

Study of the Safe Behavior in Road Crossing Using the Theory of Planned Behavior among Middle School Students

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Abstract

Background

Given that school-age students, as active road users, are more vulnerable to injury compared with other pedestrians, a large number of them, following an injury, may either fail to go to school at least for a short time or even suffer from disabilities for the rest of their lives. The aim of this study was to determine safe behavior in road crossing using the theory of planned behavior among middle school students.

Materials and Methods

The current study was cross-sectional, descriptive-analytical in design. The population included middle school students in Qom, Iran. A multistage sampling procedure was utilized with 364 students participated in the study. A questionnaire about theory of planned behavior underlying safe behavior in road crossing was employed. The collected data were analyzed using SPSS version 20.0 by independent-samples *t*-test, Chi-square, and Pearson correlation coefficient.

Results

In the current study, the mean score of safe behavior in road crossing for female students was significantly higher than in male students ($P < 0.001$). In addition, there were significant positive relationships between safe behavior in road crossing and attitude ($r = 0.36$, $p < 0.001$), perceived behavioral control ($r = 0.24$, $p < 0.001$), and intention ($r = 0.20$, $p < 0.001$). In contrast, there was no statistically significant relationship between safe behavior and subjective norms ($r = -0.26$, $p = 0.61$).

Conclusion

As regards, safe behavior in road crossing is low among students, and their attitude and ability affected on behavior; therefore, using the theory of planned behavior can be increased safe behavior in road crossing.

Key Words: Attitude, Behavior, Student, Theory of Planned Behavior.

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1- INTRODUCTION

Injury, as a predictable and preventable event, is regarded as one of the most important public health challenges imposing a heavy socio-economic burden on any community in general and those in developing countries in particular (1). Traffic accidents have complex consequences as a result of human and technical risk factors as well as relevant environmental conditions (2). About two centuries have passed since the first death caused by driving. Previous studies have shown that the annual incidence rate of traffic crashes is 34.1 per 100,000 persons in Iran, whereas this rate is 18.0 per 100,000 globally (3). Moreover, the increasing demand for urban trips has necessarily entailed expanding the service capacity of urban transport network and improving its performance; such a demand has also considerably increased the rate of private car ownership in cities, hence increasing the number of urban traffic accidents and resultant damage to life and property, especially in large cities. In Iran, the reported influential factors involved in traffic accidents include human error (65%), vehicle technical malfunctions (15%), road technical problems (13%), and weather conditions (7%) (2).

Considering the fact that most road accidents take place on public holidays involving students and staff, there has been great importance attached to these two groups in relevant studies (5, 6). Childhood and adolescence injuries are still frequently occurring in developing countries (4). Therefore, they are the most vulnerable group in the face of the traffic system, and a large number of them, following an injury, may either fail to go to school at least for a short time or spend the rest of their lives with disabilities (7, 8). Although, the rate of traffic accidents has declined in recent years as a result of the triple function of Traffic Police, Ministry of Health, and Legal Medicine

Organization, much still remains to be done to reach international standards. The identification of the most likely human and non-human risk factors affecting the intensity of accidents could be regarded as the basis for effectively preventing traffic accidents (2). Accidents not only claim people's lives, they could also affect the best years of their lives in terms of performance, efficiency, and fitness (9). In accidents around the world, traumatic brain injuries have been reported as one of the causes of death and disability (10).

Today, non-communicable diseases endanger the health of children more than infectious diseases, and, similarly, traffic accidents are among the most fatal and common types of incidents for children and adolescents (7). Furthermore, in countries such as Iran, birth and infant mortality rates have sharply declined, and infants often survive infectious diseases. However, following birth and during childhood, children are exposed to many dangers, not dangers of microscopic living organisms or viruses, but of those cause by lifestyle, environmental, and social conditions (11).

