest predictor of behavioural intention was attitude and perceived behavioural control. It seemed that behavioural intention to safe crossing increases when a personal expectation of safe crossing and perceived control beliefs and power on a behaviour is positive. Our finding is consistent with studies on predictors of behavioural intention in crossing the street which indicated that attitude, subjective norms and perceived behavioural control were able to explain 25% of the variance in behavioural intention to cross the street.[18] Participants' control beliefs and perceived power were the strongest predictors of behavioural intention to cross the street. Attitude is another important factor that affects human behaviour in traffic environment and indirectly contributes to traffic accidents because of its effects on risk perception in pedestrians.[14] According to this study's findings, attitude and perceived behavioural control were able to predict the behavioural intention. One study mentioned that perceived behavioural control could predict behavioural intention in non-conformity and conformity situations.[14] This result is consistent with earlier findings.[14] Subjective norms include personal motivation to comply with ideas, values and behaviours of others and reference groups.[3] Participants believed that persuasive subjective norms act as weak predictors of behavioural intention to safe crossing. This finding indicated that the intention of safe crossing is a personal decision and interpersonal factors have a slight effect on behavioural intention. In other words, intensive intention of safe crossing surfaces when positive evaluation of behavioural outcomes and outcome expectancy increases, and people believed that safe crossing is controllable. A study reported that unsafe crossing increased with the presence of a company and pedestrian tendencies to unsafe crossing increased in these situations.[14] Our findings related to behavioural intention among participants are consistent with a study done in China which indicated that male pedestrians have more intention to violate traffic laws and to display unsafe crossing rather than females.[10] Finally, pedestrian injuries due to RTAs is an important public health concern in developing countries. Addressing the risks of this group will require multiple policy initiatives. Developing policies on traffic safety must be based on local evidence and research and particular social, political, and economic circumstances. Future health education and research promotion would be focused on promoting knowledge and skills related to safe crossing among various age groups in these countries. Iran, in particular, needs further policies to protect pedestrians, who are affected by RTAs. Moreover, nationwide efforts should be made to conduct educational campaigns for safe crossing in specific age groups.

Conclusions

Attitude toward safe crossing and perceived behavioural control were the main determinants of behavioural intention to safe crossing. Further research is required to develop and evaluate health education and promotion of interventions with a focus on attitude and perceived behavioural control to encourage safer road-crossing.

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