

# Pedestrians in Iran: Determinants of unsafe traffic behaviors of pedestrians

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## Research note

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# Abstract

**Objective:** Pedestrians are among the most vulnerable groups in traffic accidents. In this cross-sectional study, the behavior of 600 pedestrians in Iran, using a pedestrian traffic behavior questionnaire. Cluster sampling was conducted among 30% of the health centers in each district of the city. Thereafter, individuals were randomly selected from each center depending on the covered population.

**Results:** Although 17% of the pedestrians demonstrated safe traffic behaviors, over 85% were distracted, more than 80% did not comply with traffic laws, the majority violated rules and displayed no positive traffic behaviors, and half of the participants were aggressive. Age, gender, marital status, education level, daily walking rate, and transportation mode were significant predictors of traffic behavior.

## Introduction

Pedestrian safety is one of the most important (1). Pedestrians constitute about 22% of the total road casualties and, in some countries, this ratio even reaches two-third of their total population (2). Pedestrian deaths are higher in low- and middle-income countries compared with high-income countries. The Eastern Mediterranean region is an exemption where high-income countries still have high pedestrian death rates (3).

Road traffic deaths in Iran are among the highest in the world and the Eastern Mediterranean region (4). Majority of the accidents occur because pedestrians do not comply with traffic laws (5). They enter the streets paying no attention to vehicles and cross the street without paying attention to vehicles (1). In Iran, over 39% of the deaths caused by traffic involve pedestrians (6). This study aims to investigate pedestrian traffic behaviors (PTB) in different domains and to determine the predictors of unsafe behavior.

## Methods

### Methods

This descriptive cross-sectional study was conducted among 600 pedestrians in the city of Urmia, northwestern Iran, from May to October 2018. Cluster sampling method was applied. The health centers of each cluster were randomly selected. Then, from each center, the participants were randomly selected with respect to the inclusion and exclusion criteria.

The inclusion criteria were (a) being 18 years old or above and (b) being capable of standing and walking. After selecting the respondents, they were invited to visit the health centers to participate in the study.

Data in this study were collected by means of The Pedestrian Behavior Questionnaire (PBQ). This instrument proved to be valid and reliable(7) and consisted of 29 items measuring pedestrian behaviors

across the following five dimensions, using a five-point scale ranging from 1 to 5: (1) adherence to traffic rules (7 items) (e.g., I cross the street after the vehicles are fully stopped); (2) traffic violations (10 items, reverse scored) (e.g., I don't use the pedestrian bridge because most people don't); (3) positive behaviors (2 items) (e.g., I let the vehicle pass even if I have the priority right); (4) traffic distraction (4 items, reverse scored) (e.g., I use my mobile phone while crossing the street); and (5) aggressive behaviors (2 items, reverse scored) (e.g., If I get angry at the behavior of a driver, I would kick or punch the car). Total PTB score is calculated as the sum of scores received in each of the five domains. The higher the score, the safer the behavior. Cronbach's alpha, of PTB was 0.83. The number of items in each domain and possible ranges and mean score of items in each domain are shown in Table 2. Socio-demographic characteristics including age, gender, marital status, education degree, walking minutes/day and transportation mode transportation.

### **Analytical Strategy**

The analyses were carried out using SPSS (version 23). The univariate regression was applied to assess the relationship of the total PTB score with the demographic variables. Multivariate regressions were performed to examine demographic variables as independent variables to determine a set of best predictors for the five domains as the dependent variable.

## **Results**

As shown in Table 1, participant characteristics and the five different domains of PTB. Univariate regression analyses revealed that traffic behaviors were better among the elderly compared to the other age groups, among females compared to males, and among the married compared to others. As the level of education increased, the traffic behaviors became safer. The behaviors of bicyclists and motorcyclists were less safe than those using other transportation modes. The people with longer daily walking rate showcased safer behaviors.

