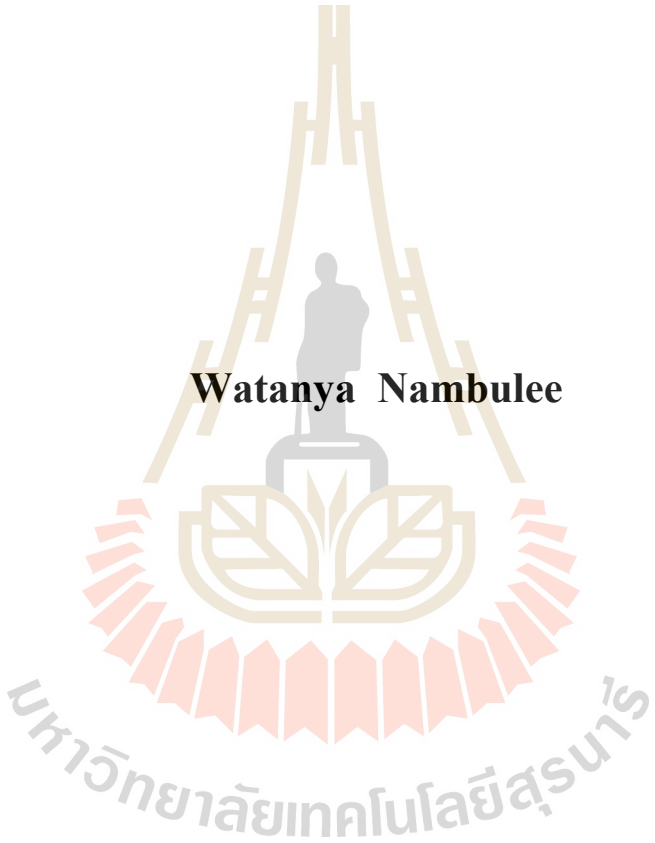
FACTORS AFFECTING OF SEAT BELT USAGE INTENTION FOR INTERCITY BUS'S PASSENGER

Watanya Nambulee



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การศึกษาปัจจัยที่มีอิทธิพลในการตั้งใจใช้เข็มขัดนิรภัย ของผู้โดยสารระบบขนส่งสาธารณะระหว่างเมือง

นางสาววทัญญา นามบุรี

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิศวกรรมศาสตรดุษฎีบัณฑิต
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FACTORS AFFECTING OF SEAT BELT USAGE INTENTION FOR INTERCITY BUS'S PASSENGER

Suranaree University of Technology has approved this thesis submitted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

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วทัญญา นามบุรี : การศึกษาปัจจัยที่มีอิทธิพลในการตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสารระบบขนส่งสาธารณะระหว่างเมือง (FACTORS AFFECTING OF SEAT BELT USAGE INTENTION FOR INTERCITY BUS'S PASSENGER) อาจารย์ที่ปรึกษา : ศาสตราจารย์ ดร.วัฒนวงศ์ รัตนวราห, 149 หน้า.

ปัจจุบันปัญหาการเกิดอุบัติเหตุจากรถโดยสารระหว่างเมืองเพิ่มมากขึ้นส่งผลให้มีจำนวนผู้โดยสารที่ได้รับบาดเจ็บและเสียชีวิตเป็นจำนวนมาก แต่สามารถป้องกันความรุนแรงและลดอัตราเสี่ยงจากการได้รับบาดเจ็บและเสียชีวิตเหล่านี้ได้โดยการคาดเข็มขัดนิรภัยระหว่างการเดินทาง โดยการศึกษานี้มีวัตถุประสงค์เพื่อหาปัจจัยที่ส่งผลต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสารรถโดยสารระหว่างเมืองโดยทำการแบ่งกลุ่มการวิเคราะห์ออกเป็น 2 กลุ่ม คือ กลุ่มวัยรุ่นและกลุ่มวัยผู้ใหญ่ ซึ่งประยุกต์ใช้ทฤษฎีพฤติกรรมตามแผน แบบแผนความเชื่อด้านสุขภาพ และทฤษฎีบุคลิกภาพแบบเชื่อในปัจจัยควบคุม วิเคราะห์เพื่อหาปัจจัยที่ส่งผลต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัย โดยใช้โมเดลสมการโครงสร้าง จากการวิเคราะห์พบว่า