Given the significant role of human behavior in causing traffic accidents, paying special attention to people's safe behavior, attitudes, and beliefs is of paramount importance. In this regard, behavioral models and theories play a role in investigating the various aspects of human performance and behavior. One of these theories is the theory of planned behavior. This theory, to a large extent, has been used to predict healthcare behavior and is also able to explain about 40 percent of the relationship between intention and healthcare behavior. It is argued that the model has the potential capacity for designing interventions to change behavioral patterns. According to this theory, the most important determinant of an individual's behavior is his/her behavioral intention. The determinant of

behavioral intention in the model includes three factors: attitude (the individual's belief in behavioral outcomes and his evaluation of the results lead to the formation of attitudes), subjective norms (influenced by an individual's beliefs about the expectations of others and also his motivation to meet those expectations), and perceived behavioral control (including the degree to which an individual feels whether or not performing any given behavior is under his voluntary control, which is, in turn, explained by the two dimensions of controllability and perceived self-efficacy) (12).

According to this theory, people who decide to cross the road in a high-risk way are more likely to perceive this behavior as positive and easy to do; they are, therefore, more exposed to dangerous decisions (13). Worldwide, several studies have been conducted using this theory; among them are studies, using the theory of planned behavior, done by Evans and Norman (13), and Diaz (14), to predict the intention of pedestrians for violating traffic rules. Based on what has been mentioned so far and given the importance of safe behavior among school students and the detrimental effects of unsafe behavior on their lives, the current study was carried out with the aim of determining the factors affecting safe behavior in road crossing using the theory of planned behavior among middle school students.

2- MATERIALS AND METHODS

2-1. Study design and population

This cross-sectional descriptive analytical study conducted to explore safe behavior in road crossing among middle school students in Qom city, Iran.

2-2. Methods

A multistage sampling procedure was utilized. Accordingly, regions 1 and 3 were randomly selected from among all regions; then, 15 public schools (girls and boys)

were selected as the strata using proportionate stratified random sampling; for each stratum, then, necessary samples of students proportionate to the size of the stratum were randomly selected using simple random sampling. Accordingly, Khalafe nilsaz et al.'s study (15), with $d=0.78$, $\sigma^2=7.8$ and confidence interval (CI) 95% by using the following formula, sample size was calculated as 384 students (including probability 5% sample loss). Finally, 364 students participated in the main study (with a 5% dropout rate).

$$n = \frac{z_{1-\frac{\alpha}{2}}^2 \sigma^2}{d^2}$$

$$n = (1.96)^2 \times 7.8 / (0.78)^2 = 384$$

2-3. Measuring tools: validity and reliability

The data collection instrument was a standard questionnaire containing two sections. The first section included seven demographic items (gender, age, parents' educational level and job, etc.); the second section was related to the theory of planned behavior including items regarding attitude (eight items on a 5-point Likert-type scale ranging from I strongly agree to I strongly disagree and on a 4-point Likert-type scale ranging from very bad to very good), subjective norms (12 items on a Likert-type scale ranging from I strongly agree to I strongly disagree), perceived behavioral control (two items on a 4-point Likert-type scale ranging from very difficult to very easy), behavioral intention (two items on a 4-point Likert-type scale ranging from It is highly likely to It is not likely at all), and safe behavior in road crossing (15 items on a 4-point Likert-type scale ranging from always to never). The reliability and validity of the questionnaire have been confirmed in the study conducted by Khalafe nilsaz et al. (15) using content validity, expert opinion,

test-retest, and Cronbach's alpha (with the index of 0.80).

2.4-Ethical consideration

Before implementing the main study, the students, as the target group, were briefed on the aim of the project and the confidentiality of the information obtained from them; therefore, the target group took part in the study with full informed consent.

2-5. Inclusion and exclusion criteria

The inclusion criteria were having no history of motor vehicle accidents as well as obtaining written consent from the students and their parents, and the exclusion criteria including; just partial completing of the questionnaire and unwillingness for participation in current study.

2-6. Data Analyses

The collected data were analyzed using SPSS version 20.0 by independent t-test for relationship between gender of students with safe behavior in road crossing, ANOVA for relationship between parent's educational level and parent's job with safe behavior in road crossing, and Pearson correlation coefficient for correlation between constructs of theory of planned behavior (attitude, subjective norms, perceived behavioral control and behavioral intention) with safe behavior in road crossing. P-valueless than 0.05 were significant.