Table 1: Traffic behaviors and their domains in pedestrians based on demographic variables

	N	Adhering to traffic rules Mean ± SD	Traffic violation <sup>a</sup> Mean ± SD	Positive behavior Mean ± SD	Traffic distraction <sup>a</sup> Mean ± SD	Aggressive behavior <sup>a</sup> Mean ± SD	Total score Mean ± SD
<b>Age</b>							
<30	218	23.74±4.92	37.78±4.16	21.18±4.24	15.60±3.21	8.34±2.02	106.67±14.33
30-45	292	24.48±5.21	40.48±6.55	22.22±4.61	16.46±3.13	8.89±1.77	112.54±14.53
46-60	76	25.38±5.05	38.78±6.78	20.82±4.20	16.39±2.89	8.48±2.06	109.88±15.10
>60	14	24.85±4.75	42±4.16	22±3.35	17.78±2.19	9.14±1.29	115.78±8.98
<b>Gender</b>							
Male	239	23.96±4.80	38.41±6.90	21.39±4.76	15.94±3.11	8.45±1.89	108.17±14.58
Female	361	24.58±5.27	39.92±6.73	21.84±4.19	16.32±3.15	8.77±1.91	111.45±14.59
<b>Marriage status</b>							
Single	155	24.02±4.99	38±7.30	21.33±4.41	15.38±3.44	8.29±2.11	107.03±15.17
Married	423	24.49±5.17	40±6.54	21.84±4.49	16.57±2.91	8.84±1.79	111.76±14.20
Others	22	23.50±4.14	35.63±6.62	20.54±2.85	14.04±3.34	7.36±1.83	101.09±13.61
<b>Educational level</b>							
Illiteracy	11	22.72±5.21	37.81±8.48	20.63±6.53	15.45±2.76	8.45±1.96	105.09±18.64
Elementary	91	23.45±5.23	37.81±7.15	21.31±4.55	15.93±2.90	8.05±2.07	106.57±14.12
Secondary	214	23.87±4.95	39.34±6.45	21.62±4.55	16.25±3.05	8.71±1.89	109.81±14.53
Associate degree <sup>b</sup>	66	24.71±4.46	39.39±6.12	21.07±4.00	16.07±3.28	8.53±1.93	109.78±13.72
Bachelor degree	150	25.10±5.12	40.08±7.08	22.14±4.17	16.24±3.22	8.78±1.80	112.35±14.46
Master degree	49	24.59±5.59	39.24±7.01	21.22±4.53	16.08±3.42	9.02±1.90	110.16±16.01
Doctorate degree	19	26.73±5.36	41.21±7.93	23.78±3.61	16.89±3.78	9.26±1.48	117.89±13.77
<b>Walking minutes/day</b>							
Less than 30	263	23.98±5.27	39.82±6.59	21.68±4.62	16.33±3.08	8.75±1.87	110.58±14.65
31-60	199	24.55±5.12	39.74±7.13	21.62±4.39	16.29±3.19	8.69±1.86	110.91±14.78
61-120	92	24.28±5.03	37.50±6.69	21.44±4.41	15.41±3.22	8.34± 2.07	106.98±15.37
121 or more	46	25.56±3.78	38.28±6.65	22.19±3.49	16.23±2.99	8.43±1.92	110.71±12.27
<b>Transportation Status</b>							
Personal	392	24.52±5.20	40.12±6.54	22.08±4.30	16.58±3.08	8.78±1.89	112.09±14.23
Taxi	84	23.72±4.46	37.39±6.54	20.63±4.74	15.14±3.16	8.47±1.90	105.36±14.68
Public	51	24.13±5.62	39.15±6.33	21.23±4.61	15.64±3.07	8.35±2.04	108.52±15.89
Bicycle or motorcycle	12	23.83±5.06	36.25±6.59	18.25±4.88	15.0±3.78	8.25±1.48	101.58±10.83
Walking	61	24.26±4.24	37.60±8.52	21.45±4.09	15.62±2.99	8.36±1.91	107.31±14.68

Note

<sup>a</sup>Items are reverse scored, so that the total score could be calculated. Higher scores indicate more safe pedestrian behaviors.

