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Research article

Applying an extended prototype willingness model to predict back seat safety belt use in China

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Abstract: The risk of injury and death in traffic accidents for passengers in the back and front seats can be reduced by utilizing safety belts. However, passengers use back seatbelts far less frequently than those in the front. More investigation is therefore required into the psychological constructs that affect individuals' attitudes toward using back seat belts. In this study, four models were used to analyze individual intentions and actual back seat belt use: the standard theory of planned behavior (TPB); the standard prototype willingness model (PWM); a model that integrates the TPB and PWM constructs; and a model that integrates the TPB construct, PWM constructs, descriptive norms and perceived law enforcement. The results showed that the standard PWM has much more explanatory power than the standard TPB in explaining the variance in behavioral intention and behavior. Incorporating perceived behavioral control (PBC) into the standard PWM did not improve the model fit considerably, while incorporating descriptive norms and perceived law enforcement moderately improved the model fit. Attitude greatly impacted behavioral intention and the use of back seat belts, followed by perceived law enforcement and descriptive norms, while subjective norms, prototype favorability, prototype similarity and PBC had no significant effect.

Keywords: traffic safety behavior; seat belt; back seat; theory of planned behavior; prototype willingness model; perceived law enforcement

1. Introduction

Studies have shown that passengers in the back seat can minimize their risks in a motor vehicle crash by wearing seat belts. According to Zhu et al. [1], the wearing of back seat belts is linked to a decreased risk of death for back seat passengers, with adjusted relative risks of 0.42 and 0.25 for outboard and center back seats, respectively. According to Høye [2], seat belt use decreases the probability of fatal and nonfatal injuries for passengers in the back seat by 44%. Jermakian [3] discovered that, while unrestrained passengers in the back seat account for approximately 12% of injuries in crashes, they account for 58.8% of serious injuries and 55.4% of deaths. The World Health Organization (WHO) [4] reported a 25% reduction in mortality and serious injury when back seat passengers wear seat belts. Ogawa et al. [5] found that unrestrained back seat passengers have a 3.8 times greater risk of death. In a meta-analysis, unrestrained back seat passengers not only put their own lives in danger, but also the lives of those in the front seat, because back seat passengers are forced forward in frontal collisions and collide with the front passenger and/or driver. Nukenine and Daniel [6] discovered that, if a passenger in the left, middle or right back seat is not belted, the likelihood of a driver or front-seat passenger suffering more serious injuries increases. According to Bose et al. [7], the odds of a belted driver suffering a fatal injury increased by 137% when the passenger behind the driver was not using a seat belt, and it increased even more when there were additional unrestrained back seat passengers. Parenteau and Viano [8] found that unrestrained passengers in the back seat put drivers and front-seat passengers at 8 times and 1.68 times more risk than restrained passengers.

Since back seat belt use is significantly less common than front-seat belt use, many studies are currently looking at the factors that affect the use of back seat belts [9]. According to relevant studies, many factors may contribute to back seat passengers' willingness to wear seat belts. The back seat belt's use may be linked to sociodemographic characteristics such as gender [5,10,11], age [9–12], educational level and marital status [11]. However, there is also significant variation in the research on the effects of these variables on back seat belt use, with some studies [13] finding no significant difference by gender, and others [3] suggesting that female respondents have a higher rate of use than males. In terms of age studies, some surveys discovered that 35–49-year-old and 25–44-year-old respondents had the lowest rate of using back seat belts[9,13].

There are studies from the social psychological perspective that suggest that additional variables that may affect the use of back seat belts include attitudes and beliefs about them. According to Jermakian and Weast [14], the most common reason back seat passengers do not wear seat belts is that passengers assume the back seat is more secure than the front and therefore see no incentive to wear them. Ogawa et al. [5] found that wearing a back seat belt is linked to both knowledge of the benefits and a sense of obligation. Beck et al. [15] argued that beliefs about the importance of using back seat belts are strongly linked to the use of back seat belts. Taylor and Daily [9] discovered that back seat belt use is significantly related to support and belief in state seat belt laws. Perceived behavioral control (PBC) may affect passenger usage of back seat belts. Jiang et al. [16] discovered that university students' behavioral intentions to utilize back seat belts are significantly influenced by PBC, but that their actual behaviors are not greatly affected by it. Okyere et al. [17] discovered that PBC has a major impact on whether people choose use seat belts on buses.

The influence of factors such as attitudes, beliefs and perceptions on associated health behaviors, such as the usage of seat belts, is well explained by social psychology models such as the theory of planned behavior (TPB) and the health belief model [18]. For example, Jiang et al. [16] used the TPB

to explain and predict the behavior of college students' back seat belt use. Although the TPB is widely used to explain seat belt use behavior, the prototype willingness model (PWM) has become a better explanatory theory in some studies of risky behavior. The PWM seems more suitable for analyzing seat belt behavior than the TPB since there is higher risk in not wearing a back seat belt. Although the PWM has been used to conduct investigations into some pedestrian violations [19] and driving speeding behavior [20], the usage behavior of seat belts, especially in the back seat, has not received much research.

Subjective norms are a significant predictor in the TPB or PWM, and some research has shown that they have a major impact on individual behavior [21]. However, in some studies, this impact is not significant [19]. In addition to subjective norms, researchers have discovered that descriptive norms may influence behavioral intention [21–23]. Both kinds of norms have a significant behavioral impact. However, the norm with a more significant impact may vary according to the situation. Therefore, descriptive norms are also considered in this paper.

Many jurisdictions have laws that make seat belt wearing mandatory in the back seat, like the USA [13], Japan [5] and UAE [24]. Some studies have discovered that seat belt laws significantly influence back seat belt use. Those who reside in states with primary and secondary regulations enforcing the usage of back seat belts are more likely to use them than those who reside in states of the USA that do not [3,13,25,26]. Jermakian and Weast [14] found that 37.5% of respondents admit to not wearing back seat belts occasionally due to the lack of laws requiring them in the USA. Taylor and Daily [9] discovered that 76% of respondents who assumed that their state had a seat belt law for back seat passengers always wore back seat belts, while only 45% of respondents who did not think that their state had such a law always wore back seat belts in the USA. Ogawa et al. [27] found that believing that a back seat belt is compulsory is associated with using a back seat belt during pregnancy in Japan. Although most studies have claimed that regulations encourage the use of back seat belts, Nemire [28] found that neither primary nor secondary seat belt laws change the use of back seat belts by passengers in an observational study of adult passengers in two cities (Las Vegas and San Francisco, USA). However, the level of enforcement and the extent of passenger perception of enforcement were not considered. Other than legal requirements, the strength of law enforcement and perceived law enforcement are also important factors that influence passengers to wear the back seat belts. Najah et al. [24] showed that the introduction of relevant laws in 2017 increased the number of people wearing back seat belts in the UAE. However, due to the loose application of the law, the disregard again arose in 2019. According to road safety laws in China, rear passengers are also required to wear seat belts. However, the lack of law enforcement has not resulted in much effectiveness. Therefore, the indicator of perceived law enforcement is proposed by the authors in this paper, which indicate the extent to which passengers perceive law to be enforced.

Although safety belts can greatly reduce fatal and nonfatal injuries in a crash, back seat passengers utilized them far less than front-seat passengers in all studies, although the statistics vary across studies [1,3,5,9,11,13–15,29]. Moreover, most back seat belt studies have been conducted in developed countries/regions, with only a few conducted in developing countries/regions [10,11]. Developing countries and regions have significantly higher crash and death rates than developed countries and regions [4]. Therefore, additional research into the use of back seat belts in developing countries and regions is needed. Research on the influencing factors related to the usage of back seat belts is shown in Table 1.

Based on the discussion above, we propose a comprehensive model to investigate and analyze passenger back seat belt use behaviors in China from the perspective of social psychology, and it incorporates the constructs in the TPB and PWM, descriptive norms and perceived law enforcement. It is also compared with the standard TPB and PWM models and their integrated models. Structural equation modeling (SEM) is suitable for examining the influence of these psychological constructs on back seat belt use behavior and the causal connections between these constructs.

Table 1. Research on the factors influencing back seat belt use.