จากการประยุกต์ใช้ทฤษฎีพฤติกรรมตามแผน ปัจจัยที่ส่งผลต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสารรถโดยสารระหว่างเมืองในกลุ่มวัยรุ่น คือ การรับรู้ความเสี่ยงจากการได้รับบาดเจ็บ ซึ่งมีอิทธิพลมากที่สุด รองลงมาคือ ทัศนคติที่มีต่ออุปกรณ์เข็มขัดนิรภัย ประสบการณ์การใช้เข็มขัดนิรภัยที่ผ่านมา การรับรู้กฎหมายบังคับใช้เข็มขัดนิรภัย การควบคุมพฤติกรรมของตนเอง และการคล้อยตามกลุ่มอ้างอิง ตามลำดับ ซึ่งทั้ง 6 ปัจจัยนี้มีอิทธิพลทางบวกอย่างมีนัยสำคัญต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสาร ส่วนปัจจัยที่มีอิทธิพลทางลบอย่างมีนัยสำคัญต่อพฤติกรรมความตั้งใจใช้มากที่สุด คือ ทัศนคติทางอารมณ์ ส่วนปัจจัยที่ส่งผลต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสารรถโดยสารระหว่างเมืองในกลุ่มวัยผู้ใหญ่ คือ การรับรู้ความเสี่ยงจากการได้รับบาดเจ็บ มีอิทธิพลมากที่สุด รองลงมาคือ ทัศนคติที่มีต่ออุปกรณ์เข็มขัดนิรภัย การรับรู้กฎหมายบังคับใช้เข็มขัดนิรภัย ประสบการณ์การใช้เข็มขัดนิรภัยที่ผ่านมา การควบคุมพฤติกรรมของตนเอง และการคล้อยตามกลุ่มอ้างอิง ตามลำดับ ซึ่งปัจจัยเหล่านี้มีอิทธิพลทางบวกอย่างมีนัยสำคัญต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสาร ส่วนทัศนคติทางอารมณ์มีอิทธิพลทางลบอย่างมีนัยสำคัญต่อพฤติกรรมความตั้งใจใช้

ส่วนการประยุกต์ใช้แบบแผนความเชื่อด้านสุขภาพ พบว่า ปัจจัยที่ส่งผลต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสารรถโดยสารระหว่างเมืองในกลุ่มวัยรุ่น คือ การรับรู้ความรุนแรงจากการได้รับอุบัติเหตุมีอิทธิพลมากที่สุด รองลงมาคือ การรับรู้ผลประโยชน์จากการใช้เข็มขัดนิรภัย ประสบการณ์การใช้เข็มขัดนิรภัยที่ผ่านมา การรับรู้ความเสี่ยงในการเกิดอุบัติเหตุ สิ่งกระตุ้นการรับรู้กฎหมายบังคับใช้เข็มขัดนิรภัย แรงจูงใจในเรื่องสุขภาพ และการรับรู้ความสามารถตนเอง

