Behavior and non-behavior Predictors of seat belt use amongst Iranian Bus Passengers

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Abstract

Background: No behavior as much as the use of a seatbelt affects the reduction of the severity of injuries caused by driving accidents. So far, there has not been sufficient evidence of predictive factors regarding the use of seatbelts in bus passengers. The purpose of this study was to determine the predictors of seatbelt use in passengers of intercity buses.

Methods: In this cross-sectional study, 458 passengers of intercity bus terminals participated. The sampling method was multistage in this study. To collect data, a researcher-made questionnaire whose validity and reliability were confirmed was used. The collected data were analyzed using SPSS software version 22 and logistic regression test.

Results: The study population included 47% of men and 53% of women with an average age of 28.35 ± 6.1. Police stations, high bus speeds, night, and inappropriate weather conditions were among the situations in which the use of a seatbelts was more on the bus. The results of the logistic regression test in the third model showed that perceived barriers, law and supervision, subjective norms, environment, and bus type predict the use of seat belts significantly (P <0.000).

Conclusions: It seems that in addition to interventions designed to increase the knowledge and attitude of passengers and enhance the use of seatbelts on the bus, a special look is also needed at important people who influence the behavior of the people (subjective norms).

Background

The seatbelt is a safety device for secondary prevention and cannot prevent accidents, but it is the most effective means to reduce the mortality of occupants of the vehicles and plays a very important role in reducing injuries caused by traffic accidents [1, 2].

The most common form of seatbelt is its three-point type, which is used in private cars, trucks, and seats for bus and minibus drivers. A two-point seatbelt is used in bus passengers' seats [3, 4].

In traffic accidents, the likelihood of experiencing injuries by people using seatbelts is much lower than those who do not use it. Research has shown that the use of front seatbelts can reduce death by 60% [5].

In the United States and some European countries, bus accidents are considered as important incidents. In developing countries such as Nepal, Tanzania, Zimbabwe [6], Pakistan [7], Chile [8], Sri Lanka [9], and Bangladesh [10], the rate of bus accidents and incidents is high.

In Iran, bus accidents are also considered as important events. Evidence suggests that a large number of people are killed or injured in bus accidents annually [11]. According to the World Health Organization, more than 2% of deaths from traffic accidents and incidents in Iran have been caused by bus crashes [12].

In spite of relatively high safety and low mortality of bus users, it should be noted that every bus accident equals several incidents regarding the frequency and severity of its consequences, with significant socio-economic outcomes.

Chang et al. reported in their study that the use of a seatbelt can prevent or reduce injuries caused by bus crashes [13]. The role and effect of seatbelt use in reducing injuries caused by traffic accidents and incidents has been confirmed [1, 14]. However, it should be noted that the use of seatbelts in bus passengers has been always neglected and there is not enough evidence on the predictors of bus passengers' behaviors regarding their use.

Many interventions have been designed and implemented to increase the use of seatbelts in other vehicles indicating that training programs can be effective [15-17]. Undoubtedly, the promotion of using seatbelts in intercity bus passengers also requires health education as well as health promotion interventions, while it is also necessary to identify the predictive factors in order to design and implement an effective intervention in this field. Therefore, the present study was carried out with the aim of determining the non-behavior predictors of seatbelt use in intercity bus passengers.

Methods

The present study was a descriptive-analytic (cross sectional) research in which 458 passengers of intercity bus terminals participated. Of these, 10 individuals were excluded from the study because they had not thoroughly completed the questionnaire.

The sampling method was multistage in this study. Thus, each of the terminals in Tehran (west, south, north, east) was considered as a class and the passenger cooperatives of each terminal were selected as clusters. In the following stage, one cooperative was randomly selected from the list of cooperatives of each terminal and passengers were selected as the sample of the study. Having the age of 14 years and older, having no restrictions on fastening seatbelt, reading and writing literacy and willingness to participate in the study were considered as inclusion criteria.

To collect data, a researcher-made questionnaire whose validity had been confirmed using the CVI and CVR indices by experts panel and whose reliability was confirmed through post-test method was applied. Mean validity index of the questionnaire for the study of factors affecting the use of seatbelts in bus passengers was 0.95. Cronbach's alpha coefficient and correlation coefficient for this tool were 0.80 and 0.78 respectively.