<sup>b</sup>Associate degree is obtained after two years university

Table 2. Descriptive characteristics of the study variables

	Number of items	Range	Cronbach's alpha	Total score Mean (SD)	Poor range scores	Moderate range scores	Good range scores	Poor N(%)	Moderate N(%)	Good N(%)	Standardized Mean (SD)
Adherence to traffic rules	7	7-35	0.60	24.33 (5.09)	≥18	19-28	≤29	105 (17.5)	397 (66.2)	98 (16.3)	3.47 (0.72)
Traffic violation <sup>a</sup>	10	10-50	0.79	39.32 (6.83)	≥32	32-45	≤46	122 (20.3)	356 (59.4)	122 (20.3)	3.93 (0.68)
Positive behavior	6	6-30	0.68	21.66 (4.43)	≥17	18-24	≤25	104 (17.3)	385 (64.2)	11 (18.5)	3.61 (0.73)
Traffic distraction <sup>a</sup>	4	4-20	0.65	16.17 (3.14)	≥13	14-18	≤19	112 (18.7)	406 (67.7)	82 (13.7)	4.04 (0.78)
Aggressive behavior <sup>a</sup>	2	2-10	0.72	8.64 (3.14)	≥6	7-9	≤9	137 (22.8)	143 (23.8)	320 (53.3)	4.32 (0.95)
Total pedestrian behavior	29	29-145	0.12	11.15 (14.67)	≥95	96-124	≤125	138 (23)	359 (59.8)	103 (17.2)	3.79 (0.50)

Note

<sup>a</sup>Items are reverse scored, so that the total score could be calculated. Higher scores indicate more safe pedestrian behaviors.

As shown in the table, traffic behaviors were good among only 17% pedestrians. Over 85% pedestrians experienced traffic distraction and over 80% of them did not adhere to traffic laws. Most of them showcased traffic violations and demonstrated no positive traffic behaviors, and half of participants even demonstrated aggressive behavior. In the present study, the score in the "aggressive behavior" domain of the studied pedestrians was better than that in the other domains, while the score in the "adherence to traffic rules" domain was lower than that in the other domains.

Results of a series of univariate regression analyses demonstrated that all the study variables were significantly associated to PTB. Among those aged below 30 years, the traffic behaviors were better than that for those aged more than 30 years. More particularly, in the age group of the elderly, PTB was 10.7 points higher than that for the youth group. Total score of men was 3.83 points lower than that of women and those who were single had more unsafe behaviors than the others and their score was 8.57 points lower than the rest. Married people displayed safer behaviors compared to those who were single and others. The higher the level of education, the more significantly improved were the traffic behaviors.

Multivariate regression results showed that, in the different domains of behaviors, several variables were significantly associated with PTB. The total explained variance for PTB was 12%, and R square was 0.06 for compliance with laws, 0.08 for traffic violation, 0.05 for positive behavior, 0.09 for traffic distraction, and 0.07 for aggressive behavior. Gender had a significant impact on the range of violent and aggressive behaviors. Adherence to traffic rules was significantly lower among men than among women, and traffic violation and demonstrating aggressive behaviors were significantly higher among men than among

women. Education had a significant impact on the domains of aggressive behavior and traffic violation. The transportation mode had a positive impact on the domains of traffic distraction and traffic violation. We further found that age had a significant impact on traffic violation, traffic distraction, and aggressive behaviors.

Table 3. Predictors of traffic behaviors and their domains in pedestrians (n=600)