ตามลำดับ ซึ่งทั้ง 8 ปัจจัยมีอิทธิพลทางบวกอย่างมีนัยสำคัญต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสาร ส่วนปัจจัยที่มีอิทธิพลทางลบอย่างมีนัยสำคัญต่อพฤติกรรมความตั้งใจใช้มากที่สุด คือ การรับรู้อุปสรรคในการใช้เข็มขัดนิรภัย และปัจจัยที่ส่งผลต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสารรถโดยสารระหว่างเมืองในกลุ่มวัยผู้ใหญ่ คือ การรับรู้ผลประโยชน์จากการใช้เข็มขัดนิรภัยมีอิทธิพลมากที่สุด รองลงมาคือ การรับรู้ความรุนแรงจากการได้รับอุบัติเหตุ การรับรู้ความเสี่ยงในการเกิดอุบัติเหตุ ประสบการณ์การใช้เข็มขัดนิรภัยที่ผ่านมา การรับรู้กฎหมายบังคับใช้เข็มขัดนิรภัย สิ่งกระตุ้น แรงจูงใจในเรื่องสุขภาพ การรับรู้ความสามารถตนเอง ตามลำดับ ซึ่งปัจจัยเหล่านี้มีอิทธิพลทางบวกอย่างมีนัยสำคัญต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสาร ส่วนการรับรู้อุปสรรคในการใช้เข็มขัดนิรภัยมีอิทธิพลทางลบอย่างมีนัยสำคัญต่อพฤติกรรมความตั้งใจใช้

และจากการประยุกต์ใช้ทฤษฎีบุคลิกภาพแบบเชื่อในปัจจัยควบคุม พบว่า ปัจจัยที่ส่งผลต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสารรถโดยสารระหว่างเมืองในกลุ่มวัยรุ่น คือ ความเชื่อที่ว่าเหตุการณ์ต่าง ๆ ที่เกิดขึ้นกับตนเองมีสาเหตุมาจากการกระทำของตนเอง รองลงมาคือ ประสบการณ์ที่ผ่านมาในการใช้เข็มขัดนิรภัย ความเชื่อที่ว่าผลของเหตุการณ์ที่เกิดขึ้นกับตัวเองมาจากสิ่งแวดล้อมหรืออิทธิพลภายนอกที่ตนเองไม่สามารถควบคุมได้ และความรู้กฎหมาย และบทลงโทษของกฎหมาย ตามลำดับ ส่วนปัจจัยที่ส่งผลต่อพฤติกรรมความตั้งใจใช้เข็มขัดนิรภัยของผู้โดยสารรถโดยสารระหว่างเมืองในกลุ่มวัยผู้ใหญ่ คือ ความเชื่อที่ว่าเหตุการณ์ต่าง ๆ ที่เกิดขึ้นกับตนเองมีสาเหตุมาจากการกระทำของตนเอง รองลงมาคือ ความเชื่อที่ว่าผลของเหตุการณ์ที่เกิดขึ้นกับตัวเองมาจากสิ่งแวดล้อมหรืออิทธิพลภายนอกที่ตนเองไม่สามารถควบคุมได้ ความรู้กฎหมายและบทลงโทษของกฎหมาย และประสบการณ์ที่ผ่านมาในการใช้เข็มขัดนิรภัย ตามลำดับ จากผลการวิเคราะห์โดยภาพรวมของทั้งสองกลุ่มนี้แสดงให้เห็นว่า ทั้งกลุ่มวัยรุ่นและวัยผู้ใหญ่มีความเชื่อที่ว่าเหตุการณ์ต่าง ๆ ที่เกิดขึ้นกับตนเองมีสาเหตุมาจากการกระทำของตนเอง

จากผลการวิเคราะห์ทั้งหมดนี้ สามารถนำไปจัดทำข้อเสนอแนะให้เป็นแบบแผนในการรณรงค์เพื่อปลูกจิตสำนึก และตระหนักถึงความปลอดภัยในการใช้เข็มขัดนิรภัยของผู้โดยสาร อีกทั้งยังสามารถเสนอแนะแนวทางต่อภาครัฐในการรณรงค์ให้ประชาชนใช้เข็มขัดนิรภัยของผู้โดยสารรถโดยสารระหว่างเมืองซึ่งจะเป็นการช่วยลดความรุนแรงในการเกิดอุบัติเหตุและลดอัตราการเสียชีวิตของผู้โดยสารในอนาคตได้อีกด้วย

สาขาวิชา วิศวกรรมขนส่ง ลายมือชื่อนักศึกษา อรทัญญา นามบุรี

ปีการศึกษา 2561 ลายมือชื่ออาจารย์ที่ปรึกษา

WATANYA NAMBULEE : FACTORS AFFECTING OF SEAT BELT USAGE INTENTION FOR INTERCITY BUS'S PASSENGER. THESIS ADVISOR : PROF. VATANAVONGS RATANAVARAHA, Ph.D., 149 PP.