3- RESULTS

In this study, 364 students (95%) participated in the study; 20 students (5%) were excluded during the study because of they filled out questionnaires incompletely. Among the final sample, 187 students (51.1%) were male, and 177 students (48.4%) were female. The average age of the participating students was 14.05 ± 1.06 years. Additionally, the majority of students' fathers had university

education (46.6%), and a low number of them were illiterate (2.2%); the majority of students' mothers had high-school diploma (40.9%), with a smaller being illiterate (1.9%). Moreover, the majority of students' fathers were employees (41.3%), and a small number were unemployed (4.1%); the most of students' mothers were housewives (73.1%), while a small number followed other jobs (2.7%). In this study, 46 percent of boy students and 54 percent of girl students have safe behavior in road crossing. The results of the study showed no significant relationship between students' age and their safe behavior in road crossing ($r = -0.06$, $P = 0.25$). Likewise, there was no significant relationship between the students' birth order and their safe behavior in road crossing ($r = -0.05$, $P = 0.31$).

Table.1 shows that there were not statistically significant relationship between students' safe behavior in road crossing with their fathers' educational level ($P = 0.25$) and job ($P = 0.17$). In a similar vein, no significant relationships were observed between students' safe behavior in road crossing and their mothers' educational level ($P = 0.63$) and job ($P = 0.63$). However, a significant relationship was detected between students' safe behavior in road crossing and gender of students ($P < 0.001$). So that, the mean score of safe behavior for female students was higher than in male students. **Table.2** indicates a statistically significant positive relationship between students' safe behavior in road crossing and attitude ($r = 0.36$, $P < 0.001$), suggesting that fostering attitudes seemed to be associated with increasing levels of demonstrating safe behavior in road crossing. Similarly, a significant positive relationship was noticed between safe behavior in road crossing and perceived behavioral control ($r = 0.24$, $P < 0.001$). So that with the increase in the perceived behavioral control scores, the instances of

safe behavior in road crossing also tended to increase. Further, there was a significant positive relationship between safe behavior in road crossing and intention ($r = 0.20$, $p < 0.001$) in such a way that the increase in the intention scores followed an increase in

the cases of safe behavior in road crossing. Nevertheless, no significant relationship was observed between safe behavior in road crossing and subjective norms ($r = -0.26$, $P = 0.61$).

Table-1: The relationships between safe behavior in road crossing with demographic variables in students (n = 364)

Variables		Score of safe behavior in road crossing (mean \pm SD)	P-value
Fathers' educational level			p = 0.25 f = 1.23
	Illiterate	42.78 \pm 3.31	
	Primary school	42 \pm 3.46	
	Junior high school	44.21 \pm 4.20	
	High school diploma	43.76 \pm 4.16	
	Academic degree	43.99 \pm 4.63	
Mothers' educational level			p = 0.63 f = 0.63
	Illiterate	43.14 \pm 2.67	
	Primary school	43.04 \pm 4.19	
	Junior high school	44.43 \pm 4.12	
	High school diploma	43.77 \pm 4.27	
	Academic degree	43.90 \pm 4.65	
Fathers' job			p = 0.17 f = 1.56
	Unemployed	45.06 \pm 3.058	
	Worker	42.79 \pm 3.50	
	Employee	43.55 \pm 4.19	
	Self-employed	43.95 \pm 4.47	
	Retired	44.04 \pm 5.09	
	Other	45.82 \pm 5.86	
Mothers' job			p = 0.63 f = 0.63
	Unemployed	43.81 \pm 4.44	
	Worker	44.25 \pm 4.06	
	Employee	43.90 \pm 3.43	
	Self-employed	43.44 \pm 5.055	
	Retired	41.90 \pm 3.47	
Gender of students			p < 0.001 t = -5.25
	Male	42.68 \pm 3.55	
	Female	44.99 \pm 4.78	

F= variation between sample means / variation within the samples.

