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Original Article

Examining the Determinants of Seatbelt Use Among Rural Drivers: An Application of the Theory of Planned Behavior

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Abstract

Background and aims: Wearing a seat belt significantly reduces the severity and fatality of road traffic injuries. This study aimed to predict seatbelt-wearing behavior among rural drivers using the Theory of Planned Behavior (TPB) and to identify its influencing factors.

Methods: This study was conducted among 450 rural drivers in the Hashtrood district of Iran using a random sampling method in 2023. Data were collected through a structured questionnaire containing questions on demographic characteristics, general traffic-related behaviors, and seatbelt use behavior based on the TPB constructs. Regression analysis was conducted using SPSS software (version 16) to predict TPB constructs.

Results: The findings indicated that 59.1 % of drivers strictly adhered to the traffic rules. However, only 21.4% of drivers used the front, and 19% used seatbelts in the rear seat on rural roads. Based on regression analysis of TPB constructs, subjective norms, attitude, and perceived behavioral control considerably predicted behavioral intention to use a seat belt ($P<0.05$, $R^2=0.422$, adjusted $R^2=0.417$). Furthermore, the constructs of behavioral intention and perceived behavioral control were found to be significant predictors of actual seatbelt use behavior ($P<0.01$, $R^2=0.283$, adjusted $R^2=0.280$). Adherence to traffic rules, parental behavior, exposure to seatbelt use training by parents and friends, and being fined for not wearing a seat belt significantly impacted the seatbelt use behavior ($P<0.05$).

Conclusion: The results of this study demonstrated that TPB predicted seatbelt use behavior among rural drivers. Educational preventive programs grounded in TPB principles could improve seatbelt use behavior among rural societies.

Keywords: Seatbelt use, Drivers, Rural regions, Behavior prediction, Injury prevention

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Introduction

Based on a report from the Iranian Legal Medicine Organization, 20045 people died and 391069 were injured due to road traffic-related injuries (RTIs) in 2023.[1] In rural areas of Iran, 1120 people died due to RTIs in 2023, reflecting a 4.3% increase compared to 2022.[1]

Rural drivers tend to use seat belts less frequently than urban drivers and are more likely to hold unfavorable attitudes or beliefs regarding seatbelt use.[2] Beck et al demonstrated a significant reduction in seatbelt use in rural areas.[3] A review study also indicated that failure to fasten seat belts is a significant risk factor for road traffic injury-related mortality in Iran.[4] Additionally a study by Tavakoli Kashani et al identified seatbelt use on rural roads as one of the primary factors influencing the severity of injuries in traffic accidents.[5]

Demographic factors, including age, gender, and educational level, can influence seatbelt use. Baker et al reported a significant impact of age on seatbelt use behavior.[6,7] However, Şimşekoğlu and Lajunen found that neither gender nor age had a significant effect on seatbelt use behavior.[7]

Adherence to traffic rules has been found to influence seatbelt use. Rezapur-Shahkola et al reported that students who adhered to traffic rules wore seat belts more frequently than those who did not.[8] Additionally, parental behavior influenced the beliefs and behaviors of children.[9] However, there is limited research on the impact of demographic characteristics and parental traffic-related behaviors on children's traffic behaviors, especially in

rural communities.

A positive attitude toward seatbelt use enhances the probability of seatbelt use.[2,10] In rural regions, negative attitudes toward traffic-related behavior can result in dangerous behaviors such as failure to wear seat belts. The TPB serves as a suitable model for predicting traffic safety-related behaviors. The TPB consists of constructs such as behavioral intention, attitude, perceived behavioral control, subjective norms, and behavior. Behavioral intentions are considered the best predictors of behavior, determined by attitude, subjective norms, and perceived behavioral control. These behaviors are influenced by behavioral intention and perceived behavioral control.[11] TPB is a suitable framework for predicting seatbelt-wearing behavior among drivers.[12,13]

Most studies conducted in Iran on driver's seatbelt use have focused on urban populations.[14-17] However, there has been limited research among rural residents. The increase in the number of vehicles on rural roads in recent years and limited access to emergency medical services during an accident underscore the importance of seatbelt use on rural roads. The rate of seatbelt use among rural drivers on rural roads may be unfavorable. Practical factors influencing seatbelt wearing among drivers of rural societies have not been well-documented. Therefore, the current study aimed to predict seatbelt use behavior based on the TPB and determine the influence of demographic factors, parental behavior, adherence to traffic rules, and seatbelt use training on seatbelt-wearing behavior among rural drivers.