The questionnaire consisted of two parts including demographic information (age, sex, and marital status, type of bus, distance, adherence to law, and education level) and 57 questions for identifying the determinants of the seatbelt use behavior on the bus. Questions related to determinants of seatbelt use included: knowledge (6 questions), perceived susceptibility (3 questions), perceived severity (5 questions), perceived barriers (9 questions), behavioral beliefs (6 questions), Evaluation of Behavioral Outcome (6 questions), law and supervision (3 questions), observational learning (5 questions), peripheral trust (2 questions), subjective norms (4 questions), self-efficacy (4 questions), health Locus of control (2 questions), and environment (2 questions). These questions (except those related to knowledge) were scored 0-2 based on the Likert three-option scale including “disagree”, “uncertain’ and “agree”. For “knowledge” variable, two points were considered for the correct item, zero was given to the wrong item, and one point was assigned to “I do not know”. All analyses of this study were performed using SPSS software version 22. In order to determine behavioral and non-behavioral predictors of seatbelt use, logistic regression was used. The outcome variable in this study was defined as two-fold (zero code = seatbelt use and code-1 = no use of seatbelt) and three statistical models were implemented for statistical modeling as follows. The first model included behavioral predictors; the second model included the variables of the first model, age, and sex; and the third model, included the variables of the second model as well as other background variables which had a significance value of less than 0.2 in the single-variable analysis (such as marital, bus type, distance, adherence to law, and education level). The Hosmer – Lemeshow test and Area under the Curve (AUC) were applied for each model in order to verify the model’s goodness of fit.

Results

The mean age of participants in this study was 28.35 ± 6.1 and the study population consisted of 47% males and 53% females. Majority of participants were single (62%), urban residents (89.1%) with associate or bachelor degree (46.2%).The frequency of using the seatbelt with 95% confidence intervals was relatively higher in personal vehicles (61%) compared with the bus (24%). Most passengers preferred to buy front seats (38.6%) and travel by VIP buses (63.8%). In response to the question of when the seatbelt was used on the bus, participants chose the options of police station, high bus speeds, night, and inappropriate weather conditions. Also, most people (60.2%) had not received any training on seatbelt use.

Among the non-behavioral predictors of seatbelt use, Evaluation of Behavioral Outcome (89.77 ± 17.01) had the highest score and peripheral trust (27.55 ± 16.19) obtained the lowest score (Table 1).

Table 2 illustrates the role of some behavioral predictors of seatbelt non-use by logistic regression modeling.

According to the results of modeling, perceived barriers could predict seatbelt non-use on the buses, so that one unit increase in the score of perceived barriers results in 9% increase in likelihood of seatbelt non-use. Significance value did not change after several modifications in the second and third models.

The variable of law and supervision has an inverse and significant impact on the seatbelt use behavior in all three models. The findings of the third model indicate that one unit increase in this variable decreases the likelihood of seatbelt use by approximately 14%.

The results indicate that subjective norms are a positive predictor of the behavior of the seatbelt use, so that one unit increase in the subjective norms score increases the likelihood of the seatbelt use by 25%.

According to the findings of the present study, another factor contributing to the behavior of the seatbelt use is the role of the environment, so that one unit increase in its score increases the likelihood of the seatbelt use by 18%.

In this study, the role of non-behavioral factors (after modifying the variables of model 3) was also investigated. The results indicate that the bus type is also a strong predictor of seatbelt use on the bus, so that the odds of seatbelt non-use behavior in ordinary bus passengers are 2.2 times higher than VIP bus passengers. Also, the results showed that age, sex, marital status, and education had no significant effect on the behavior of seatbelt use.

The area under the curve (AUC) was calculated using ROC analysis after applying any regression model in order to fit the regression models. As shown in the figure, the third model has a better fit compared to the other two models and the AUC is equal to 0.78 (0.74-0.83), which indicates that the predicting rate of the variables entered into the third model equals 78% for seatbelt use, which is statistically significant (Fig. 1 and Table 3). The results of Hosmer – Lemeshow test also confirm insignificance of the third model (p=0.8) which indicates better fit of this model compared to others.

Discussion

So far, no study has been done to determine the frequency of seatbelt use on the buses in Iran. While the use of seatbelts in cars is fairly acceptable in Iran, the results of this study showed that only 86 percent of passengers do not always use a seatbelt on the bus. Most people using seatbelts on the bus reported they would do this only at police stations, and at other times they would prefer not to use a seatbelt. Accordingly, it can be said that passengers do not consider seatbelt use as a protective behavior and use it solely to prevent the legal punishment of the police at stations. In light of this finding, it seems that in the design of seatbelt use promotion interventions on the bus, more attention should be focused on in-person factors such as knowledge and attitude. On the other hand, lack of control and supervision over the seatbelt use by the police (like other cars) will weaken the adoption of this preventive behavior by passengers; therefore, it can be concluded that the change in monitoring mechanisms for using seatbelts on the buses is also one of the areas that needs more research and intervention.