INTERCITY-BUSPASSENGER/SEAT BELT USE/THEORY OF PLANNED BEHAVIOUR/STRUCTURAL EQUATION MODELLING/ HEALTH BELIEF MODEL/ LOCUS OF CONTROL/MULTI-GROUP ANALYSIS

This study aims to determine the factors that affect the seat belt use behavioural intention of intercity bus passengers. These factors could be considered for policy plans are proposed to the government for promoting more seat belt use, divided into teenager and adult groups, by applying of the theory of planned behaviour (TPB), health belief model (HBM) and locus of control (LC). Structural-equation modelling was used to analyse factors affecting intention of using a seat belt among both groups of intercity-bus passengers. The results of the study shows that as follow:

In the analysis of seeking factors affecting seat-belt-use behavioural intention of teenage and adult intercity-bus passengers by applying TPB. In the teenage group, injury risk had a significantly positive influence on seat-belt-use behavioural intention, followed in order by instrumental attitude, past experience, perception of seat belt enforcement, behavioural control and subjective norm. The emotion attitude had a significantly negative influence. In the adult group, injury risk also had a significantly positive influence on seat-belt-use behavioural intention, followed in order by instrumental attitude, perception of seat belt enforcement, past experience,

behavioural control and subjective norm. The emotional attitude had the same significantly negative influence as the teenage group.

Predictors of behavioural intention seatbelt usage among teenagers and adults by applying of health belief model (HBM). The most affecting factors of the seat belt use behavioural intention of intercity bus passengers in the teenager group were perceived severity, followed by perceived benefits, past experience, perceived susceptibility, cue to action, perceived enforcement, health motivation and self-efficacy. Perceived barriers had the most significantly negative influence on the seat belt use behavioural intention. The most-affecting factors of the seat belt use behavioural intention of intercity bus passengers in the adult group was perceived benefits, followed by perceived severity, perceived susceptibility, past experience, perceived enforcement, cue to action, health motivation and self-efficacy. Perceived barriers was the factor having the most significantly negative influence on the seat belt use behavioural intention.

And locus of control (LC), The factor of teenage group that had a significant positive influence and the highest coefficient of standardised factor loading value towards seat belt use BI was Internality (IN), followed by past experience, Externality (EX) and Knowledge of seat belt enforcement (EN). For adult groups, the factor that had a significant positive influence and highest coefficient of standardised factor loading value towards seat belt use was IN, followed by EX, EN and past experience.

School of Transportation Engineering Student's Signature ฐกัญญา ชามนวี

Academic Year 2018 Advisor's Signature

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Watanya Nambulee

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

Page

TABLE OF CONTENTS (Continued)

Page

TABLE OF CONTENTS (Continued)

Page

TABLE OF CONTENTS (Continued)

Page

TABLE OF CONTENTS (Continued)

Page

LIST OF TABLES

Table **Page**

LIST OF TABLES (Continued)

Table **Page**

LIST OF FIGURES

Figure **Page**

SYMBOLS AND ABBREVIATIONS

α	=	Statistically significant level
β	=	Structural coefficient
χ^2	=	Chi-square
df	=	Degree of freedom
RMSEA	=	Root mean square of approximation
SRMR	=	Standardized root mean residual
CFI	=	Comparative fit index
TLI	=	Tucker Lewis Index
SEM	=	Structural equation modelling
CFA	=	Confirmatory factor analysis
EFA	=	Exploratory factor analysis
CR	=	Composite reliability
AVE	=	Average variance extracted
IOC	=	Index of item objective congruency