	N(%)	Adherence to traffic rules		Traffic violation		Positive behavior		Traffic distraction		Aggressive behavior		Total Pedestrian Behavior	
		B	p-value	B	p-value	B	p-value	B	p-value	B	p-value	B	p-value
<b>Age (ref = &lt;30)</b>													
60<	14	1.59	.26	4.63	.01	1.08	.38	2.37	.006	1.00	.05	10.7	0.007
46-60	76	1.82	.01	.71	.45	-.45	.47	.42	.33	.10	.69	2.61	0.19
45-30	292	.555	.28	2.06	.002	.84	.06	.47	.13	.39	.04	4.33	0.003
<b>Gender (ref = female)</b>													
Male	239 (39.8)	-1.04	0.01	-1.45	0.01	-0.55	0.14	-0.44	0.09	-0.32	0.04	-3.83	0.02
<b>Marriage status (ref = others)</b>													
Single	155 (25.8)	-1.19	.33	-3.53	.030	-.85	.429	-1.81	.01	-1.17	.01	-8.57	0.002
Married	423 (70.5)	.242	.66	.85	.23	.09	.844	.78	.01	.41	.04	2.39	0.11
<b>Educational level</b>													
Illiteracy	11 (1.8)	-4.13	.036	2.58	.22	-2.58	.13	-1.38	.24	-.81	.26	-12.03	0.02
Elementary	91(15.2)	-3.94	.003	1.71	.01	-2.40	.03	-1.41	.07	-1.47	.002	-13.29	<0.001
Secondary	214 (35.7)	-3.48	.005	1.60	.07	-2.31	.030	-1.21	.10	-.83	.06	-10.73	0.02
Associate degree	66 (11)	-2.53	.057	1.74	.07	-2.91	.01	-1.42	.07	-1.05	.03	-10.99	0.03
BSc	150 (25)	-2.22	.076	1.64	.08	-2.15	.04	-1.41	.06	-.88	.05	-9.51	0.06
MSc	49 (8.2)	-2.86	.041	1.83	.04	-3.06	.01	-1.64	.05	-.64	.21	-11.99	0.02
Doctorate degree	19 (3.2)	1		1		1		1		1		1	
<b>Walking (min/day)</b>													
30 ≥	263(43.8)	-2.32	.008	-.45	.68	-1.48	.050	-.72	.16	-.13	.68	-5.12	0.03
31-60	199 (33.2)	-1.56	.071	.07	.94	-1.28	.087	-.50	.33	-.08	.79	-3.36	0.16
61-120	92 (15.3)	-1.37	.14	-1.76	.15	-1.40	.09	-1.16	.04	-.24	.48	-5.94	0.02
≥121	46(7.7)	1		1		1		1		1		1	
<b>Transportation mode</b>													
Personal car	392 (65.3)	.42	.56	2.31	.01	.87	.17	1.08	.01	.31	.25	5.01	0.01
taxi	84(14)	-.20	.81	.17	.87	-.47	.52	-.15	.76	.23	.45	-0.42	0.19
Public transport ation	51(8.5)	-.10	.91	1.87	.14	-.10	.90	.35	.54	.05	.87	2.08	0.44
Bicycle or motorcycle	12 (2)	.80	.62	.95	.65	-2.64	.17	.39	.69	.54	.37	0.45	0.99
Walking	61 (10.2)	1		1		1		1		1		1	

## Discussion

In this study, less than 20% of the pedestrians demonstrated safe traffic behaviors. Over 85% of the pedestrians were distracted and over 80% of them did not adhere to traffic rules. The majority demonstrated traffic violations and no positive traffic behaviors and half of them were aggressive. This implies dangerous and high-risk behavior among pedestrians in Urmia. Contrary to the present study, other studies have shown that the majority of the pedestrians had positive behaviors and were less aggressive (1, 8). Although the majority of the participants in the present study were distracted and the frequency of aggressive behaviors was lower than other domains, almost half of the participants had aggressive behaviors, which is higher than other studies. In a study conducted in the U.S., 12% of the participants said they were aggressive and 15% expressed they were slowly crossing the street to annoy drivers (1). In the present study, the traffic behaviors were inappropriate in all domains. Therefore, it is important to provide the necessary training to pedestrians in all domains of behavior in order to change the overall traffic behavior (4, 5). One study showed that a distracted pedestrian can cause aggression among others, such that a pedestrian who is both aggressive and distracted suffers more in accidents (9). Therefore, due to the inappropriate behavior in different domains as well as the unsafe traffic behavior of most of the studied pedestrians, it is necessary to intervene in all domains of traffic behaviors to reduce pedestrian accidents.

To reduce intervention costs, it is essential to perform various training interventions, make changes in the physical environment, and increase policies to promote positive pedestrian behaviors. One way to do this is by conducting training workshops in the selected neighborhoods on pedestrian and cyclist's safety (9), designing new pavements with different performance for pedestrian safety (10), providing reflective products and training brochures (11), increasing compliance with priority rights of pedestrians by drivers and stopping to let them pass (12), and increasing positive behaviors and mutual respect alongside the improvement in Iranian infrastructure and culture.