The results of this study showed that one unit increase in the subjective norms score increases the likelihood of a seatbelt use on the bus by 25%. Şimşekoğlu et al. also introduced subjective norms as a strong predictor of the behavior of seatbelt use in taxi passengers [18]. According to this finding, it can be said that passengers, who believe that certain people, such as the driver, traffic police, parents, and friends confirm the use of seatbelt on the bus and have motivation to meet their expectations, will have positive subjective norms and the likelihood of this behavior will increase in them, while on the other hand, passengers who believe that others do not confirm the use of seatbelt on the bus will have negative subjective norms and, obviously, the behavior will be undermined in this situation.

The environment was also one of non-behavioral factors in which one unit increase led to 18% higher likelihood of seatbelt use. In this study, the role of the environment in the use of seatbelts by passengers was associated with some factors, such as available belts, easy access to them, as well as the safety of the belt, since many passengers have attributed seatbelt use to these factors. In other studies, the importance of access to non-defective seatbelts in the vehicles has been also mentioned [19-21].

According to self-reports of seatbelt use on the urban roads, perceived barriers are a strong predictor of this behavior [22]. Logistic regression results in this study showed that perceived barriers were also a strong predictor of the use of seatbelts on the bus, so that one unit increase in the perceived barriers score would increase the chance of seatbelt non-use on the bus by 9%. Perceived barriers are the factors that prevent people from performing health behaviors. The results of this study showed that many passengers did not use a seat belt for reasons such as annoyance, stiffness, embarrassment, sweating especially in hot seasons, body pressure, and limitation of movement. In some studies limitation of movement, stiffness of the seatbelt, feeling hot, and sweating have been mentioned among the serious barriers to the non-use of seatbelts [18, 22, 23], which are consistent with the findings of this study. It should be noted that in other health behaviors, such as the use of helmet in cyclists, perceived barriers were also the most important predictor [24].

The results of this study showed that in the first and second models, observational learning logistics regression has a reverse and significant relation with the behavior of seatbelt use on the bus, while the study by Kuhn et al. showed that observational learning is one of the effective factors in seatbelt use [25]. Observational learning means learning how to perform new behaviors through interpersonal interactions or through the media, and specifically through peers or in other words, the acquisition of the behavior by observing the actions of others [26]. This finding can be justified by the fact that in the present study, the adoption of a seatbelt use behavior is more influenced by other psychological perceptions of individuals, such as perceived barriers, rather than observing others' behaviors. On the other hand, imitation is the essential basis of observational learning, and this is more decisive in children than in adults. Therefore, considering that most bus passengers are from an adult group and the adoption of preventive behavior in this group is less affected by imitation, it could be another justification for this finding.

One of the significant limitations of this study is the self-declaration of completing the questionnaire. Also, considering that one of the criteria for entering the study was reading and writing literacy, the results of this study were limited to the literate population and the illiterate population was ignored.

Conclusion

It seems that in addition to interventions designed to increase the knowledge and attitudes of passengers to enhance the use of seatbelts on the bus, a special look is also needed for important people who influence the behavior of the person (subjective norms).

Considering that perceived barriers and environment were also other important predictors for the behavior of seatbelt use, and given that engineering strategy is one of the strategies for prevention of traffic accidents and incidents [27], it can be concluded that in order to promote the use of seatbelt on the bus, this strategy can be applied by conducting further research on the standard status of the bus seatbelts, as well as designing more suitable belts to remove the barriers and facilitate passengers' access. On the other hand, careful monitoring of the safety of seatbelts before each trip is also one of the issues that should be taken seriously into account by responsible organizations.

Declarations

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Availability of data and materials

Please contact the first author for data requests.

Ethics approval and consent to participate

This study is a part of a PhD dissertation that was approved by the Shahid Beheshti University of Medical Sciences and Health Services (Code: IR.SBMU.PHNS.REC.1395.106) ethical committee. Verbal informed consent was obtained from all participants. Verbally read the elements and verbally agrees to participate.

Consent for publication

Not applicable.

Competing interests

All authors declare that they have no competing interests related to this specific study and topic.