CHAPER I

INTRODUCTION

1.1 Rationale of the research

1.1.1 Situations of Intercity Bus Accidents in Thailand

At present, Thailand has an increasing demand for travelling to serve the national growth due to the development of diverse areas whether in the fields of agriculture, commerce or business. Thus, the transportation system has been developed to meet the needs of travelling in the future. An Intercity bus is a popular vehicle for people travelling with individual's various purposes either business trips, tour trips, study or even homecoming. From these reasons, the demand of service has been steadily rising with subsequently increasing problems. For example, accidents were caused by intercity bus as shown in Figure 1.1 showing the record of more than 700 accidents a year as 1.22 percent from all kinds of vehicles in 2015. (Royal Thai Police, 2015) with more than 2500 injuries, and more than 360 fatalities (Department of Land Transport, 2015). Despite the smaller proportion of intercity bus accident occurrences when compared with other vehicle types, the number of fatalities and injuries of each accident is particularly large. The intercity bus accidents are wholly caused by overspeeding, sleeping driving, cutting someone off etc. (Department of Land Transport, 2015).

Figure 1.1 Accidents were caused by intercity bus.

As mentioned above, we can see that each accident is something that passengers can not predict or control. Likewise, Thailand has been unceasingly confronting these problems; there have always been news of intercity bus accidents of which the severity resulted in an immense damage which every sector has soundly recognized. Although the passengers cannot predict or control the situations, we can prevent the accident severity or reduce the risks of injuries and fatalities by seatbelt wearing (Bilgic, Barut, Karacasu, Er, and Yaliniz, 2011) which is globally concerned and placed great emphasis on while travelling (Eluru and Bhat, 2007; Olsen, Cook, Keenan, and Olson, 2010).

1.1.2 Seatbelt Wearing

A seatbelt is an appliance which can protect passengers from serious injury or fatality in accidents causing the impact on the steering wheel or other solid objects in the vehicles. It can reduce the number of deaths or serious injuries by more than 60% (Albertsson, Falkmer, Kirk, Mayrhofer, and Björnstig, 2006; Eugenia Gras,

Cunill, Sullman, Planes, and Font-Mayolas, 2007). The number of passengers wearing seatbelts in Thailand is still small. According to a survey conducted by observing seatbelt use behavior, the availability was only 40% (ThaiRoads Foundation, 2013). In addition, the data reported by the World Health Organization also found that Thailand has a seatbelt rate for the driver and Passengers in relatively low proportion when compared to developed countries (WHO, 2013) which had a high seatbelt rate by 80-90 % (Bilgic et al., 2011).

For these reasons, Thailand recognizes the importance of seat belt use during travelling not only in Thailand but also the world which put great emphasis still important and there are research studies on the use of seat belts on a continuous basis. For example,

Eugenia Gras et al. (2007) have studied the factors influencing the use and non-use of private vehicle belts on motorways in Spain. The reasons for not using seatbelts were Movement Inconvenience and Social influences while the reasons for using seatbelts were the seatbelt use of Traveler companions, the Number of experience in driving, etc. Discriminant analysis was used for analysis.

Studnek and Ferketich (2007) have studied the factors related to the seatbelt use of emergency staff (EMS). It was found that when the organization policy of the seatbelt use while driving was acknowledged, it affected the employees to use seatbelts. Multivariable logistic regression model is used for analysis.

Şimşekoğlu and Lajunen (2008b) have studied the motivation of use and non-use of private car's driver and passenger in front seat. It was found that the reason for using a seat belt during travel is the condition of the trip (travel for a long distance, high speed driving while travelling, bad weather, and hazardous road condition), safety,

habits of use and avoidance of being arrested or fined. Regarding the reasons for non-use of seatbelt, they include lack of confidence in seatbelt protection, operational impracticality, and unaccustomed to using etc. Principal component analysis (PCA) and Multiple regression analysis are used for analysis.