According to the findings of this study, all the demographic variables were significantly associated with traffic behaviors. Age was one of the most important predictors of PTB, so that with aging, people demonstrated higher levels of safe behaviors. This finding is similar to the result of other studies (1, 8). In the present study, the PTB score of the elderly was 10.7 points higher compared to that of those aged under 30 years. In examining behavioral dimensions, it was also observed that age had a significant impact on traffic violation, traffic distraction, and aggressive behavior.

This was similar to another study (13) wherein age was found to be significantly negatively associated with aggression and violation. It could be said that the higher experience of the elderly could lead them to have safer behaviors. Moreover, it could be argued that adolescents are more likely to use mobile phones and other distractive devices that could increase their distraction. A study showed that almost 100% of the Americans aged 18–29 years had mobile phones and about 92% had smartphones (14). Mobile use is one of the important distractors and environmental and training intervention programs are required in this regard.

This study showed that gender was a predictor of pedestrian behaviors and women showcased safer behaviors than men. According to the World Health Organization (1), the traffic accident death rate in Iran was 15932 in 2016, of which 78% included to men (1). A research carried out in the United States showed that 70% of the pedestrian deaths was related to men. In Mexico, the pedestrian mortality rate among men was higher than that among women (15, 16). In the present study, the men and those who were single were less adhering to traffic rules, and they demonstrated higher violation and higher aggression. A greater emphasis on men is required in the interventions for safe traffic behaviors.

Results of the present study showed, with an increase in education level, the traffic behaviors of the pedestrians significantly improved, which was similar to the findings of other studies (17, 18). Higher education had a significant impact, especially on the dimensions of adherence to traffic rules and aggressive behaviors. Studies have shown that increased level of education also affects the acquisition of other healthy behaviors, such as physical activity (19, 20). It can be argued that, with increased education level, the perception of various issues is increased, so people can better understand safe behaviors.

This study showed that, in individuals with more walking rate, adherence to traffic rules was significantly better. Also, higher experience of walking and observing behaviors of others in the environment makes people practically understand the laws. Studies have also shown that seeing the behavior of others in the environment leads to the same behaviors among the individuals in Iran, the rate of death and injury from traffic accidents is high. Therefore, it is essential to examine the behavior of users and determine the predictors for implementing interventional programs with the aim of reducing the burden of traffic accidents.

## Conclusion

The present study found that the behaviors of the Iranian pedestrians were rather unsafe. The youth, those who were single, those with lower education, those with less walking rate, as well as bicyclists and motorcyclists demonstrated more unsafe behaviors. It is essential to have interventional training programs to improve all domains of traffic behaviors with respect to age and other predictors.

## Limitations

The present study didn't examine traffic accident history of the participants or their family and friends, language, and ethnicity were not assessed, which could affect the traffic behavior. Another limitation is the use of self-reports which may have resulted in biased answers.

## Abbreviations

PTB: Pedestrian Traffic Behaviors

PBQ: Pedestrian Behaviors Questionnaire

# Declarations

## Availability of data and materials

All relevant data are available within the manuscript. In case of need, the data that support the findings of this study are available from the corresponding author on reasonable request.

**Credit authorship contribution statement:** Conceptualization, Data curation:, Fatemeh Bakhtari Aghdam & Homayoun Sadeghi- Bazargani ; Formal analysis: Parvin Sarbakhsh; Investigation; Methodology: Maryam Nicknejad; Roles/Writing - original draft: Fatemeh Bakhtari Aghdam & Homayoun Sadeghi- Bazargani; Writing - review & editing: Tahere Pashaie & Koen Ponent; Project administration: Fatemeh Bakhtari Aghdam.

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## Ethics approval and consent to participate

Ethical approval was provided by the ethical committee of Tabriz University of Medical Sciences vide reference number IR.TBZMED.REC.1397.969. All participants completed the informed consent form.