Materials and Methods

Participants

The current study was conducted in 2023 among drivers in rural areas of the Hashtrood district, Iran. The sample size was determined using the following formula:

$$n = \frac{\left(Z_{\frac{\alpha}{2}}\right)^2 P\mathrm{q}}{d^2}$$

Considering a 95% confidence level, a seatbelt use prevalence of 25% among rural residents based on a pilot study ($P = 0.25$, $\mathrm{q} = 0.75$, and a margin error (d) of 4%, the final sample was determined to be 450 drivers. Participants were randomly selected from rural residents.

The inclusion criteria were drivers who reside in rural areas of the Hashtrood district, are inclined to participate in the study and provide consent to participate. The exclusion criterion was the incomplete completion of the questionnaires.

Data Collection Instrument

The researcher-made questionnaire, designed in our previous study, was used to collect data.[8,16] The content validity index (CVI) and content validity ratio (CVR) for all dimensions of the questionnaire were higher than 0.9 and 0.8, respectively. Cronbach's alpha coefficients for all sections were equal to or higher than 0.7. This questionnaire contains three sections. The first section includes questions about drivers' demographic characteristics, including their educational levels, age, and gender. The second section contains traffic-related behaviors such as seatbelt use by parents, previous fines for seat violations, adherence to traffic rules, opinions on mandatory seatbelt use, seating position in the car (front or rear seat), and any seatbelt training received. The third section examines seat-belt use behavior according to TPB. The TPB constructs were attitude, perceived behavioral control, subjective norms, behavioral intention, and behavior related to seatbelt wearing. The attitude dimension contained 7 questions on behavioral beliefs (e.g., "Seatbelt use prevents injury during a traffic-related accident") and 7 questions on assessments of behavioral consequences (e.g., "I need to avoid injury during a traffic-related accident"). The subjective norms dimension included 8 questions on normative beliefs (e.g., "My friend insists that I should wear a seat belt whenever I sit in the car") and 8 questions on motivation to comply (e.g., "My friend insists that seatbelt use is vital to me"). The perceived behavior control involved 9 questions on control beliefs (e.g., "Using seat belt makes me feel chocked") and 9 questions on perceived power (e.g., "Feeling chocked prevents me from using a seat belt"). Behavioral intentions consisted of 6 questions (e.g., "I intend to wear a seat belt in the front seat when driving on rural roads"), and the actual behaviors included 6 questions (e.g., "I wear my seat belt in the front seat of a car when driving on rural roads"). A 5-point Likert scale was used for scoring, with participants' responses ranging from "most of the time" (5) to "never" (1). A higher mean score for each construct indicated a better status. Assistance was obtained from the rural health center to access participants in rural areas. Those referring to the health center to receive health services were asked to participate in the study and complete the questionnaire. A self-report method was used to collect data. The scoring range for dimensions of attitude, subjective norms, behavioral intention, perceived behavioral control, and behavior were 7-175, 8-200, 6-30, 9-225, and 6-30, respectively. Illiterate people and people unfamiliar with completing questionnaires were helped to fill out the questionnaire.

Statistical Analysis

Data were analyzed using SPSS software (version 16). A linear regression test was used to predict the relationship between the constructs of TPB and practical factors influencing seatbelt use behavior. *A P value* less than 0.05 was considered statistically significant.

Results

Table 1 illustrates that most participants were male (83.4%). Regarding the educational level, most drivers (66.1 %) had a diploma or less, 59.1 % of drivers strictly adhered to traffic rules, 45.8% of drivers were trained on seatbelt use via radio and television, and 63.5% believed

Table 1. Participant Demographic and Traffic-Related Variables (n = 450)

Variable	Variable	Percent
Sex	Male	83.4
	Female	16.6
Educational level	Illiterate	2.6
	Diploma and below	67.1
	Academic	30.3
Adherence to traffic rules	Strictly adhere	59.1
	Somewhat adhere	38.4
	Do not adhere	2.5
Training on seat belt use	Not trained	15.9
	Radio and television	45.8
	Virtual spaces	15.6
	Friends and parents	22.2
	Others	0.5
Agreement with mandatory seatbelt use	Front seat inside the city	87.2
	Front seat outside the city	95.4
	Rear seat inside the city	57.3
	Rear seat inside the city	83.9
	Front seat on rural roads	76.5
	Rear seat on rural roads	63.5
Preferred seating position	Front	71.5
	Rear	6.3
	Not important	22.2
Received fine for not wearing a seat belt	Yes	51.4
	No	48.6

seatbelt wearing is mandatory in the rear seat on rural roads. Furthermore, nearly half (51.4%) of drivers had previously been fined due to not using a seat belt. Only 24.1 % and 19% of drivers reported wearing seat belts in the front and rear seats on rural roads, respectively.