Routley, Ozanne-Smith, Qin, and Wu (2009) have conducted a study of factors and the use of seat belts for taxi drivers as well as their attitudes. It was found that avoidance of being arrested or fined, safety, speeding, and duration of travel affected the drivers 'seatbelt use. Regarding inconvenience and the feeling like being trapped resulted in non-use of seatbelt. It was also found that seatbelt wearing did not affect taxi driver use. This study used Independent sample t-test for analysis.

Karbakhsh, Ershadi, Khaji, and Rahimi-Sharbaf (2010) have studied the attitudes and use of seatbelts of pregnant women. It was found that factors that they do not use seat belts were the thought that the seatbelt use would increase the risk of harm to the unborn child, forgetting to wear seatbelts; they thought that seat belt wearing is not appropriate while the reasons for the seat belt use are to prevent pregnant women and fetus from accidents and husband and family members persuade or induce them to use seat belts. For analysis, the cross-sectional study method was used.

From all research mentioned above, most of them studied the use of seatbelts involving most private vehicles, whether drivers or front seat passengers who are very prevalent tar. Some research may focus on pregnant women, taxi drivers, etc. However, there have been no research studies focusing on the group of intercity bus passengers who are an important group which is very interesting to study. The situations of accident severity of each accident kill a large number of facilities. Therefore, due to the recognition of the problem significance, the researchers realize to

use the psychological model of attitude and seat belt behavioral intention of intercity bus passengers to acknowledge the influencing factors and propose the plan of policies promoting the increase in passengers' seat belt use (Kamal, Masuri, Dahlan, and Isa, 2015) for their awareness of safety passengers. In addition, this may raise the proportion of seatbelt use for the accident severity in the future.

1.2 Research Objectives

1.2.1 To apply the psychological model to study attitudes and seatbelt use behavior of intercity bus passengers by using Theory of Planned Behavior (TPB), Health Belief Model (HBM), and Locus of Control (LC).

1.2.2 To take the factors acquired from analysis to make policy recommendations or suggest guidelines for the government sector to promote people for passenger seatbelt use in intercity.

1.3 Scope of Study

The samples used for analysis were intercity bus passengers at intercity bus terminal of four provinces (Bangkok / Chiang Mai / Nakhon Ratchasima / Songkhla)

1.4 Research Benefits

1.4.1 To acknowledge the factors or attitudes that influence the seatbelt use of intercity bus passengers.

1.4.2 To be able to take the factors or attitudes acquired from the analysis to make policy recommendations or propose the government sector the guidelines for promoting the seat belt use in the future.

From all mentioned, the results of this study will be very helpful as the recommendations can be taken to be a pattern of cultivating passengers' awareness, and recognition of using seatbelts for safety. In addition, the guidelines for promoting people to use intercity bus passenger seatbelts are potentially recommended to reduce the accident severity as well as fatality rate of passengers in the future.

1.5 References

Albertsson, P., Falkmer, T., Kirk, A., Mayrhofer, E., and Björnstig, U. (2006). Case study: 128 injured in rollover coach crashes in Sweden—Injury outcome, mechanisms and possible effects of seat belts. **Safety Science**. 44(2): 87-109.

Bilgic, S., Barut, H. B., Karacasu, M., Er, A., and Yaliniz, P. (2011). The changes in usage of seat belts in Antalya, Turkey. **Procedia - Social and Behavioral Sciences**. 20: 588-593. doi: http://dx.doi.org/10.1016/j.sbspro.2011.08.065.

Department of Land Transport. (2558). **Thai RSC**. http://www.roadsafetycontrol.com /rsc-stat-main.html?cid=29.

Eluru, N., and Bhat, C. R. (2007). A joint econometric analysis of seat belt use and crash-related injury severity. **Accident Analysis & Prevention**.39(5): 1037-1049. doi: http://dx.doi.org/10.1016/j.aap.2007.02.001.

Eugenia Gras, M., Cunill, M., Sullman, M. J. M., Planes, M., and Font-Mayolas, S. (2007). Predictors of seat belt use amongst Spanish drivers. **Transportation Research Part F: Traffic Psychology and Behaviour**. 10(3): 263-269.

