Pedestrians in Iran: Determinants of Unsafe Traffic Behaviors of Pedestrians

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Abstract

Background: Pedestrians are among the most vulnerable groups in traffic accidents. This study investigates the determinants of traffic behaviors of pedestrians.

Methods: In this cross-sectional study, the behavior of 600 pedestrians in the city of Urmia, northwestern Iran, was evaluated from May to October 2018, using a pedestrian traffic behavior questionnaire consisting of five dimensions: traffic violations, traffic distraction, adherence to traffic rules, aggressive behavior, and positive behaviors. 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.

Conclusion: Most pedestrians demonstrate unsafe traffic behaviors. The youth, those who were single, those with lower education, and those with less walking rate showcased higher unsafe behaviors. Training and intervention programs should be implemented to improve all domains of pedestrian traffic behaviors factoring in age and other predictors.

Background

Injuries caused by traffic accidents are the eighth leading cause of death across age groups(1). Pedestrian safety is one of the most important (2) as well as neglected (3) issues in the world. At the international level, pedestrians constitute about 22% of the total road casualties and, in some countries, this ratio even reaches two-third of their total population. Millions of pedestrians are injured in traffic accidents while walking, some of whom permanently remain disabled and paralyzed (4). Pedestrian deaths, in general, are higher in low- and middle-income countries compared with high-income countries (45% road deaths in low-income countries, 29% in middle-income countries, and 18% in high-income countries) (5, 6). The Eastern Mediterranean region is an exemption where high-income countries still have high pedestrian death rates (5).

There is no global estimate of the economic impact of pedestrian accidents, but it has been estimated that between 1 and 2% of the GDP is being consumed for road accidents (1). Survivors of accidents along with their families, friends, and others often suffer from adverse social, physical, and psychological effects. Road traffic deaths in Iran are among the highest in the world and the Eastern Mediterranean region, and in line with those in African countries (1). Pedestrians are vulnerable groups and there are no effective laws to control their behaviors. Majority of the accidents occur because pedestrians do not comply with traffic laws (7). Two-third of the U.S. pedestrians enter the streets paying no attention to vehicles and 16% cross the street without paying attention to vehicles. Among those who notice vehicles approaching, 40.6% stopped, 11.4% return to let the vehicles pass by, and 31.9% rush to cross the street. Some are so overwhelmed with talking on their phone that they forget they are crossing the street (2).

Various studies have shown that by observing pedestrians who incorrectly cross the road, many people are likely to follow them carelessly (8–10). Some works have pointed out factors such as distraction (mobile phones)(11), pedestrian perception of risk and its relationship with high-risk behaviors (12, 13), personality characteristics, age, and gender (14, 15), alcohol use, and not seeing pedestrians on the roads (16, 17) as high-risk pedestrian behaviors. In Iran, over 39% of the deaths caused by traffic involve pedestrians (18), but to the best of our knowledge, there is no study that has investigated the status of pedestrian traffic behaviors (PTB) and their different domains in Iran. This study aims to investigate PTB in different domains and to determine the predictors of unsafe behavior. We add to the literature by focusing on the determinants of the five traffic behaviors: traffic violations, traffic distraction, adherence to traffic rules, aggressive behavior, and positive behaviors.

Method

Sample Design

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. Given that in Iran, family files and complete information of all households are kept in health centers, we chose to collect data in health centers. The health centers of each cluster were randomly selected. Then, from each center, depending on the population covered, the participants were randomly selected with respect to the inclusion and exclusion criteria.

The inclusion criteria were (a) being 18 years old or above, (b) willing to participate in the study, and (c) being capable of standing and walking. The exclusion criteria were having a history of severe mental illness, depression, Alzheimer's, dementia, restrictive musculoskeletal disorders, neurological deficits (stroke), Parkinson's and paralytic disease, acute heart diseases (acute myocardial infarction, uncontrolled hypertension),

or severe hearing and visual impairment. After selecting the respondents, they were invited to visit the health centers to participate in the study. All participants completed the informed consent form. Based on Jalilian et al.'s (19) work and considering mean and standard deviation of pedestrian behaviors, cluster sampling, effect size, as well as rate of loss, the sample size was estimated at 600.

Data in this study were collected by means of The Pedestrian Behavior Questionnaire (PBQ), which had been designed by the Road Traffic Injury Research Center, Tabriz University of Medical Sciences. The instrument proved to be valid and reliable(20). The instrument consisted of 29 items measuring pedestrian behaviors across the following five dimensions, using a five-point scale ranging from 1 to 5 (1=*never*, 2=*rarely*, 3=*sometimes*, 4=*often*, and 5=*always*): (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 are shown in Table 2. Raw score of each domain was calculated as sum of scores of items of that domain. Standardized score for each domain was considered as mean score of items in each domain. PTB and each domain of behavior were categorized into three groups, poor (≥ 95), moderate (96-124), and good (≤ 125), based on the mean and SD (see Table 2).

Furthermore, some socio-demographic characteristics were enquired about, including age, gender, marital status (single, married, and others), education (illiteracy, elementary, secondary, associate degree, bachelor degree, master degree, doctorate degree), walking minutes/day (less than 30, 31–60, 61–120, 121 or more), and transportation mode (personal car, taxi, public transportation, bicycle or motorcycle, and walking).