Reference	Factors considered/Method	Significant factors	Region	Descriptive norm	Perceived law enforcement
Taylor et al. [9]	Front-seat belt use, support and belief in seat belt use laws, peer perceptions of seat belt use, nighttime belt use and demographic factors/multivariate logistic regression.	Front-seat belt use, support and belief in state seat belt laws, nighttime seat belt use, age, education.	USA	-	-
Bhat et al. [13]	Demographic characteristics and type of rear seat belt use enforcement/multivariable regression.	Age, race, geographic region, metropolitan status, type of enforcement.	USA	-	-
Beck et al. [15]	Seat belt belief, type of state seat belt law and demographic characteristics /multivariable regression.	Belief about importance of seat belt use (belief by sex, belief by region), seat belt laws.	USA	-	-
Ogawa et al. [5]	Perceived benefits of wearing a rear seat belt, sense of obligation to use back seat belts and demographic characteristics/logistic regression analysis.	Seat belt use as compulsory, benefits of wearing a back seat belt, gender, possession of a driver's license.	Japan	-	-
Najah et al. [24]	The back seat belt use law and demographic characteristics/t test and ANOVA test.	Gender, age, education, driving experience.	UAE	-	-
Jiang et al. [16]	TPB with perceived accident severity and safety consciousness/SEM.	All psychological factors, majors.	China	-	-
This Work	TPB, PWM, integrative model, descriptive norm and perceived law enforcement/SEM.	Attitude, descriptive norm, perceived law enforcement.	China	√	√

2. Materials and methods

2.1. Conceptual framework

2.1.1. The theory of planned behavior

Generally, research studies utilize social-cognitive or socioecological models to analyze travel behaviors. The TPB is a widely used social-cognitive model [30]. The TPB assumes that individuals make reasonable judgments about what to do based on accessible information [30]. The TPB contends that behavioral intention is the factor that directly determines behavior. Behavioral intention indicates the level of effort an individual is willing to exert to perform a behavior, which is determined by attitudes, subjective norms and PBC (Figure 1) [30]. Attitude is a general assessment of behavior. Individuals' perceptions of whether others deemed to be important believe they perform the behavior is reflected in subjective norms. PBC influences behavior directly and indirectly through intentions and indicates individual perceptions and sense of control over the performed behavior [19]. However, whether these factors are effective in assessing and predicting behavior depends on the various behaviors and populations [21].

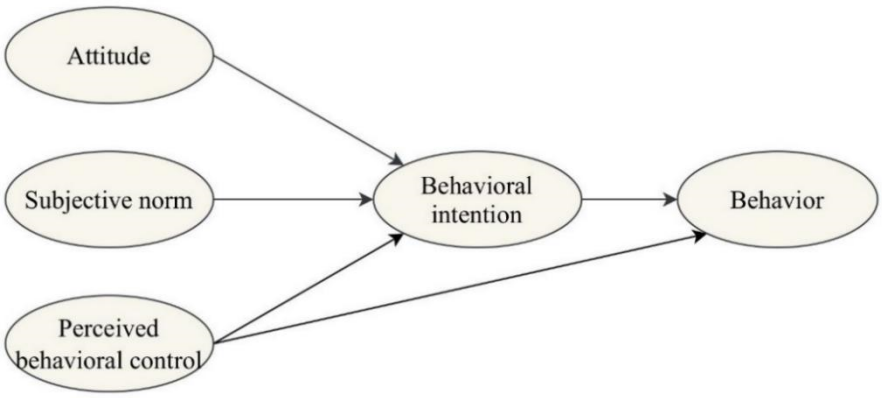

Figure 1. Conceptual framework of the TPB.

2.1.2. Prototype willingness model

The PWM was developed to increase the predictive and explanatory power of existing health behavior theories, with a focus on health-risk behavior [31]. Different from the TPB, the PWM claims that health decision-making incorporates two types of information processing (the reasoned pathway and the social reaction pathway). The reasoned pathway is based on analytic reasoning, and it asserts that some risky behaviors are the consequence of weighing the pros and cons of various possibilities and projected outcomes. The social reaction path asserts that risky behaviors are more reactive than reasoned behaviors [31]. In the reasoned path, similar to the TPB, attitudes and subjective norms directly influence intentions, and intentions directly respond to behaviors. In contrast, the social reaction path adds the perception of the prototype (i.e., individual perceptions of a typical image of the behavior, including similarity and favorability to the prototype) and the willingness to perform the

behavior. The difference between intention and willingness is that the former is what one plans to do, and the latter is what one is willing to do [32]. All of these variables affect behavioral willingness, which directly determines intentions and behaviors. The conceptual framework of the PWM is shown in Figure 2.

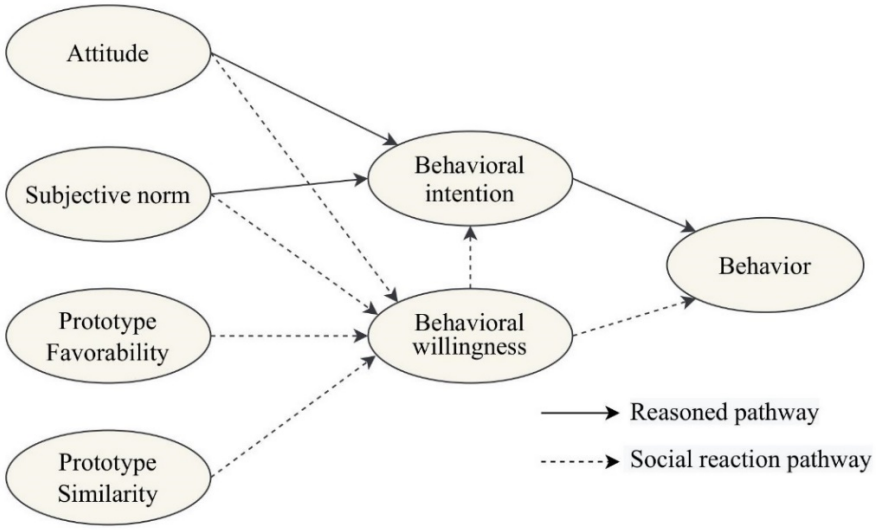

Figure 2. Conceptual framework of the PWM.

2.1.3. Integrating the TPB and the PWM

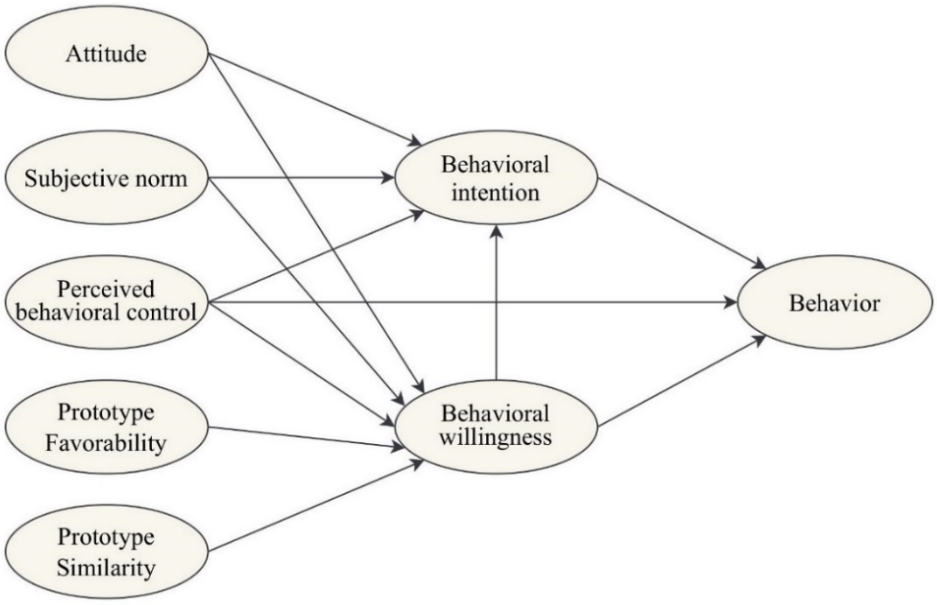

Figure 3. Conceptual framework of the integrative model (the standard TPB and PWM).

The TPB and PWM have been integrated in various studies [19,32] to investigate the explanatory potential of the integrated model for behavior, and these studies have shown that the integrated model

has a more vital explanatory variance for pedestrian violations than the TPB and PWM [19]. However, the explanatory power of the model depends largely on behavior. Whether the integrated model outperforms the standard model in terms of explaining back seat belt use remains to be investigated. Therefore, this study integrates the TPB and PWM, as shown in Figure 3, where PBC not only predicts intention and behavior, but it also may directly influence willingness.

2.1.4. Integrating the TPB, the PWM, descriptive norms and perceived law enforcement

Social norms can be divided into injunctive norms (subjective norms), which tell us "what we should do", and descriptive norms, which show "what other people are actually doing" [33]. In the case of back seat belt use, subjective norms tell us that we should wear back seat belts, while the descriptive norms emphasize the important people around us who perform the behavior. The ability to explain different behaviors varies with norms. Some studies argue that descriptive norms have more explanatory power, especially when the two norms are inconsistent [22,34].

While rear seat belt laws are in place in many countries, many studies have discovered that these laws significantly affect back seat belt use. However, the intensity of enforcement also affects people's usage, and perceived law enforcement is proposed to indicate the extent to which passengers perceive law to be enforced. Therefore, this study goes further to consider descriptive norms and perceived law enforcement in an integrated model, as shown in Figure 4. In the new integrated model, we consider perceived law enforcement to influence intention, willingness and behavior.