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## Author statement

All authors contributed to the design of the project and manuscript preparation and reviewing

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

# References

1. Deb S, Strawderman L, DuBien J, Smith B, Carruth DW, Garrison TM. Evaluating pedestrian behavior at crosswalks: Validation of a pedestrian behavior questionnaire for the US population. *Accident Analysis & Prevention*. 2017;106:191-201.
2. Organization WH. *Pedestrian safety: a road safety manual for decision-makers and practitioners*. 2013.
3. Eid HO, Abu-Zidan FM. Pedestrian injuries-related deaths: a global evaluation. *World journal of surgery*. 2015;39(3):776-81.
4. Aghdam FB, Sadeghi-Bazargani H, Azami-Aghdash S, Esmaeili A, Panahi H, Khazae-Pool M, et al. Developing a national road traffic safety education program in Iran. *BMC public health*. 2020;20(1):1-

- 13.
5. Haghighi M, Nadrian H, Sadeghi-Bazargani H, Hdr DB, Bakhtari Aghdam F. Challenges related to pedestrian safety: a qualitative study identifying Iranian residents' perspectives. *International Journal of Injury Control and Safety Promotion*. 2020;1-9.
6. Ahadi MR, Pejmanzad P, Ardebili PB. The epidemiology of accident fatalities in Iran (8-year review). *Safety Promotion and Injury Prevention*. 2015;2(4):329-38.
7. Heydari ST, Sadeghi-Bazargani H, Haghighy M, Rezai Shah Kalaei F. Developing and validating a Measurement Tool to self-report Pedestrian safety-related behavior: The Pedestrian Behavior Questionnaire (PBQ). *Archives of Trauma Research*. 2020.
8. Granié M-A, Pannetier M, Gueho L. Developing a self-reporting method to measure pedestrian behaviors at all ages. *Accident Analysis & Prevention*. 2013;50:830-9.
9. Barajas JM, Beck KM, Cooper JF, Lopez A, Reynosa A. How effective are community pedestrian safety training workshops? Short-term findings from a program in California. *Journal of Transport & Health*. 2019;12:183-94.
10. Wallqvist V, Kjell G, Cupina E, Kraft L, Deck C, Willinger R. New functional pavements for pedestrians and cyclists. *Accident Analysis & Prevention*. 2017;105:52-63.
11. James S, Shepard L, Harpe S, Margalit-Faircloth D. Walk and Be Seen—A Grassroots Seniors' Project (symposia). *Journal of Transport & Health*. 2017;7:S34.
12. Nasar JL. Prompting drivers to stop for crossing pedestrians. *Transportation research part F: traffic psychology and behaviour*. 2003;6(3):175-82.
13. Torquato R, Bianchi A. Comportamento de Risco do Pedestre ao Atravessar a Rua: Um Estudo com Universitários. *Transporte: teoria e aplicação*. 2010;2(1):19-41.
14. Wells HL, McClure LA, Porter BE, Schwebel DC. Distracted pedestrian behavior on two urban college campuses. *Journal of community health*. 2018;43(1):96-102.
15. Clifton KJ, Livi AD. Gender differences in walking behavior, attitudes about walking, and perceptions of the environment in three Maryland communities. *Research on women's issues in transportation*. 2005;2:79-88.
16. Peden MM, Knotlenbelt JD, van der Spuy J, Oodit R, Scholtz HJ, Stokol JM. Injured pedestrians in Cape Town-the role of alcohol. *South African Medical Journal*. 1996;86(9).
17. Onelcin P, Alver Y. Why cross on red? A questionnaire survey study in Izmir, Turkey. *Transportation research procedia*. 2017;25:1964-71.
18. Wu Y, Lu J, Chen H, Wu L. Identification of contributing factors to pedestrian overpass selection. *Journal of traffic and transportation engineering (English edition)*. 2014;1(6):415-23.
19. Aghdam FB, Moghaddam MHB, Jafarabadi MA, Allahverdipour H, Nikookheslat SD, Nourizadeh R. Explaining the role of personal, social and physical environment factors on employed women's physical activity: a structural equation analysis. *Global journal of health science*. 2013;5(4):189.

20. Bakhtari F, Mohammadpoorasl A, Nadrian H, Alizadeh N, Jahangiry L, Ponnet K. Determinants of hookah smoking among men in the coffee houses: an application of socio-ecological approach. *Substance Abuse Treatment, Prevention, and Policy*. 2020;15(1):1-6.