Table-2: The relationships between safe behavior in road crossing and the constructs of the theory of planned behavior in students

Variables	Attitude	Subjective norms	Perceived behavioral control	Intention	Safe Behavior in Road Crossing
Attitude	1				
Subjective norms	p = 0.11 r = -0.08	1			
Perceived behavioral control	p < 0.001 r = 0.40	p = 0.12 r = -0.13	1		
Intention	p = 0.25 r = 0.05	p = 0.02 r = -0.11	p = 0.005 r = 0.14	1	
Safe Behavior in Road Crossing	p < 0.001 r = 0.36	p = 0.61 r = -0.26	p < 0.001 r = 0.24	p < 0.001 r = 0.20	1

r= Correlation coefficient.

4- DISCUSSION

In the present study, the constructs of the theory of planned behavior were used as determinants of safe behavior; there were significant positive relationships between safe behavior in road crossing and attitude, perceived behavioral control, and intention. In the current study, no significant relationship was detected between students' age and their safe behavior in road crossing. In this line, Tabibi and Kiafar (2013) showed that the growth of the ability to identify high-risk and unsafe points when crossing the road and the relevant arguments would be sustained after the age of 10 (7).

Similarly, in Moosazadeh et al.'s (2013) study conducted in Mazandaran, Iran, most victims were in the 20-29 age range (16). Tabibi and Peffer (2003) also indicated that perceived risk, as one of the necessary capabilities to cope with high-risk environments (such as traffic), would improve with age (17). The results of that study were inconsistent with those obtained in the present study; this might be related to the difference between the two studies in terms of research time and place as well as the different characteristics of the two target groups under study.

The results of the current study indicated no statistically significant relationship between students' safe behavior in road crossing and their birth order. In reviewing the past literature, it was found out that the pattern of play in boys and older children was different from that in girls and younger children. Boys and girls could both influence the decisions made by their younger siblings yet in different ways; that is, boys often sought to make the subject matter funny and amusing while girls put greater emphasis on safety (18). With the increase in the number of older siblings, the accident risk was also raised so that the highest rate of accidents was related to those children with at least three older siblings (19). These differences are most likely related to the difference in the types of safe behavior as the instances of safe behavior in road crossing are shaped during early ages by observing and modeling the safe behavior performed by adults. In addition, a statistically significant relationship was observed between students' safe behavior in road crossing and their gender; female students outperformed their male counterparts in terms of safe behavior in road crossing. In this regard, Khazaei et al. (2016) showed that there was a significant difference between gender and place of accident with

type of accident (20). Also, Soori (2002) (21), reported boys' greater vulnerability to traffic accidents when compared with that of girls; this was consistent with the pattern of vulnerability to accidents in Iran and across the world. In Iran, the highest accident rate in all age groups (except for the elderly) belongs to men, and, in the 6-9 age range, boys' accident rate is twice that of girls (21). In Qatar, men suffer from injuries and deaths due to traffic accidents four to five times more than women (22). The most important reason for this difference, as investigated in several studies, is related to men's high-risk behavior in driving and road crossing (23).

Other studies have regarded gender as a risk factor in the occurrence of traffic accidents (24). Still other studies have reported that mostly men were among the fatalities of traffic accidents (25). The findings of Waylen and McKenna's study suggested that young boys, compared the girls, were more likely to perform high-risk behavior in road crossing (26). The results of Nasehi et al.'s (2013) study also indicated that most victims of disasters and accidents were men (27), while Bakhtiyari et al. (2014) showed that, in urban traffic accidents, masculinity was regarded as a protective factor against the occurrence of accidents. The logical explanation to this may be related to the lower number of female drivers on intercity roads and their greater number in urban areas (2). Therefore, it seems that, compared with girls, boys tend to be more curious and riskier and to act more independently while performing road crossing behavior.