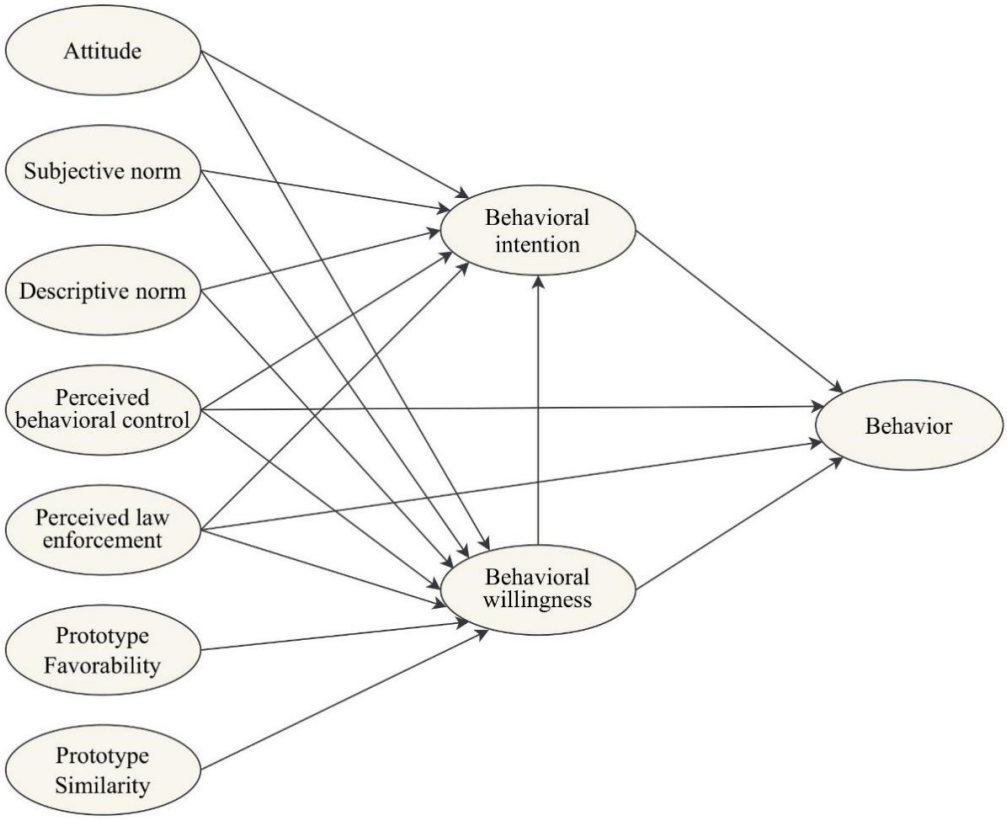

Figure 4. Conceptual framework of the integrative model (the TPB, the PWM, descriptive norms and perceived law enforcement).

2.2. Participants

In this study, surveys were conducted via the Chinese online survey platform Wenjuanxing (https://www.wjx.cn/), an online survey service provider whose platform has previously been applied in several studies [35–37]. Surveys were conducted from February 20, 2022 to March 10, 2022, in Henan Province. The survey was distributed randomly and accounted for the age distribution of the respondents. The responses of a total of 515 individuals in the online survey were retained after excluding suspicious responses, such as those with short response times or inconsistent logic.

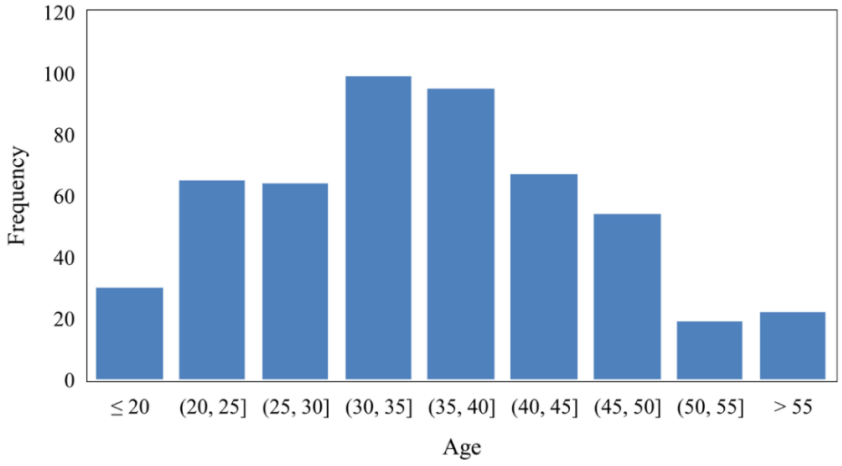

Figure 5. Age statistics of the respondents.

Table 2. Research on the influencing factors of back seat belt use.

Characteristics	Weighted %	Characteristics	Weighted %
Age (years)		Family income	
Below 24	18.4%	Very well	12.2%
25–34	31.7%	Good	25.2%
35–49	41.9%	Normal	58.1%
Over 50	8%	Difficulty	4.5%
Gender		Marriage	
Male	56.3%	Married	79.2%
Female	43.7%	Unmarried	20.8%
Education attainment		Vehicle ownership	
College or higher	30.5%	Yes	67%
Junior college	13.2%	No	33%
High school degree	22.1%	Occurrence of crash	
Below high school degree	28.0%	Yes	37.7%
Never attended school	6.2%	No	62.3%

The respondents were aged from 18 to 67 (mean = 36.0, SD = 9.96). The age statistics of the respondents are shown in Figure 5. The age distribution was normally distributed, similar to the age distribution of the total Chinese population. Females made up 43.7% of the respondents. This indicates that the participants in this study were nationally representative. A total of 79.2% of the respondents

were married, and 67% of the respondents said that they owned a car. A total of 37.7% of the respondents said that they had been in a traffic accident as a driver or passenger. A total of 53.4% of the respondents reported that they often wear back seat belts. The demographic characteristics of the respondents are shown in Table 2, and the data sampling distribution is very close to that reported in the seventh population census (2021) in Henan Province.

2.3. Measures

Some of the items used to assess the variables were derived from previous studies and further revised for this study, while others were proposed by the authors. In the structure of the model in this paper, intention, willingness, attitude, subjective norms, prototype favorability and prototype similarity were assessed using four items each. Descriptive norms, PBC and perceived law enforcement were assessed using two items. The respondents' back seat belt wearing behavior was measured by using four items. The specific measurement items are included in Table A1, and a five-point Likert scale was used to evaluate each measurement item. For example, respondents used "strongly agree", "basically agree", "not sure", "disagree" or "strongly disagree" to answer the questions.

- Attitude

The attitude toward back seat belt use was measured by using four items, such as "when seated in the back seat, wearing a seat belt can help reduce injury risks", and Cronbach's α was 0.866, which is acceptable.

- Subjective norms

Subjective norms were measured by using four items, including items on family, friends and other important people who urge respondents to wear their rear seat belt. The Cronbach's α was 0.908, which is acceptable.

- Descriptive norms

Descriptive norms were measured by using three items, including items on family, friends and other important people who always wear rear seat belts. The Cronbach's α was 0.943, indicating excellent reliability.

- Perceived behavioral control

To measure PBC, three items regarding the ease of back seat belt use were presented. The Cronbach's α of 0.909 shows that the reliability is satisfactory.

- Prototype favorability

Prototype favorability was assessed by using four items to indicate favorability toward people who wear a back seat belt. These include the following: "People who wear a back seat belt are smart", "People who wear a back seat belt are careful", etc. The Cronbach's alpha of 0.933 indicates great reliability.

- Prototype similarity

Prototype similarity was measured by using four items to measure the respondents' similarity to those who wear a back seat belt. These include "Do the characteristics of passengers who wear a back seat belt also describe you?", etc. The Cronbach's alpha of 0.922 indicates favorable reliability.

- Perceived law enforcement

To measure the level of law enforcement perceived by the respondents, three items, such as "traffic police strictly enforce the policy that people in the back seats of cars must wear seat belts", were used. The Cronbach's α of 0.936 shows that the reliability is satisfactory.

- Behavioral intention

The respondents were asked to respond to four items to test their intention to buckle up in the back seat, such as "in the future, I'll wear a seat belt when I sit in the back seat", etc. The Cronbach's α was 0.944, indicating excellent reliability.

- Behavioral willingness

This study examines the willingness of respondents to use back seat belts in four scenarios, such as how likely they are to buckle up when sitting in the back of a taxi or a friend's car. The Cronbach's alpha of 0.934 indicates favorable reliability.