As seen in Table 2, the mean scores for the TPB constructs among rural drivers were as follows: intention (23.62), attitude (138.34), subjective norms (135.02), perceived behavioral control (134.96), and behavior (20.21). Higher scores indicate a more favorable status.

The attitude construct significantly predicted the intention to wear a seat belt ($\beta = 0.271$, $P < 0.001$). Similarly, the subjective norms construct significantly predicted this intention ($\beta = 0.393$, $P < 0.001$). The perceived behavioral control construct also exhibited a significant and positive relationship with seatbelt-wearing intention ($\beta = 0.107$, $P = 0.029$), as illustrated in Table 3. Additionally, results showed that behavioral intention considerably predicted seatbelt-wearing behavior ($\beta = 0.452$, $P < 0.001$), and perceived behavioral control forecasted seatbelt-wearing behavior as well ($\beta = 0.156$, $P = 0.001$), as depicted in Table 3.

Results demonstrated that adherence to traffic rules significantly affected seatbelt use behavior ($P = 0.006$). The mean (standard deviation) of seatbelt use behavior scores for participants who adhered to traffic role "strictly", "to some extent", or "not at all" (never) were 21.90 (5.75), 17.46 (5.04), and 17.75 (8.29), respectively. Furthermore, training on seatbelt use, especially from parents and friends, significantly increased the seatbelt use behavior ($P < 0.001$). Parent seatbelt use behavior also significantly increases seatbelt use in children ($P < 001$). Moreover, being fined for not fastening a seat belt significantly affected the seatbelt use behavior ($P = 0.017$). The mean (SD) attitude scores for participants who were fined versus those who were not fined for not wearing seat belts were 19.81 (5.58) and 20.66 (6.45), respectively (Table 4).

Table 2. Mean Scores of TPB Constructs Among Rural Drivers

Construct	Mean	Standard Deviation	Range
Intention	23.62	4.69	6-30
Attitude	138.34	32.39	7-175
Subjective norms	135.02	43.40	8-200
Behavior	20.21	5.96	6-30
Perceived behavioral control	134.96	50.08	9-225

Note. TPB: Theory of planned behavior.

Discussion

The findings of this study indicated that seatbelt-wearing usage among rural drivers was low. The rate of always wearing a seat belt was the lowest for those sitting in the rear seat of a vehicle on rural roads. This low rate of seatbelt use among drivers on rural roads can significantly contribute to traffic-related deaths in rural regions. Similar to the results of the current study, Beck et al reported that seatbelt use among front-seat passengers (86.1%) was more than in those in rear-seat passengers (61.6%) in the United States.[10] Similarly, Strine et al found that the mean number of people wearing seat belts on rural roads was lower than that on urban roads, consistent with the current study's results.[18] The lack of strict monitoring of compliance with traffic rules on rural roads concerning wearing seat belts could be one of the potential reasons for the low rate of fastening seat belts on rural roads.

Based on the regression analysis of TPB in the current study, the constructs of perceived behavioral control, attitude, and subjective norms significantly predicted the behavioral intention of seatbelt use. Intention also significantly predicted mean seatbelt use behavior. Watson and Austin reported that drivers with less desirable opinions were less likely to use their seat belts.[2] Beck et al found that a positive attitude toward seatbelt use could increase the rate of wearing seat belts.[10] In line with the results of the present study, previous studies have reported that driver attitudes, subjective norms, and perceived behavioral control significantly affected traffic violations such as not fastening seat belts, speeding, dangerous driving, and distracted driving.[19] Another study indicated that intention, subjective norm, and perceived behavioral control significantly predicted seatbelt use behavior.[12] Jiang et al highlighted that TPB could significantly predict seatbelt use behavior among university student

Table 3. Prediction of Behavioral Intention and Seatbelt-Wearing Behavior Based on TPB Constructs

Response	Variable	B	SE	Std. B	*P* Value
Behavioral intention	Intercept	11.297	0.883	-	<0.001
	Attitude	0.039	0.008	0.271	<0.001
	Subjective norms	0.044	0.006	0.393	<0.001
	Perceived behavioral control	0.009	0.004	0.107	0.029
R^2=0.422, Adjusted R^2=0.417					
Behavior	Intercept	4.549	1.300	-	0.001
	Behavioral intention	0.572	0.059	0.452	<0.001
	Perceived behavioral control	0.016	0.005	0.156	0.001
R^2=0.283, Adjusted R^2=0.280					

Note. TPB: Theory of planned behavior; SE: Standard error; R^2: Coefficient of determination.

