



# Safe Traffic Behaviors in Adolescents: A Cross-Sectional Study Based on the Theory of Planned Behavior

Alireza Shahab Jahanlou <sup>1</sup>, Laleh Hassani <sup>2, \*</sup>, Vahid Ranaei <sup>3</sup>, Ghodratollah Roshanaei <sup>4</sup>, Sonja Forward <sup>5</sup>, Kristin Haglund <sup>6</sup> and Forouzan Rezapur-Shahkolai <sup>7</sup>

<sup>1</sup>Cardiovascular Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, Iran

<sup>2</sup>Department of Health Promotion and Education, School of Health, Mother and Child Welfare Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, Iran

<sup>3</sup>Social Determinants in Health Promotion Research Center, Hormozgan Health Institute, Hormozgan University of Medical Sciences, Bandar Abbas, Iran

<sup>4</sup>Department of Biostatistics, School of Public Health, Modeling of Noncommunicable Diseases Research Center, Hamadan University of Medical Sciences, Hamadan, Iran

<sup>5</sup>Swedish Road and Transport Research Institute, Linköping, Sweden

<sup>6</sup>Marquette University, College of Nursing, Milwaukee, Wisconsin, USA

<sup>7</sup>Department of Public Health, School of Public Health and Social Determinants of Health Research Center, Hamadan University of Medical Sciences, Hamadan, Iran

\*Corresponding author: Department of Health Promotion and Education, School of Health, Mother and Child Welfare Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, Iran. Email: lalehassanii@gmail.com

Received 2021 October 09; Revised 2022 January 30; Accepted 2022 March 19.

## Abstract

Adolescents do not have adequate safe traffic behaviors. This cross-sectional study investigated safe traffic behaviors of 414 male high school students of Hamadan, Iran, randomly selected using the multistage sampling method in 2020. This study used a researcher-made questionnaire based on the theory of planned behavior about safe traffic behaviors with Cronbach's alpha coefficient of 0.95, content validity ratio of 0.70, and content validity index of 0.85. There was a strong positive correlation between safe traffic behaviors with perceived behavioral control and intention. Adolescents can be influenced to internalize behavioral safety precursors that can lead to a sustained increase in safe traffic behaviors and the prevention of road traffic injuries.

**Keywords:** Attitude, Adolescent, Cross-Sectional Study, Intention, Prevention, Helmet

## 1. Background

The burden of road traffic injuries (RTIs) is observed to be high in developing countries, with heavy economic and social pressures on the communities. In Iran, which is a developing country, the annual RTI rate is estimated to be 34 individuals in 100,000 cases (1). In Western countries, RTIs account for approximately 35 - 40% of adolescent deaths, where these have primarily been attributed to high-risk road behaviors (2). Studies also indicate that the traffic safety of adolescents is not appropriate in developing countries (3). In developing countries, RTIs account for approximately 90% of deaths, especially affecting the working age of 15 - 44 years (4). In addition to mortalities, RTIs in adolescents can be associated with physical injuries, mental disorders, and social and psychological problems in families (5, 6).

## 2. Objectives

In particular, in the Middle East, especially in Iran, researchers have used the theory of planned behavior (TPB)

in studies with male adolescents and health behaviors, disease prevention, and nutritional behaviors but not to investigate RTIs. The unsafe traffic behaviors of male adolescents in Iran (5) led to conducting the present study.

## 3. Methods

For the determination of the sample size using a pilot study on 30 students, mean and standard deviation were calculated and entered into the Cochran sample size formula. Based on the mean formula and considering the 20% nonresponse rate, the target sample size was determined at 414 participants. The face validity, content validity, and internal consistency of the questionnaire were investigated to establish reliability and validity. The participants were asked to give a score from 1 (not important) to 5 (very important) on the importance of each item. The impact scores of the items were investigated, and corrections were made. The items with impact scores less than 1.5 were removed or amended. For the measurement of the content

validity, the questionnaire was given to 10 health education and health promotion specialists. The content validity was measured based on the aforementioned 10 experts' opinions. The content validity ratio (CVR) was reported by a panel of content experts to measure the validity of individual questionnaire items associated with necessity. The numeric value for the overall mean CVR is provided by the content validity index (CVI), which is related to the simplicity, clarity, and relatedness of all included items in the questionnaire (7). The values of CVR and CVI were 0.7 and 0.85, respectively, which confirmed the good content validity of the questionnaire. For the evaluation of the internal consistency of the questionnaire, Cronbach's alpha was calculated based on 30 responses (0.95) that confirmed internal consistency. The test-retest data were used to check stability reliability. Finally, the correlation between the two sets of data was 0.88, which confirmed the reliability of the questionnaire.