- Behavior

The respondents' back seat belt wearing behaviors were measured by using four items. These include "I buckle the seat belt voluntarily when seated in the back seat" and "I buckle my seat belt after being prompted by others when seated in the back seat". The reliability was good, as indicated by the Cronbach's alpha of 0.904.

3. Results

3.1. Reliability and validity of the measurement items

As a prelude to analyzing the causal/correlative relationships between the constructs, several tests were conducted to determine the reliability and validity of the measurement items [38,39]. The results are summarized in Tables 3 and 4.

Cronbach's α [40] measures the internal consistency reliability of a construct, and it is considered acceptable when it is larger than 0.7 [41]. Table 3 shows that each of the constructs had a Cronbach's α greater than 0.7. For each of the constructs, confirmatory factor analysis was performed. According to Table 3, the standard factor loadings were significant and greater than 0.6, which is acceptable [41]. Composite reliability (CR), which assesses internal consistency in scale items similarly to Cronbach's α, is regarded as acceptable when it exceeds 0.7 [42–44]. The average variance extracted (AVE) assesses how much variance in the measurement items can be explained by the construct, and AVE values above 0.5 are considered acceptable [42,44]. Table 3 shows that the CR and AVE values meet the required criteria. Therefore, the latent constructs' convergent validity is acceptable.

Table 3. Convergent validity of the latent variables.

Constructs	Standard factor loadings	Cronbach's α	CR	AVE
Behavior	0.779–0.904	0.904	0.910	0.717
Behavioral intention	0.866–0.916	0.944	0.945	0.810
Behavioral willingness	0.867–0.909	0.934	0.935	0.783
Attitude	0.657–0.873	0.866	0.886	0.662
Subjective norm	0.733–0.957	0.908	0.917	0.736
Descriptive norm	0.909–0.937	0.943	0.944	0.848
Perceived behavioral control	0.846–0.924	0.909	0.911	0.774
Prototype favorability	0.856–0.897	0.933	0.934	0.779
Prototype similarity	0.848–0.892	0.922	0.922	0.748
Perceived law enforcement	0.876–0.942	0.936	0.937	0.833

Discriminant validity assesses how different one construct is from another. It is acceptable when the square root of the AVE of each construct is greater than the correlation between two constructs [38]. In Table 4, the values off the diagonal are the correlations between the two constructs, whereas the values on the diagonal represent the square root of the construct's AVE. Table 4 shows that the diagonal element's value was higher than the values of the other elements in the same row and the values of the other elements in the same column, which indicates that discriminant validity holds.

Table 4. Discriminatory validity of the latent variables.

	1	2	3	4	5	6	7
1 Behavior	0.847						
2 Behavioral intention	0.846	0.901					
3 Attitude	0.602	0.710	0.835				
4 Perceived behavioral control	0.597	0.643	0.814	0.880			
5 Subjective norm	0.674	0.617	0.569	0.659	0.857		
6 Descriptive norm	0.787	0.698	0.578	0.621	0.752	0.921	
7 Perceived law enforcement	0.744	0.704	0.561	0.598	0.688	0.830	0.913

Note: P values for off-diagonal elements are all less than 0.05.

3.2. Structural model

SEM was used to examine the connections between the latent constructs. Four models were investigated in this research:

- In Model 1, the standard TPB was analyzed; that is, behavior, behavioral intention, attitude, PBC and subjective norms were considered.
- In Model 2, the standard PWM was analyzed; that is, behavior, behavioral intention, behavioral willingness, attitude, subjective norms, prototype favorability and prototype similarity were considered.
- In Model 3, the integration of the constructs in the standard TPB and PWM was analyzed.
- In Model 4, the descriptive norm construct and perceived law enforcement construct were added to Model 3.

Table 5. Results of Model 1.

Explained construct	Explanatory construct	Estimate	S.E.	P value
Behavioral intention	Attitude	0.632	0.113	0.000
	Subjective norms	0.313	0.058	0.000
	Perceived behavioral control	-0.044	0.118	0.711
Behavior	Behavioral intention	0.949	0.070	0.000
	Perceived behavioral control	0.133	0.077	0.083

The robust maximum likelihood method, which can handle nonnormality, was used to analyze the data. The model fits were assessed by using the following indicators: the ratio between the chi-square value and the degree of freedom ($\chi 2/df$), comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA) and standardized root mean square residual

(SRMR). Tables 5 through 8 show the results for Models 1 through 4. A comparison of the four models is shown in Table 9.

Table 6. Results of Model 2.

Explained construct	Explanatory construct	Estimate	S.E.	P value
Behavioral intention	Attitude	0.306	0.069	0.000
	Subjective norms	0.086	0.049	0.078
	Behavioral willingness	0.542	0.062	0.000
Behavioral willingness	Attitude	0.622	0.095	0.000
	Subjective norms	0.392	0.058	0.000
	Prototype favorability	-0.039	0.126	0.759
	Prototype similarity	-0.012	0.109	0.916
Behavior	Behavioral intention	0.602	0.075	0.000
	Behavioral willingness	0.501	0.074	0.000

Table 7. Results of Model 3.

Explained construct	Explanatory construct	Estimate	S.E.	P value
Behavioral intention	Attitude	0.387	0.103	0.000
	Subjective norms	0.108	0.048	0.026
	Behavioral willingness	0.547	0.064	0.000
	Perceived behavioral control	-0.119	0.099	0.231
Behavioral willingness	Attitude	0.534	0.127	0.000
	Subjective norms	0.361	0.066	0.000
	Prototype favorability	-0.044	0.126	0.726
	Prototype similarity	-0.021	0.107	0.843
	Perceived behavioral control	0.139	0.119	0.242
Behavior	Behavioral intention	0.615	0.076	0.000
	Behavioral willingness	0.535	0.083	0.000
	Perceived behavioral control	-0.071	0.070	0.314

Table 8. Results of Model 4.

Explained construct	Explanatory construct	Estimate	S.E.	P value
Behavioral intention	Attitude	0.387	0.098	0.000
	Subjective norms	0.008	0.054	0.876
	Descriptive norms	0.070	0.085	0.411
	Perceived law enforcement	0.176	0.074	0.018
	Behavioral willingness	0.438	0.065	0.000
	Perceived behavioral control	-0.137	0.094	0.143
Behavioral willingness	Attitude	0.492	0.134	0.000
	Subjective norms	0.116	0.062	0.060
	Descriptive norms	0.250	0.081	0.002

Continued on next page

Explained construct	Explanatory construct	Estimate	S.E.	P value
Behavioral willingness	Perceived law enforcement	0.171	0.078	0.029
	Prototype favorability	-0.040	0.121	0.743
	Prototype similarity	-0.107	0.111	0.332
	Perceived behavioral control	0.092	0.121	0.447
Behavior	Behavioral intention	0.519	0.083	0.000
	Behavioral willingness	0.462	0.081	0.000
	Perceived law enforcement	0.239	0.056	0.000
	Perceived behavioral control	-0.126	0.072	0.079

Table 9. Comparison of the four models.

Explained construct	Explanatory construct	Estimate	S.E.	P value
Behavioral intention	Attitude	0.387	0.098	0.000
	Subjective norms	0.008	0.054	0.876
	Descriptive norms	0.070	0.085	0.411
	Perceived law enforcement	0.176	0.074	0.018
	Behavioral willingness	0.438	0.065	0.000
	Perceived behavioral control	-0.137	0.094	0.143
Behavioral willingness	Attitude	0.492	0.134	0.000
	Subjective norms	0.116	0.062	0.060
	Descriptive norms	0.250	0.081	0.002
	Perceived law enforcement	0.171	0.078	0.029
	Prototype favorability	-0.040	0.121	0.743
	Prototype similarity	-0.107	0.111	0.332
	Perceived behavioral control	0.092	0.121	0.447
Behavior	Behavioral intention	0.519	0.083	0.000
	Behavioral willingness	0.462	0.081	0.000
	Perceived law enforcement	0.239	0.056	0.000
	Perceived behavioral control	-0.126	0.072	0.079

Model 1 (the TPB) had an acceptable fit to the data ($\chi 2/df = 3.86$, CFI = 0.928, TLI = 0.915, RMSEA = 0.075, SRMR = 0.083). Model 1 explains 57.6% of the variance in behavioral intention and 72.9% of the variance in behavior. In the standard TPB, attitudes and subjective norms significantly predicted intention, while PBC did not. Back seat belt wearing behavior was significantly predicted by intention; however, PBC played a small role in this (Figure 6).

Model 2 (the PWM) had a good fit to the data ($\chi 2/df = 2.60$, CFI = 0.936, TLI = 0.928, RMSEA = 0.056, SRMR = 0.070). Model 2 explains 61.9% of the variance in behavioral willingness, 69.6% of that in behavioral intention and 78.1% of that in behavior. In the standard PWM, the significant predictors of intention were attitude and willingness. The significant predictors of intention were attitude and subjective norms. Both intention and willingness significantly predicted back seat belt wearing behavior. Intention was a better predictor of back seat belt wearing behavior than willingness in this study (Figure 7).