The findings of the present study showed no statistically significant relationship between students' safe behavior in road crossing and their fathers' educational level. A related study in conducted in New Zealand reported that educational level had a significant effect on motorcycle accidents so that the former was inversely related to high-risk behavior (28). Along

the same line, Moradi et al. (2007) showed a significant difference in the occurrence of motorcycle accidents between those with primary education and those having higher education (29). The reason for this difference is likely due to improving roads and more monitoring and enforcement of traffic laws broadly by police. The results of Khalafe nilsaz et al.'s (2013) study also indicated that there was a close association between children's behavior and their parents' educational level; accordingly, the higher the parents' educational level, the greater their children's ability to perform road crossing behavior (15). It seems that parents do not have adequate supervision and control over their children's road crossing behavior.

In this study, no statistically significant relationships were observed between students' safe behavior in road crossing on the one hand and their fathers' occupation, their mothers' educational level, and their mothers' occupation on the other hand. As mentioned before, Khalafe nilsaz et al. (2013) indicated that the higher the parents' educational level, the more skillful were their children in performing road crossing behavior (15). However, Kheirabadi and Bolhari (2011) found that stressful jobs were associated with car accidents and that financial stress could increase the likelihood of more serious accidents (30). Most likely, given that private and school service cars are mostly used for students to commute to schools, parents do not appear to feel any worries about the risks involved in their children's road crossing behavior.

The results of the current study revealed a statistically significant positive relationship between students' safe behavior in road crossing and attitude. Tabibi and Kiafar (2013) showed that training could enhance risk perception among preschool children and raise its level to that of 9-year old children (7). Zhou et al. showed that attitude and

subjective norm were significant in the basic TPB model (31). The results of this study also indicated that there was a significant positive relationship between students' safe behavior in road crossing and perceived behavioral control. Khalafe nilsaz et al. (2013) found that there were significant relationships between safe behavior in road crossing and such constructs as intention, perceived behavioral control, compliance motivation, outcome evaluation, and normative beliefs; the researchers also showed that behavioral intention was a good predictor of behavior but without any significant relationship with behavioral beliefs (15). It seems that students had created a clear perception of barriers and facilitators of road crossing including the abilities to take the pedestrian overpass, cross the road at the pedestrian crossing, perceive the risks involved in traffic accidents, and obey traffic rules of road crossing; this heightened perception had accordingly affected their scores on the perceived behavioral control construct.

The present study found no significant relationship between students' safe behavior in road crossing and subjective norms. Diaz's (14) study also showed that, compared with subjective norms, the attitude construct had a greater effect on behavioral intention, and this was justified as the lack of influence of social rules and forces among the participants under study. However, Khalafe nilsaz et al. (2013) reported a significant relationship safe behavior in road crossing and subjective norms (normative beliefs and compliance motivation) (15).

Most likely, important people (such as parents, teachers, and traffic police) failed to affect students' decision-making with respect to road crossing, and necessary training related to safe behavior road crossing has not been provide to students by influential people including their parents. The current study also revealed a

significant relationship between students' safe behavior in road crossing and intention. In this regard, studies carried out by Evans and Norman (13), Diaz (14) and Jiang et al. (32) confirmed the importance of the theory of planned behavior to underlie research attempts on safe roads and recognized behavioral intention as the most influential construct in road crossing behavior. In the same vein, Khalafe nilsaz et al. reported a significant relationship between safe behavior in road crossing and intention among children from 9-11 years of old (15). Therefore, the theory of planned behavior could be applied as a useful framework for implementing instructional interventions, by making parents and teachers involved, in order to change students' patterns of safe behavior in road crossing.

4-1. Limitations of the study

The current study had some limitations; for instance in this study used a self-report tool to collect data. In addition, there was no possibility of direct observation for safe behavior in road crossing. Moreover, because of the varying socio-cultural and demographic conditions and the variety of factors related to the safe behavior in road crossing, the results of this study cannot be generalized to all the population living in the same area.

5- CONCLUSION

In this study, 46 percent of boy students and 54 percent of girl students have safe behavior in road crossing. Therefore, safe behavior in road crossing is low among students. As regards, attitude and ability of students affected on their safe behavior; therefore, using the theory of planned behavior can be increased safe behavior in road crossing.

6- CONFLICT OF INTEREST

7- ACKNOWLEDGMENT

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