#### 4. Results

According to Table 1, there was a significant difference in the mean scores of knowledge at different transportation levels ( $P = 0.042$ ). The participants with all three modes of transportation had the highest scores. In addition, the mean score of attitudes toward behavior was significantly different according to the mother's job ( $P = 0.024$ ); accordingly, the participants whose mother's job was housewife had a higher score. Attitudes toward behavior scores at transportation levels also showed a significant difference ( $P = 0.001$ ); accordingly, the highest score was in participants who went to school on foot. Attitudes toward behavior scores were significantly different in different grades ( $P = 0.001$ ); accordingly, the participants with grades 11-12 had the highest scores.

According to Table 2, there was a significant correlation between the variables. The highest correlation was observed between perceived behavioral control and behavioral intention with safe traffic behaviors of participants ( $r = 0.811, P < 0.001$ ). Furthermore, the lowest correlation was noticed between knowledge and behavioral intention with safe traffic behaviors of participants ( $r = 0.196, P < 0.001$ ).

There was a positive relationship between perceived behavioral control and behavioral intention with participants' safe traffic behaviors ( $r = 0.764, P < 0.001$ ) (Table 2). There was a significant positive relationship between the constructs of the TPB with behavioral intention and traffic behaviors. The results of the present study are in line with the results of a study performed by Soroosh et al. (8), in which of 300 individuals, 58.3% declared that they always fasten their seat belts. The current study's results revealed

a positive and significant relationship between safety traffic behaviors and prosafety attitudes. The estimation and evaluation of the risks and consequences of traffic behaviors (outcome value) affect the intention to display safe traffic behaviors.

#### Footnotes

**Authors' Contribution:** All the authors made significant contributions to the proposal development, data collection, data analysis, and manuscript preparation process of this work. All the authors also read and approved the final manuscript.

**Conflict of Interests:** The authors declared that there is no conflict of interest.

**Ethical Approval:** The present study was approved by the Ethics Committee of Hormozgan University of Medical Sciences (specific number of the ethics committee: IR.HUMS.REC.1398.484). The participants were provided with information about the study and consented by proceeding to participate in the survey implying that consent was approved by the Ethics Committee of Hormozgan of Medical Sciences ([ethics.research.ac.ir/EthicsProposalView.php?id=125351](http://ethics.research.ac.ir/EthicsProposalView.php?id=125351)).

**Funding/Support:** This study was sponsored by Hormozgan University of Medical Sciences, Hormozgan, Iran. The funding agencies had no role in the study design, data collection, analysis, or presentation of the results.

**Table 1.** Frequency and Percentage of Demographic Variables and Mean Values of Structures of Theory of Planned Behavior<sup>a</sup>