Model 3 (the PWM construct + the TPB construct) had a good fit to the data ($\chi 2/df = 2.40$, CFI = 0.938, TLI = 0.930, RMSEA = 0.052, SRMR = 0.065). Model 3 explains 62.5% of the variance in

behavioral willingness, 69.9% of that in behavioral intention and 78.4% of that in behavior. In the model combining TPB and PWM, we discovered that intentions could be predicted by attitudes, subjective norms and willingness. Similar to Model 2, the significant predictors of intention were attitude and subjective norms. Both intention and willingness significantly predicted back seat belt wearing behavior (Figure 8).

Model 4 (the PWM construct + the TPB construct + descriptive norms + perceived law enforcement) had a good fit to the data ($\chi 2/df = 2.55$, CFI = 0.925, TLI = 0.915, RMSEA = 0.055, SRMR = 0.070). Model 4 explains 69.8% of the variance in behavioral willingness, 72.4% of that in behavioral intention and 80.6% of that in behavior. In an integrative model considering descriptive norms and perceived enforcement, attitudes, perceived law enforcement and willingness predict intentions. Attitudes, descriptive norms and perceived law enforcement significantly predict intentions. Unlike in the other models, perceived law enforcement also significantly predicted back seat belt wearing behavior (Figure 9).

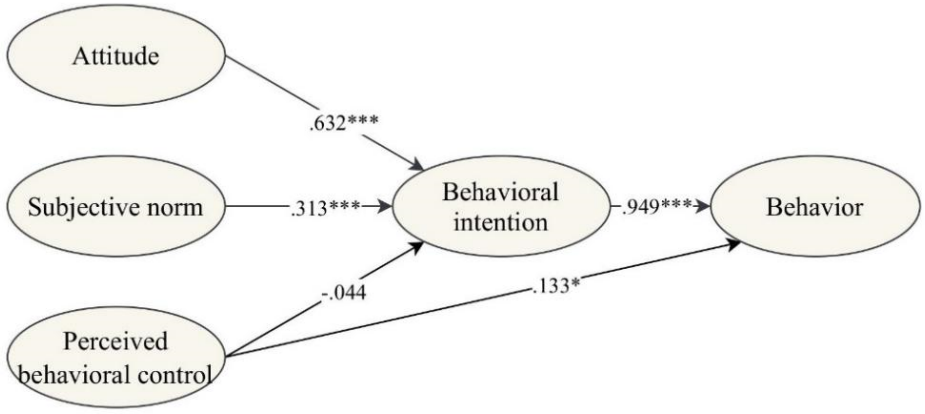

Figure 6. Back seat belt use behavior explained with the standard TPB.

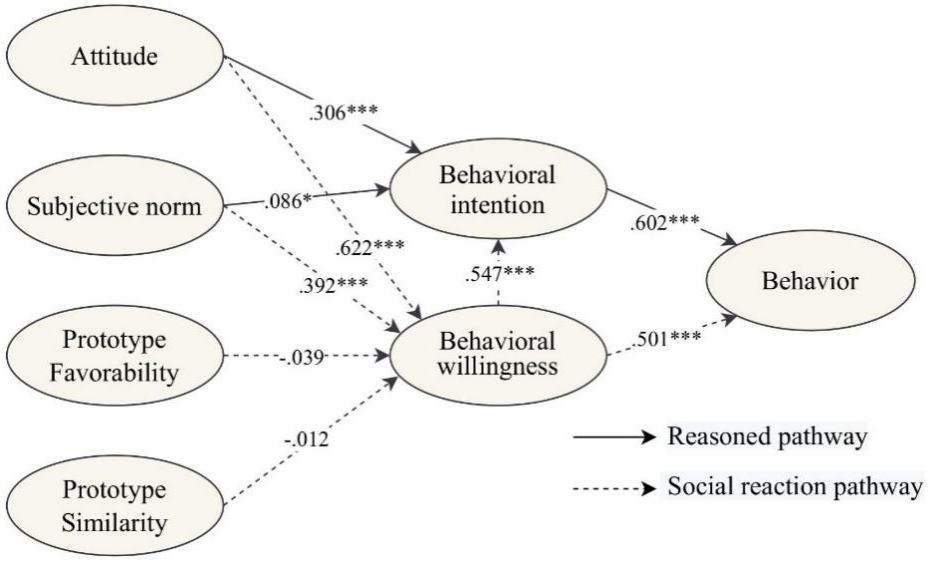

Figure 7. Back seat belt use behavior explained with the standard PWM.

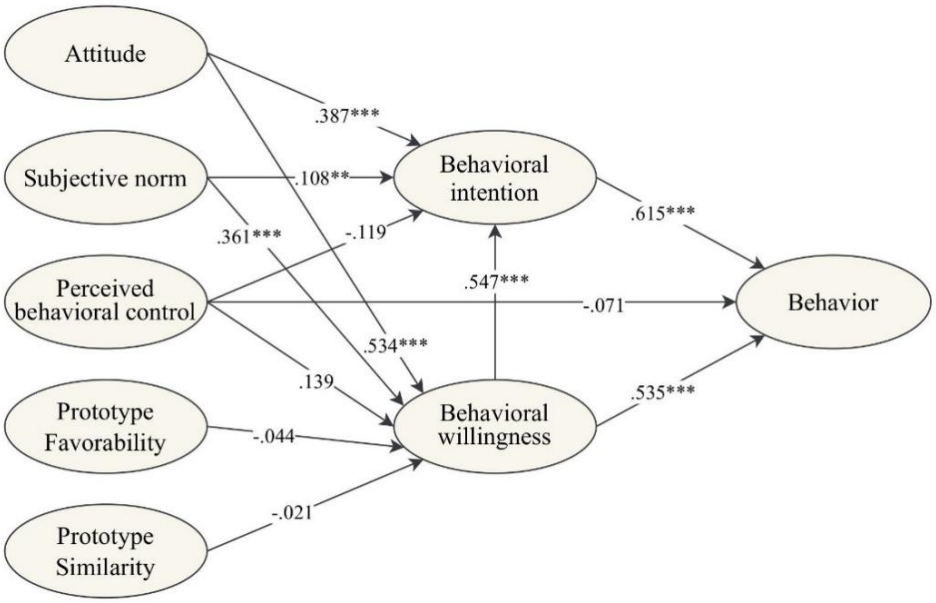

Figure 8. Back seat belt use behavior explained with the integrative model (the standard TPB and PWM).

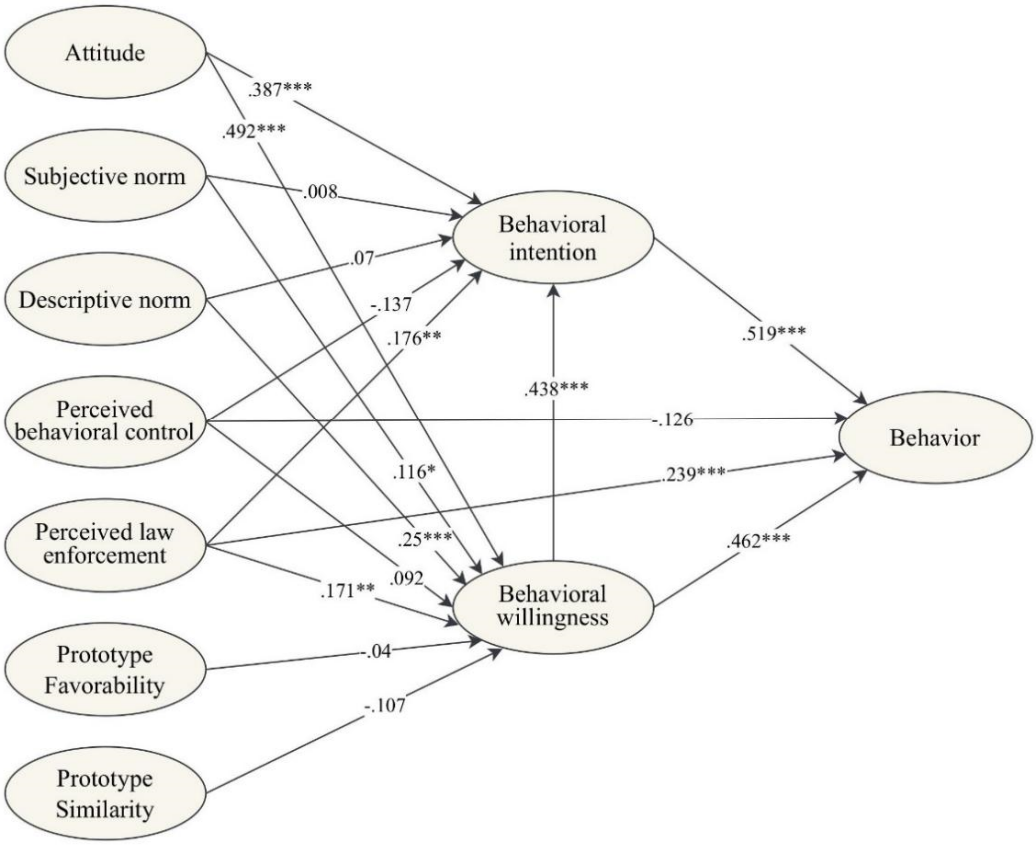

Figure 9. Back seat belt use behavior explained with the integrative model (the TPB, the PWM, descriptive norms and perceived law enforcement).