Ethical Approval

This study was conducted in accordance with the ethical standards of the 1964 Helsinki declaration. Ethical approval was provided by the ethical committee of Tabriz University of Medical Sciences vide reference number IR.TBZMED.REC.1397.969.

Analytical Strategy

The analyses were carried out using SPSS (version 23). Mean and standard deviations are provided for continuous variables and number and percentage for categorical variables. The normality of distribution for the data was checked by applying the Kolmogorov–Smirnov test. To assess the relationship of the total PTB score with the demographic variables, a univariate regression was applied. Multivariate regressions were performed to examine age, gender, education, marital status, educational level, daily walking rate, and transportation mode as independent variables to determine a set of best predictors for the five domains as the dependent variable. Hotteling's Trace method was used to calculate the p-value and evaluate the impact of the variables.

Results

As shown in Table 1, the mean age of the participants was 36.69 (SD=10.69) years. The majority of the participants were women (60.2%) and married people (70.5%). The highest level of education completed by most participants was less than a high-school degree (52%). In total, 43.8% of the participants walked less than 30 minutes per day. Over 60% of the participants used a personal car for transportation. Table 1 includes the five different domains together with the other study variables. 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 ^a Mean ± SD	Positive behavior Mean ± SD	Traffic distraction ^a Mean ± SD	Aggressive behavior ^a Mean ± SD	Total score Mean ± SD
Age							
< 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
Gender							
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
Marriage status							
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
Educational level							
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 ^b	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
Walking minutes/day							
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

	N	Adhering to traffic rules Mean ± SD	Traffic violation ^a Mean ± SD	Positive behavior Mean ± SD	Traffic distraction ^a Mean ± SD	Aggressive behavior ^a Mean ± SD	Total score Mean ± SD
Transportation Status							
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 ^a Items are reverse scored, so that the total score could be calculated. Higher scores indicate more safe pedestrian behaviors. ^b 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 ^a	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 ^a	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 ^a	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 ^a Items are reverse scored, so that the total score could be calculated. Higher scores indicate more safe pedestrian behaviors.											

Table 2 presents an overview of PTB and the different domains in terms of demographic variables. 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 (including gender, marital status, education level, daily walking rate, transportation type, and age) 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)

		Adherence to traffic rules		Traffic violation		Positive behavior		Traffic distraction		Aggressive behavior		Total Pedestrian Behavior	
	N(%)	B	p-value	B	p-value	B	p-value	B	p-value	B	p-value	B	p-value
Age (ref = < 30)													
> 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
Gender (ref = female)													
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
Marriage status (ref = others)													
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
Educational level													
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	
Walking (min/day)													
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	
Transportation mode													
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

The purpose of this study was to investigate the traffic behaviors of pedestrians in the city of Urmia and to determine their most important predictors. 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 (2, 21). 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 (2). 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 (1, 7). 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 (22). 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 (22), designing new pavements with different performance for pedestrian safety (23), providing reflective products (such as cloth strips and LED silicone band) and training brochures (24), installing pedestrian signboards in the middle of two-way lanes (YTPCD) (25), increasing compliance with priority rights of pedestrians by drivers and stopping to let them pass (26), and increasing positive behaviors and mutual respect alongside the improvement in Iranian infrastructure and culture.

Given the high distraction rate in the present study, it seems necessary to implement training programs. For instance, in several cities the physical environment has been changed by establishing alert systems, special routes for people who use mobile phones, pedestrian islands, etc. in the design of streets (Santa Monica, California, United States, 2016, Jersey City, New Jersey, United States, 2017) or designs such as Pedestrian Friendly Streets (Honolulu, United States, 2015). To increase regulation in the society, it is essential to begin traffic law training from childhood and continue it over time (1).

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 (2, 21). 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 (27) 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 (28). Mobile use is one of the important distractors and environmental and training intervention programs are required in this regard. Given that violation was high among the youth, the training programs must begin at an early age and continue thereafter.

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 (mortality rate of 2.19 per 100,000 people compared with 0.91 in women). In Mexico, the pedestrian mortality rate among men (10.6% per 100,000 people) was higher than that among women (4% per 100,000 people) (29, 30). 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 (3, 31). 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 (32, 33). 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. Thus, one of the strengths of this study could be in terms of investigating the behavior of pedestrians as vulnerable users, which was carried out in one of the large cities of northwestern Iran. Urmia is one of the cities in which different ethnic groups of Turks and Kurds with different cultures are living, and the cultural context of the region can affect the behavior of the people in that domain. Moreover, the questionnaire applied to measure the behavior was localized for Iran. The questionnaire had been developed and validated by the Traffic Research Center of Iran. However, the present study also has some limitations, including 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 in this study which may have resulted in biased answers. Therefore, it is suggested to have observational and behavioral measures to better tap the behaviors of pedestrians. Furthermore, other factors that could predict behaviors, such as history of traffic accidents, must be considered.

Conclusions

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.

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.

Declaration of Competing Interest: The authors declare that they have no competing interests.

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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.

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