Variables and Levels	Knowledge	Attitudes Toward Behavior	Subjective Norms	Perceived Behavioral Control	Behavioral Intention	Behavior
<b>Family member</b>						
3 - 4	2.61 ± 0.97	18.49 ± 5.72	18.16 ± 6.38	20.51 ± 6.98	10.85 ± 3.98	9.06 ± 3.56
> 4	2.60 ± 0.96	19.08 ± 5.98	19.04 ± 6.45	21.03 ± 7.62	10.81 ± 4.42	9.68 ± 3.99
P-value	0.902	0.406	0.256	0.562	0.935	0.183
<b>Father's job</b>						
Governmental job	2.72 ± 0.92	18.90 ± 5.13	18.84 ± 5.99	21.01 ± 6.5	11.19 ± 3.7	9.31 ± 3.49
Private job	2.5 ± 0.99	18.47 ± 6.23	18.07 ± 6.69	20.38 ± 7.5	10.58 ± 4.31	9.16 ± 3.94
P-value	0.072	0.472	0.252	0.403	0.163	0.713
<b>Mother's job</b>						
Housewife	2.6 ± 0.95	19.07 ± 5.49	18.71 ± 6.18	21.2 ± 6.93	11.09 ± 4	9.49 ± 3.72
Governmental/ Private job	2.6 ± 1.02	17.3 ± 6.49	17.37 ± 7.01	18.89 ± 7.59	10 ± 4.31	8.36 ± 3.73
P-value	0.826	0.024	0.116	0.013	0.045	0.015
<b>Father's education</b>						
Primary	2.59 ± 0.91	18.73 ± 5.14	18.57 ± 5.92	20.79 ± 6.8	11.01 ± 4.02	9.34 ± 3.68
High school	2.66 ± 1.05	19.14 ± 5.56	18.87 ± 6.01	21.09 ± 7.14	11.27 ± 3.81	9.62 ± 3.66
University	2.58 ± 0.94	18.24 ± 6.28	17.94 ± 6.94	20.24 ± 7.37	10.42 ± 4.33	8.85 ± 3.85
P-value	0.769	0.457	0.485	0.619	0.222	0.240
<b>Mother's education</b>						
Primary	2.69 ± 1.02	19.7 ± 5.26	18.97 ± 6.05	21.58 ± 7.34	11.37 ± 4.06	9.74 ± 3.88
High school	2.56 ± 0.83	18.85 ± 5.2	18.5 ± 6.14	20.83 ± 6.87	11.01 ± 3.93	9.28 ± 3.76
University	2.6 ± 1.05	17.80 ± 6.51	17.93 ± 6.86	19.9 ± 7.27	10.34 ± 4.25	8.84 ± 3.64
P-value	0.651	0.057	0.488	0.226	0.164	0.219
<b>Type of school</b>						
Public	2.60 ± 0.99	18.73 ± 5.74	18.52 ± 6.46	20.68 ± 7.19	10.9 ± 4.15	9.25 ± 3.76
Private	2.64 ± 0.88	18.25 ± 6.02	17.82 ± 6.15	20.49 ± 7.03	10.5 ± 3.86	9.1 ± 3.74
P-value	0.771	0.56	0.434	0.843	0.511	0.793
<b>Transportation mode</b>						
On foot	2.6 ± 1	19.78 ± 5.03	19.1 ± 5.71	21.54 ± 6.59	11.30 ± 3.86	9.75 ± 3.52
Bike	2.17 ± 1.01	14.45 ± 7.27	14.75 ± 7.7	17.18 ± 8.19	8.97 ± 4.28	7.77 ± 3.67
Public transportation	2.69 ± 0.88	19.44 ± 5.2	19.31 ± 5.93	21.28 ± 6.68	11.14 ± 3.98	9.57 ± 3.66
A combination of three methods	2.72 ± 0.96	17.96 ± 5.77	18.03 ± 6.73	20.19 ± 7.57	10.64 ± 4.32	8.64 ± 3.75
P-value	0.042	0.001	0.004	0.012	0.013	0.008
<b>Grade</b>						
7 - 8	2.61 ± 0.98	16.65 ± 6.74	16.33 ± 7.24	18.66 ± 7.77	9.91 ± 4.38	8.58 ± 3.94
9 - 10	2.53 ± 0.99	18.08 ± 6.14	18.23 ± 6.83	20.35 ± 7.47	10.51 ± 4.26	8.78 ± 3.7
11 - 12	2.68 ± 0.93	20.41 ± 4	19.91 ± 4.98	22.22 ± 6.1	11.7 ± 3.61	9.96 ± 3.54
P-value	0.527	0.001	0.001	0.001	0.001	0.005

<sup>a</sup> Values are expressed as mean ± SD.

**Table 2.** Relationship Between Constructs of Theory of Planned Behavior and Behavioral Intention

Constructs	Knowledge	Attitude	Subjective Norms	Perceived Behavioral Control	Behavioral Intention	Behavior
<b>Knowledge</b>						
Pearson correlation	1					
Sig. (2-tailed)	1					
<b>Attitude</b>						
Pearson correlation	0.256 <sup>a</sup>	1				
Sig. (2-tailed)	< 0.001					
<b>Subjective norms</b>						
Pearson correlation	0.225 <sup>a</sup>	0.745 <sup>a</sup>	1			
Sig. (2-tailed)	< 0.001	< 0.001				
<b>Perceived behavioral control</b>						
Pearson correlation	0.279 <sup>a</sup>	0.733 <sup>a</sup>	0.757 <sup>a</sup>	1		
Sig. (2-tailed)	< 0.001	< 0.001	< 0.001			
<b>Behavioral intention</b>						
Pearson correlation	0.196 <sup>a</sup>	0.696 <sup>a</sup>	0.649 <sup>a</sup>	0.811 <sup>a</sup>	1	
Sig. (2-tailed)	< 0.001	< 0.001	< 0.001	< 0.001		
<b>Behavior</b>						
Pearson correlation	0.193 <sup>a</sup>	0.649 <sup>a</sup>	0.607 <sup>a</sup>	0.764 <sup>a</sup>	0.811 <sup>a</sup>	1
Sig. (2-tailed)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	

<sup>a</sup> Correlation is significant at 0.01 (2-tailed).