4. Discussion

In this study, we investigated the explanatory power of four models for back seat belt wearing behavior and the associated influences. The data analysis revealed the model fitting results, and the fitting effect and explanatory power of each model were compared. The fit indices indicate that Models 2–4 fit the data well, but the fit of Model 1 may be deficient.

In terms of the explanatory ability of the model, we discovered that the standard PWM had much more power than the TPB in terms of the ability to explain the variance in behavioral intentions and behaviors. Models 2 and 3 had similar explanatory abilities. Model 3 differs from Model 2 in that it considered the impact of PBC, whereas Model 2 does not. Therefore, the model's fit did not improve considerably when the PBC element was added. Model 4 had much more explanatory power than Model 1 (the TPB), and moderately more explanatory power than Models 2 and 3. Model 4 is different from Model 3 because it considered the impact of descriptive norms and perceived law enforcement. This shows that descriptive specification and perceived law enforcement can effectively improve the explanatory power of the model, and that these two variables can effectively influence back seat belt wearing behavior.

In terms of each variable's ability to predict behavior, all models indicated that intention and willingness strongly predict behavior, with intention having higher predictive capacity than willingness. The difference is that perceived law enforcement was a significant predictor of back seat belt wearing behavior in Model 4. Moreover, we discovered that perceived law enforcement significantly affected the prediction of intentions and willingness. Descriptive norms also significantly influenced behavioral intentions. Therefore, descriptive norms and perceived law enforcement greatly influenced the prediction of wearing a back seat belt. However, unlike related studies, PBC and prototype favorability and similarity did not significantly impact back seat belt wearing behavior.

Table 10. Direct and indirect effects of the exogenous constructs in Model 4.

Exogenous construct	Behavioral intention			Behavior		
	Direct	Indirect	Total	Direct	Indirect	Total
Attitude	0.387***	0.216***	0.603***	-	0.540***	0.540***
Subjective norms	0.008	0.051*	0.059	-	0.085	0.085
Descriptive norms	0.070	0.110**	0.180*	-	0.209***	0.209***
Prototype favorability		-0.017	-0.017	-	-0.027	-0.027
Prototype similarity		-0.047	-0.047	-	-0.074	-0.074
Perceived law enforcement	0.176**	0.075*	0.251***	0.239***	0.209***	0.448***
Perceived behavioral control	-0.137	0.040	-0.097	-0.126	-0.008	-0.134

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Since Model 4 had the greatest explanatory power in terms of ability to explain the variance in behavioral willingness, behavioral intention and behavior, we chose to analyze it further. In Model 4, exogenous construct attitude has a direct effect on behavioral willingness, which in turn has a direct impact on behavioral intention and behavior. Furthermore, behavioral intention has a direct impact on behavior. Therefore, attitude may affect behavioral intention indirectly through behavioral willingness, and attitude may affect behavior indirectly through two pathways (attitude > behavioral willingness > behavior, attitude > behavioral willingness > behavioral intention > behavior). In addition to attitude,

other exogenous constructs (subjective norms, descriptive norms, perceived law enforcement, prototype favorability, prototype similarity and PBC) may also influence behavioral intention and behavior indirectly. We then analyzed the direct and indirect effects of these exogenous constructs on behavioral intention and behavior. The results are shown in Table 10.

Table 10 shows that behavioral intention is most significantly influenced by attitude (0.603), followed by perceived law enforcement (0.251) and descriptive norms (0.180), while subjective norms, prototype favorability, prototype similarity and PBC had no discernible effect on behavioral intention. Similar to behavioral intention, attitude (0.540) had the largest total effect on actual behavior, followed by perceived law enforcement (0.448) and descriptive norms (0.209), while subjective norms, prototype favorability, prototype similarity and PBC had no discernible effect on behavior.

In addition to having a significant direct and indirect impact on behavioral intention, attitude also had a significant indirect impact on behavior. Many studies indicate that attitudes significantly influence individual (behavioral) intentions to obey rules, and the findings of this study support these claims [16,19,45,46].

Subjective norms do not significantly influence behavior, but they do significantly influence behavioral intention indirectly. Previous studies on the effects of subjective norms are inconsistent, as some scholars have stated that subjective norms significantly influence behavioral intention or behavior [16,46–48], while others have disagreed [19,21,45]. Behavioral intention and behavior are significantly impacted by descriptive norms. Many studies have indicated that descriptive norms can influence behavioral intention and behavior [21–23], and the results of this study are consistent with these findings.

The literature is inconclusive as to whether prototypes have a significant effect on behavioral willingness. Elliott et al. [20] and Yadav et al. [49] argued that prototype similarity significantly impacts behavioral willingness, while prototype favorability does not. Demir et al. [19] argued that both prototype similarity and prototype favorability significantly influence behavioral willingness. Basse et al. [50] argued that neither prototype favorability nor similarity significantly impact behavioral willingness. In this study, behavioral intention and behavior were not significantly influenced by either prototype favorability or similarity.

Jiang et al. [16] found that PBC significantly influences behavioral intention but has no significant effect on actual behavior. However, Okyere et al. [17] found that it can significantly impact actual behavior. In this study, PBC had no significant impact on behavioral intention or actual behavior, which means that PBC is an unimportant factor in the behavior of back seat belt use.

According to the results, perceived law enforcement significantly impacts behavioral intention and actual behavior, which indicates that perceived law enforcement can sufficiently impact back seat belt use behavior.

5. Conclusions

This study applied four models to investigate the behavior of individuals related to back seat belt use: Model 1 (the TPB), Model 2 (the PWM), Model 3 (the PWM construct + the TPB construct) and Model 4 (the PWM construct + the TPB construct + descriptive norm + perceived law enforcement). The results of these four models were also compared and analyzed. According to the discussion of this study, the standard PWM has much more explanatory power than the standard TPB in terms of ability to explain the variance in behavioral intention and behavior. Incorporating PBC into

the standard PWM did not improve the model fit considerably, while incorporating descriptive norms and perceived law enforcement improved the model fit moderately. In the analysis of the influencing variables of behavior, we discovered that attitude has the largest total impact on intention and actual behavior, followed by perceived law enforcement and descriptive norms, while subjective norms, prototype favorability, prototype similarity and PBC have no noticeable impact on intention or actual behavior.

According to the results, we can propose corresponding improvement measures and applications to increase the use of rear seat belts. Attitude has the largest impact on behavioral intention and actual back seat belt use behavior. As a result, interventions aimed at raising public awareness of the function of the back seat belt as a tool to decrease the severity of casualties and fatalities in vehicle crashes might be beneficial in encouraging people to use the back seat belt. It is worth noting that safety education and programs that are introduced to individuals at a young age may be more effective [51]. Perceived law enforcement has the second largest impact on behavioral intention and actual back seat belt use behavior. According to road safety laws, rear passengers in China are also required to wear seat belts. However, the lack of law enforcement has not yielded much effectiveness. It is not enough to enact laws or regulations requiring back seat passengers to buckle up; it is also necessary to vigorously enforce the legislation and punish back seat passengers who fail to abide by the law. Descriptive norms significantly impact intention and actual back seat belt use behavior, while subjective norms do not. Therefore, the actual behaviors of those around an individual, but not their expectations, influence the individual's behavior. Individual behaviors are more socially reactive than rational, and social comparison has a great impact on their decision-making regarding back seat belt use. Road safety and urban management may benefit from the use of social media to foster public awareness of back seat belt use and form a strong social normative effect.

The limitations of this study are discussed below. The responses collected were not evenly distributed across cities, and the sample size was inadequate. In addition, we did not ask in detail whether or how often the participants sat in the back seat. In future studies, we will collect more sample data from different regions and refine our questionnaire items. Moreover, this study analyzed the impact of psychosocial factors on back seat belt use without considering the effect of demographic variables. In future studies, we will also consider the relevant variables of demographic characteristics in the integrated model to analyze the influence of gender, age, education and income on back seat belt use behavior.