Authors’ contributions

MG, SR, YM, HS and JH were involved in the conceptualization and the design of the study. JH carried out the data collection. SR and MR conducted the analyses. JH and MR commented on the final analysis and drafted the manuscript. All the authors read and approved the final manuscript

Abbreviations

CVI: Content Validity Index – CVR: Content Validity Ratio – AUC: Area under the Curve

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Tables

Table 1: Number of questions, mean, standard deviation and range of scores for the variables

	Variable	Number of questions	Mean	Range of scores	SD
1	Knowledge	6	84/01	0 -100	18/96
2	Perceived Susceptibility	3	87/07	0 -100	16/34
3	Perceived Severity	5	85/37	0 -100	18/27
4	Perceived Barriers	9	36/67	0 -100	16/12
5	Behavioral Beliefs	6	64/49	0 -100	20/34
6	Evaluation of Behavioral Outcome	6	89/77	0 -100	17/01
7	Law & Supervision	3	56/25	0 -100	12/39
8	Observational Learning	5	65/46	0 -100	9/06
9	Peripheral Trust	2	27/55	0 -100	16/19
10	Subjective Norms	4	81/08	0 -100	14/17
11	Self Efficacy	4	88/94	0 -100	11/09
12	Health Locus of Control	2	76/33	0 -100	13/08
13	Environment	2	73/33	0 -100	21/18

Table 2: Predictive factors for bus seat belt use by logistic regression model

Variable	Model 1*	Model 2**	Model 3***
	OR (CI:95%)	OR (CI:95%)	OR (CI:95%)
Knowledge	(0/94 -1/14) 1/03	(0/93 -1/14) 1/03	(0/93 -1/15) 1/04
Perceived susceptibility	(0/90 -1/30) 1/08	(0/90 -1/30) 1/08	(0/90 -1/31) 1/08
Perceived Severity	(0/90-1/11) 0/99	(0/89-1/11) 0/99	(0/91-1/15) 1/02
Perceived barriers	(1/03 -1/15) 1/09	(1/03 -1/15) 1/09	(1/02 -1/15) 1/08
Behavioral Beliefs	(0/84 -1/03) 0/93	(0/84 -1/04) 0/93	(0/83 -1/04) 0/93
Evaluation of Behavioral Outcome	(0/88 -1/13) 1/04	(0/88 -1/13) 1/00	(0/88 -1/14) 1/05
Law & Supervision	(1/02-1/30) 1/15	(1/02-1/30) 1/15	(1/02-1/28) 1/13
Observational learning	(1/05 -1/17) 1/08	(1/06 -1/17) 1/08	(0/99 -1/17) 1/08
Peripheral Trust	(0/72 -1/01) 0/85	(0/72 -1/01) 0/85	(0/68 -1) 0/82
Subjective Norms	(0/65 -0/87) 0/75	(0/65 -0/87) 0/75	(0/65 -0/87) 0/75
Self Efficacy	(0/78 -1/57) 0/92	(0/78 -1/57) 0/92	(0/80 -1/11) 0/94
Locus of control	(0/96 -1/34) 1/14	(0/96 -1/34) 1/13	(0/99 -1/40) 1/18
Environment	(0/73 -0/99) 0/85	(0/73 -0/99) 0/85	(0/66 -0/97) 0/82

Model 1* **:** Unadjusted
Model 2**:** Model 1 - Adjusted for Age and Sex
Model 3***:** Model 2 – Adjusted for Marriage, Education, Bus Type, Frequency use of bus and Non-compliance of law

Table 3: Estimating the area *under* the *ROC curve* by logistic regression models to determine the behavior and non-behavior predictors of not using seat belt

	AUC*	Standard Error	P-Value	CI (95%)
Model 1	0/733	0/24	<0/001	(0/686 – 0/779)
Model 2	0/733	0/24	<0/001	(0/687 – 0/780)
Model 3	0/784	0/22	<0/001	(0/741 – 0/872)

AUC* : Area *Under* the *Curve*

Figures

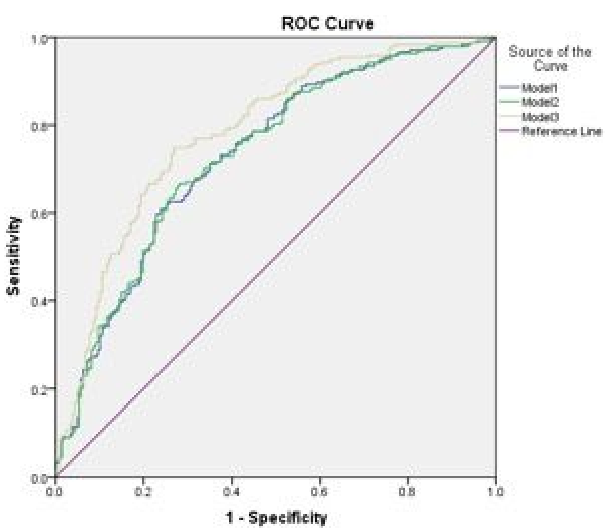

Figure 1

ROC curves for all models.

Supplementary Files

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