## References

- Khosravi Shadmani F, Mansori K, Karami M, Zayeri F, Shadman RK, Hanis SM, et al. Avoidable Burden of Risk Factors for Serious Road Traffic Crashes in Iran: A Modeling Study. *J Prev Med Public Health*. 2017;**50**(2):83–90. doi: [10.3961/jpmph.16.085](https://doi.org/10.3961/jpmph.16.085). [PubMed: [28372352](https://pubmed.ncbi.nlm.nih.gov/28372352/)]. [PubMed Central: [PMC5398334](https://pubmed.ncbi.nlm.nih.gov/PMC5398334/)].
- Assailly JP. Road safety education: What works? *Patient Educ Couns*. 2017;**100** Suppl 1:S24–9. doi: [10.1016/j.pec.2015.10.017](https://doi.org/10.1016/j.pec.2015.10.017). [PubMed: [26549168](https://pubmed.ncbi.nlm.nih.gov/26549168/)].
- Donroe J, Tincopa M, Gilman RH, Brugge D, Moore DA. Pedestrian road traffic injuries in urban Peruvian children and adolescents: case control analyses of personal and environmental risk factors. *PLoS One*. 2008;**3**(9). e3166. doi: [10.1371/journal.pone.0003166](https://doi.org/10.1371/journal.pone.0003166). [PubMed: [18781206](https://pubmed.ncbi.nlm.nih.gov/18781206/)]. [PubMed Central: [PMC2528934](https://pubmed.ncbi.nlm.nih.gov/PMC2528934/)].
- Nantulya VM, Muli-Musiime F. Kenya: Uncovering the Social Determinants of Road Traffic Accidents. In: Evans T, Whitehead M, Diderichsen F, Bhuiya A, Wirth M, editors. *Challenging Inequities in Health: From Ethics to Action*. Oxford, UK: Oxford University Press; 2001. p. 210–25. doi: [10.1093/acprof:oso/9780195137408.003.0015](https://doi.org/10.1093/acprof:oso/9780195137408.003.0015).
- Kohli G, Aathi MK, Sethi M. Road Accidents among Adolescents. *J Asia-Pac Stud*. 2013;**3**(2).
- Ranaei V, Hassani L, Jahanlou AS, Roshanaei G, Rezapur-Shahkolai F. Effect of educational intervention on safe traffic behaviors of high school male students in Iran, using the theory of planned behavior: a quasi-experimental study. *BMC Public Health*. 2021;**21**(1):1876. doi: [10.1186/s12889-021-11943-x](https://doi.org/10.1186/s12889-021-11943-x). [PubMed: [34663278](https://pubmed.ncbi.nlm.nih.gov/34663278/)]. [PubMed Central: [PMC8524979](https://pubmed.ncbi.nlm.nih.gov/PMC8524979/)].
- Salari R, Niakan Kalhori SR, Fatehi F, Ghazisaeei M, Nazari M. Determining minimum set of features for diabetes mobile apps. *J Diabetes Metab Disord*. 2019;**18**(2):333–40. doi: [10.1007/s40200-019-00417-y](https://doi.org/10.1007/s40200-019-00417-y). [PubMed: [31890658](https://pubmed.ncbi.nlm.nih.gov/31890658/)]. [PubMed Central: [PMC6914742](https://pubmed.ncbi.nlm.nih.gov/PMC6914742/)].
- Soroosh D, Nematshahi M, Javadinia SA, Hesamifard M. Study of the Pattern and Frequency of Road Traffic Injuries in Car Occupants in the Eastern Part of Iran. *Int J Med Toxicol Forensic Med*. 2020;**10**(2):28112. doi: [10.32598/ijmtfm.v10i2.28112](https://doi.org/10.32598/ijmtfm.v10i2.28112).