Author contributions

Mingyang Pei: conceptualization, formal analysis, writing original draft; Yi Hu: conceptualization, data acquisition, writing original draft, the methodology; Lingshu Zhong: investigation, supervision, review, editing. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of 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. M. Zhu, P. Cummings, H. Chu, L. J. Cook, Association of rear seat safety belt use with death in a traffic crash: a matched cohort study, *Inj. Prev.*, **13** (2007), 183–185. https://doi.org/10.1136/ip.2006.012153
2. A. Høye, How would increasing seat belt use affect the number of killed or seriously injured light vehicle occupants? *Accid. Anal. Prev.*, **88** (2016), 175–186. https://doi.org/10.1016/j.aap.2015.12.022
3. J. S. Jermakian, Statement before Maryland House Environment and Transportation Committee Research on rear-seat safety and primary-enforcement safety belt use laws, in *Insurance Institute for Highway Safety*, 2017.
4. World Health Organization, Global status report on road safety 2018: Summary, World Health Organization, 2018. Available from: https://www.who.int/publications/i/item/WHO-NMH-NVI-18.20
5. S. Ogawa, K. Hayashi, H. Nakao, H. Shinozaki, Factors that associate Japanese university students' use of rear seat belts on general roads and expressways, *J. Community Health*, **46** (2021), 603–608. https://doi.org/10.1007/s10900-020-00912-x
6. S. K. L. Nukenine, J. Daniel, Impact of belt use by rear-seat occupants on injury severity of belted drivers in New Jersey, *Transp. Res. Rec.*, **2265** (2011), 91–99. https://doi.org/10.3141/2265-10
7. D. Bose, C. Arregui-Dalmases, D. Sanchez-Molina, J. Velazquez-Ameijide, J. Crandall, Increased risk of driver fatality due to unrestrained rear-seat passengers in severe frontal crashes, *Accid. Anal. Prev.*, **53** (2013), 100–104. https://doi.org/10.1016/j.aap.2012.11.031
8. C. S. Parenteau, D. C. Viano, Driver and front passenger injury in frontal crashes: Update on the effect of unbelted rear occupants, *Traffic Inj. Prev.*, **19** (2018), 28–34. https://doi.org/10.1080/15389588.2017.1344355
9. N. L. Taylor, M. Daily, Self-reported factors that influence rear seat belt use among adults, *J. Saf. Res.*, **70** (2019), 25–31. https://doi.org/10.1016/j.jsr.2019.04.005
10. E. Sutanto, N. Zia, N. Taber, F. R. Rinawan, I. Amelia, P. Jiwattanakulpaisarn, et al., Rear-seat seatbelt use in urban Southeast Asia: results from Bandung and Bangkok, *Int. J. Inj. Control Saf. Promot.*, **29** (2022), 247–255. https://doi.org/10.1080/17457300.2021.1998135
11. S. Bendak, S. S. Alnaqbi, Rear seat belt use in developing countries: a case study from the United Arab Emirates, *Int. J. Transport Veh. Eng.*, **11** (2017), 2768–2772. https://doi.org/10.5281/zenodo.1314586
12. D. G. Kidd, A. T. McCartt, Drivers' attitudes toward front or rear child passenger belt use and seat belt reminders at these seating positions, *Traffic Inj. Prev.*, **15** (2014), 278–286. https://doi.org/10.1080/15389588.2013.810333
13. G. Bhat, L. Beck, G. Bergen, M. J. Kresnow, Predictors of rear seat belt use among US adults, 2012, *J. Saf. Res.*, **53** (2015), 103–106. https://doi.org/10.1016/j.jsr.2015.03.011

14. J. S. Jermakian, R. A. Weast, Passenger use of and attitudes toward rear seat belts, *J. Saf. Res.*, **64** (2018), 113–119. https://doi.org/10.1016/j.jsr.2017.12.006
15. L. F. Beck, M. J. Kresnow, G. Bergen, Belief about seat belt use and seat belt wearing behavior among front and rear seat passengers in the United States, *J. Saf. Res.*, **68** (2019), 81–88. https://doi.org/10.1016/j.jsr.2018.12.007
16. K. Jiang, Z. Yang, Z. Feng, Z. Yu, Z. Huang, Psychological predictors of seat belt usage among university student passengers and an examination of the differences between the front and rear seats, *Traffic Inj. Prev.*, **21** (2020), 139–144. https://doi.org/10.1080/15389588.2020.1732361
17. P. Okyere, P. Agyei-Baffour, M. J. Harris, C. Mock, P. Donkor, I. K. Yankson, et al., Predictors of belt use among bus passengers in Ghana: an application of the theory of planned behaviour and health belief model, *J. Community Health*, **46** (2021), 992–999. https://doi.org/10.1007/s10900-021-00980-7
18. Ö. Şimşekoğlu, T. Lajunen, Social psychology of seat belt use: A comparison of theory of planned behavior and health belief model, *Transp. Res. Part F Psychol. Behav.*, **11** (2008), 181–191. https://doi.org/10.1016/j.trf.2007.10.001
19. B. Demir, T. Özkan, S. Demir, Pedestrian violations: Reasoned or social reactive? Comparing theory of planned behavior and prototype willingness model, *Transp. Res. Part F Psychol. Behav.*, **60** (2019), 560–572. https://doi.org/10.1016/j.trf.2018.11.012
20. M. A. Elliott, R. McCartan, S. E. Brewster, D. Coyle, L. Emerson, K. Gibson, An application of the prototype willingness model to drivers' speeding behaviour, *Eur. J. Social Psychol.*, **47** (2017), 735–747. https://doi.org/10.1002/ejsp.2268
21. H. Zhou, S. B. Romero, X. Qin, An extension of the theory of planned behavior to predict pedestrians' violating crossing behavior using structural equation modeling, *Accid. Anal. Prev.*, **95** (2016), 417–424. https://doi.org/10.1016/j.aap.2015.09.009
22. Y. Wang, Y. Yang, J. Wang, M. Douglas, D. Su, Examining the influence of social norms on orderly parking behavior of dockless bike-sharing users, *Transp. Res. Part A Policy Pract.*, **147** (2021), 284–296. https://doi.org/10.1016/j.tra.2021.03.022
23. X. Qiao, L. Ji, Y. Jin, H. Si, Y. Bian, W. Wang, et al., Development and validation of an instrument to measure beliefs in physical activity among (pre) frail older adults: an integration of the health belief model and the theory of planned behavior, *Patient Educ. Couns.*, **104** (2021), 2544–2551. https://doi.org/10.1016/j.pec.2021.03.009
24. A. Najah, M. Abuzwidah, D. Khalil, The impact of the rear seat belt use on traffic safety in the UAE, in *2020 Advances in Science and Engineering Technology International Conferences (ASET)*, IEEE, (2020), 1–6. https://doi.org/10.1109/ASET48392.2020.9118388
25. D. J. Findley, M. Sanchez, T. Nye, Estimating the effect of standard enforcement of a rear seat belt law for rear seat fatality prevention, *Transp. Res. Rec.*, **2672** (2018), 67–77. https://doi.org/10.1177/0361198118790131
26. K. F. Boakye, S. S. Nambisan, Seatbelt laws and seatbelt use among front-and rear-seat vehicle occupants in fatal crashes in the United States, *Case Stud. Transp. Policy*, **8** (2020), 1030–1037. https://doi.org/10.1016/j.cstp.2020.04.003
27. S. Ogawa, H. Shinozaki, K. Hayashi, M. Itoh, M. Soda, T. Kameda, et al., Prevalence of rear seat belt use among pregnant women in a suburban area of Japan, *J. Obstet. Gynaecol. Res.*, **44** (2018), 117–123. https://doi.org/10.1111/jog.13468