Table 4. The Relationship Between Demographic Variables and Traffic-Related Variables and Seatbelt Use Behavior

Variable	B	SE	Std. B	*P* Value
Constant	40.730	3.337	-	<0.001
Sex	0.032	0.525	0.004	0.952
Age	0.067	0.039	0.127	0.089
Parent behavior	-13.181	1.405	-0.627	<0.001
Agreed with mandatory seatbelt use	-3.081	1.629	-0.130	0.062
Education level	-	-	-	0.507
Illiterate	Reference	-	-	-
<Diploma	0.303	0.874	0.027	0.730
Academic	0.985	0.894	0.088	0.273
Being fine for not using seat belt	1.646	0.681	0.151	0.017
Training	-	-	-	<0.001
Not trained	Reference	-	-	-
Virtual	-2.007	1.350	-0.126	0.140
Family and friends	-3.729	1.125	-0.283	0.003
Radio and television	-1.484	1.214	-0.137	0.224
Adherence to traffic rules	-	-	-	0.006
Always	Reference	-	-	-
Newer	-5.788	2.935	-0.142	0.051
To some extent	-2.379	0.776	-0.216	0.003
Seating position	-	-	-	0.782
Indifferent	Reference	-	-	-
Front	-0.197	0.758	-0.018	0.803
Rear	0.770	1.348	0.037	0.569

R^2=0.702, Adjusted. R^2=0.660.
Note. SE: Standard error; R^2: Coefficient of determination.

passengers.[20]

Nearly half of rural drivers were fined for not using a seat belt. Previous studies in Iran demonstrated that 27% of drivers were fined for not using a seat belt. In comparison, seatbelt use on urban and rural roads was reported at 50% and 75%, respectively, which is notably lower than in developed countries.[21]

Among the drivers surveyed, 63.5% and 76.5% believed that seatbelt use in the rear and front seats, respectively, is legally mandatory on rural roads. Furthermore, most rural drivers (95.4%) perceived wearing a seat belt in the front seat on roads outside urban areas as compulsory. It is worth noting that drivers experience lower traffic densities on rural roads, which may make these roads appear less threatening than more crowded urban roadways. The seating position had no considerable influence on seatbelt-wearing behavior. Contrary to the results of the current study, other research has suggested that the seating position of passengers within the vehicle is contributing to seatbelt use.[10,15, 17, 22,23]

Age has a significant impact on attitudes toward seatbelt use. Şimşekoğlu and Lajunen found that age did not significantly affect seatbelt use behavior.[7] Another study reported that seatbelt use increased with increasing age,

particularly among front-seat passengers.[10]

Adherence to traffic regulations had a considerable influence on seatbelt use behavior. Similar to the current study, Rezapur-Shahkolai et al showed that seatbelt use among students who adhered to traffic rules was higher than among those who did not.[8]

The experience of receiving training on seatbelt use, particularly from parents and friends, significantly affected seatbelt use behavior. Additionally, the current study's results indicated that parents' seatbelt use behavior significantly improved children's seatbelt wearing. Parents shape children's health beliefs and behaviors.[24] In line with the findings of this study, previous research has reported that parental social support and driving behavior influence children's driving behaviors.[25-27]

The limitations of this study include the use of a self-reported data collection method, the inability of drivers to fill out questionnaires independently, and the use of oral responses from drivers for certain items. Another limitation was the lower frequency of females compared to males, which may affect the generalizability of the findings regarding sex differences.

Conclusion

The results showed that the rate of seatbelt use among rural drivers was low. Based on the TPB, the constructs of perceived behavioral control, attitude, and subjective norms significantly predicted the behavioral intention to wear a seat belt, and behavioral intention, in turn, significantly predicted seatbelt-wearing behavior. Adherence to traffic rules, parental behavior, receiving training on seatbelt use by parents and friends, and being fined for not using a seat belt significantly impacted seatbelt-wearing behavior. Preventive measures such as educational intervention programs highlighting the benefits of seatbelt use for rural drivers and stricter monitoring of traffic regulations on rural roads could decrease the severity of RTIs and fatalities in rural societies.

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Competing Interests

The authors declare no conflict of interests.

Ethical Approval

The study was approved by the Ethics Committee of Tabriz University of Medical Sciences (IR.TBZMED.REC.1401.940) and conducted according to the ethical norms and guidelines. All participants provided written informed consent before participating in the study.

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