28. K. Nemire, Seat belt use by adult rear seat passengers in private passenger, taxi, and rideshare vehicles, in *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, **61** (2017), 1644–1648. https://doi.org/10.1177/1541931213601896
29. K. Nemire, Warning signs to fasten seat belts result in higher rates of rear seat belt use in rideshare vehicles, in *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, **63** (2019), 2046–2050. https://doi.org/10.1177/1071181319631515
30. I. Ajzen, The theory of planned behavior, *Organ. Behav. Hum. Decis. Processes*, **50** (1991), 179–211. https://doi.org/https://doi.org/10.1016/0749-5978(91)90020-T
31. F. X. Gibbons, M. L. Stock, M. Gerrard, The prototype-willingness model, *Wiley Encycl. Health Psychol.*, **2020** (2020), 517–527. https://doi.org/10.1002/9781119057840.ch102
32. J. Frater, R. Kuijer, S. Kingham, Why adolescents don't bicycle to school: Does the prototype/willingness model augment the theory of planned behaviour to explain intentions? *Transp. Res. Part F Psychol. Behav.*, **46** (2017), 250–259. https://doi.org/10.1016/j.trf.2017.03.005
33. R. B. Cialdini, R. R. Reno, C. A. Kallgren, A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places, *J. Pers. Social Psychol.*, **58** (1990), 1015–1026. https://doi.org/10.1037/0022-3514.58.6.1015
34. M. S. Kredentser, L. R. Fabrigar, S. M. Smith, K. Fulton, Following what people think we should do versus what people actually do: Elaboration as a moderator of the impact of descriptive and injunctive norms, *Social Psychol. Pers. Sci.*, **3** (2012), 341–347. https://doi.org/10.1177/1948550611420481
35. X. Li, S. A. Useche, Y. Zhang, Y. Wang, O. Oviedo-Trespalacios, N. Haworth, Comparing the cycling behaviours of Australian, Chinese and Colombian cyclists using a behavioural questionnaire paradigm, *Accid. Anal. Prev.*, **164** (2022), 106471. https://doi.org/10.1016/j.aap.2021.106471
36. X. Wang, K. F. Yuen, W. Shi, F. Ma, The determinants of passengers' safety behaviour on public transport, *J. Transp. Health*, **18** (2020), 100905. https://doi.org/10.1016/j.jth.2020.100905
37. L. Ma, X. Zhang, X. Ding, G. Wang, Risk perception and intention to discontinue use of ride-hailing services in China: Taking the example of DiDi Chuxing, *Transp. Res. Part F Psychol. Behav.*, **66** (2019), 459–470. https://doi.org/10.1016/j.trf.2019.09.021
38. J. Hulland, Use of partial least squares (PLS) in strategic management research: A review of four recent studies, *Strategic Manage. J.*, **20** (1999), 195–204. https://doi.org/10.1002/(SICI)1097-0266(199902)20:2<195::AID-SMJ13>3.0.CO;2-7
39. I. A. Rahman, A. H. Memon, A. T. Abd Karim, Examining factors affecting budget overrun of construction projects undertaken through management procurement method using PLS-SEM approach, *Procedia-Social Behav. Sci.*, **107** (2013), 120–128. https://doi.org/10.1016/j.sbspro.2013.12.407
40. L. J. Cronbach, Coefficient alpha and the internal structure of tests, *Psychometrika*, **16** (1951), 297–334. https://doi.org/10.1007/BF02310555
41. J. F. Hair, W. C. Black, B. J. Babin, R. E. Anderson, R. Tatham, *Multivariate Data Analysis : A Global Perspective*, Pearson Education, 2010.
42. J. F. Hair, C. M. Ringle, M. Sarstedt, PLS-SEM: Indeed a silver bullet, *J. Mark. Theory Pract.*, **19** (2011), 139–152. https://doi.org/10.2753/MTP1069-6679190202

43. W. W. Chin, The partial least squares approach to structural equation modeling, *Mod. Methods Bus. Res.*, **295** (1998), 295–336.
44. C. Fornell, D. F. Larcker, Evaluating structural equation models with unobservable variables and measurement error, *J. Mark. Res.*, **18** (1981), 39–50. https://doi.org/10.1177/002224378101800104
45. K. Jiang, F. Ling, Z. Feng, K. Wang, L. Guo, Psychological predictors of mobile phone use while crossing the street among college students: An application of the theory of planned behavior, *Traffic Inj. Prev.*, **18** (2017), 118–123. https://doi.org/10.1080/15389588.2016.1236195
46. H. Eren, C. Gauld, Smartphone use among young drivers: Applying an extended Theory of Planned Behaviour to predict young drivers' intention and engagement in concealed responding, *Accid. Anal. Prev.*, **164** (2022), 106474. https://doi.org/10.1016/j.aap.2021.106474
47. Y. Xiao, Y. Liu, Z. Liang, Study on road-crossing violations among young pedestrians based on the theory of planned behavior, *J. Adv. Transp.*, **2021** (2021), 1–11. https://doi.org/10.1155/2021/6893816
48. M. Shukri, F. Jones, M. Conner, Theory of planned behaviour, psychological stressors and intention to avoid violating traffic rules: A Multi-Level modelling analysis, *Accid. Anal. Prev.*, **169** (2022), 106624. https://doi.org/10.1016/j.aap.2022.106624
49. A. K. Yadav, S. S. Choudhary, N. M. Pawar, N. R. Velaga, Are you willing to drink and drive? An investigation in Indian scenario using an extended prototype willingness model, *Traffic Inj. Prev.*, **22** (2021), S134–S136. https://doi.org/10.1080/15389588.2021.1982592
50. M. Basse, D. Twisk, S. A. Kaye, Pro-social behaviour in young passengers: Predictive utility of the social reaction pathway of the prototype willingness model, *Transp. Res. Part F Psychol. Behav.*, **74** (2020), 151–160. https://doi.org/10.1016/j.trf.2020.08.014
51. M. Hou, S. Chen, J. Cheng, The effect of risk perception and other psychological factors on mobile phone use while crossing the street among pedestrians, *Accid. Anal. Prev.*, **170** (2022), 106643. https://doi.org/10.1016/j.aap.2022.106643
52. S. S. Tavafian, T. Aghamolaei, D. Gregory, A. Madani, Prediction of seat belt use among Iranian automobile drivers: application of the theory of planned behavior and the health belief model, *Traffic. Inj. Prev.*, **12** (2011), 48–53. https://doi.org/10.1080/15389588.2010.532523
53. W. Nambulee, S. Jomnonkwao, S. Siridhara, V. Ratanavaraha, Modelling of seat belt use intention for intercity buses based on health belief model, *Transportmetrica A Transp. Sci.*, **15** (2018), 944–962. https://doi.org/10.1080/23249935.2018.1551946
54. M. Ali, N. Haidar, M. M. Ali, A. Maryam, Determinants of seat belt use among drivers in Sabzevar, Iran: a comparison of theory of planned behavior and health belief model, *Traffic Inj. Prev.*, **12** (2011), 104–109. https://doi.org/10.1080/15389588.2010.535227

Appendix

Table A1. The specific measurement items used in the study.

Construct	Items
Behavior [18,52]	I always remind people riding in the back seat to wear seat belts when I am driving or riding in a car.
	How often do you buckle up when you're in the back of a car?
	I buckle the seat belt voluntarily when seated in the back seat.
	I buckle the seat belt after being prompted by others when seated in the back seat.
Behavioral intention [16–18,52–54]	In the future, I'll wear a seat belt when I sit in the back seat.
	In the future, I will always remind myself to wear a seat belt when sitting in the back seat.
	In the future, I will remind my family to buckle up when they sit in the back seat.
	In the future, I will remind people to buckle up when they sit in the back seat.
Behavioral willingness [19,20,50]	If you are sitting in the back of a taxi, how likely are you to wear a seat belt?
	If you're in the back seat of a friend's car, how likely are you to wear a seat belt?
	If you are driving and your family is in the back seat, how likely are you to ask your family to wear their seat belts?
	If you are driving and your friend is in the back seat, how likely are you to ask your friend to wear a seat belt?
Attitude [16,17,52]	Unless passengers in the back seat fasten seat belts, the driver should not drive.
	The police should step up enforcement against people who do not wear seat belts in the back seat.
	People should be urged to wear seat belts in the back seat through stronger public relations campaigns.
	When seated in the back seat, wearing a seat belt can help reduce injury risks.
Subjective norm [16–18,52,54]	My family keeps urging me to wear a seat belt when I sit in the back seat.
	If I am in the back seat of a taxi, the driver urges me to put on my seat belt.
	I often see advertisements promoting the importance of wearing seat belts in the back seat.
	My friends keep urging me to wear a seat belt when I sit in the back seat.
Descriptive norm [21–23]	My family always wears their seat belts when they sit in the back seat.
	My friends always wear their seat belts when they sit in the back seat.
	Many people always wear their seat belts when they sit in the back seat.
Perceived behavioral control [17,52,54]	Using a back seat belt is very easy for me.
	Using a back seat belt isn't troublesome.
	It is easy to remember to wear a back seat belt.
Perceived law enforcement (Proposed by the authors)	Traffic police strictly enforce the policy that does not allow people to sit in the back seats of cars without wearing seat belts.
	A traffic police officer will pull you over if you do not wear a back seat belt in the car.
	Traffic police ask people to wear back seat belts.
Prototype favorability [19,20,50]	People who wear a back seat belt are smart.
	People who wear a back seat belt are careful.
	People who wear a back seat belt are responsible.
	People who wear a back seat belt pay great attention to preventing risks.

Continued on next page

Construct	Items
Prototype similarity [19,20,50]	Do you resemble the typical person your age who wears a belt in the back seat? How similar or different are you to the type of person your age who regularly wears a belt in the back seat? Do the characteristics of a passenger who wears a belt in the back seat also describe you? To what extent are you like the typical person your age who regularly wears a back seat belt?