Kamal, W. N. H. W. A., Masuri, M. G., Dahlan, A., and Isa, K. A. M. (2015). Seat Belt Compliance and Quality of Life among Educated Young Adults in an Urban University. **Procedia - Social and Behavioral Sciences**. 202: 442-447.

Karbakhsh, M., Ershadi, Z., Khaji, A., and Rahimi-Sharbaf, F. (2010). Seat belt use during pregnancy in Iran: attitudes and practices. **Chinese Journal of Traumatology (English Edition)**. 13(5): 275-278. doi: http://dx.doi.org/10.3760/cma.j.issn.1008-1275.2010.05.004.

Olsen, C. S., Cook, L. J., Keenan, H. T., and Olson, L. M. (2010). Driver seat belt use indicates decreased risk for child passengers in a motor vehicle crash. **Accident Analysis & Prevention**. 42(2): 771-777.

Routley, V., Ozanne-Smith, J., Qin, Y., and Wu, M. (2009). Taxi driver seat belt wearing in Nanjing, China. **Journal of Safety Research**. 40(6): 449-454.

Şimşekoğlu, Ö., and Lajunen, T. (2008b). Why Turks do not use seat belts? An interview study. **Accident Analysis & Prevention**. 40(2): 470-478. doi: http://dx.doi.org/10.1016/j.aap.2007.08.002.

Studnek, J. R., and Ferketich, A. (2007). Organizational policy and other factors associated with emergency medical technician seat belt use. **Journal of Safety Research**. 38(1): 1-8. doi: http://dx.doi.org/10.1016/j.jsr.2006.09.001.

Thai Roads Foundation and Thailand Road Safety Observatory.(2556). **Seat belt use rate in Thailand 2554**.

World Health Organization (2013). **Global Status Report on Road Safety**: Supporting a Decade of Action.

CHAPTER II

THEORIES AND RELATED RESEARCH

This research reviews the concepts and theories used to study attitudes and seatbelt use behavioral intention of intercity bus passengers in order to determine conceptual framework for the study as follows; (1) Review the research related to the seatbelt use; (2) The theories used for studying attitudes and the intercity bus passenger seat belt use behavioral intention; (3) The determination of sample size; and (4) Sampling.

2.1 Review the research related to the seatbelt use

According to the review of the previous research concerning the seat belt use, the researchers have acknowledged the influencing factors which resulted in the choice of seatbelt use. The various factors from the reviewed literature were concluded as shown in Table 2.1 and they were subsequently taken to build items or tools to measure construct of each of theories including Measurement model of Theory of Planned Behavior (TPB), Health Belief Model (HBM), and Locus of Control (LC) for consequently analyzing the consistency of hypothetical model of research. The details of each theory will be subsequently explained.

Importantly, from the reviewed research related to seatbelt use, most research have studied on the private cars either the drivers or front seat passengers who are very common target group, and some research have focused on pregnant woman. However, there has been no research concerning seat belt use of intercity bus

passengers despite a large number of intercity bus accidents simultaneously causing abundant fatalities not wearing seat belts. This research aims to emphatically study the factors influencing seatbelt use of intercity bus passengers.

Table 2.1 Summary of related research.

Author(s)/year	Type of vehicle/Country	Analysis method	Factor of seat belt
Eugenia Gras, Cunill, Sullman, Planes, and Font-Mayolas (2007)	Car driver/Spanish	Discriminant analysis.	Unbelted drivers(the seat belt limited their movement , uncomfortable ,negative social influence) Seat belt use (beliefs about their friends' seat belt use, the number of years driving experience.)
Studnek and Ferketich (2007)	Front seat ambulance/USA	Multivariable logistic regression model.	Seat belt usage while in the front compartment of an ambulance increased when employees were aware of a written organizational seat belt policy.
Şimşekoğlu and Lajunen (2008)	Car driver/Turks	Conducting principal component analysis (PCA) and multiple regression analysis.	Using a seat belt (traveling conditions (such as a long trip, high speed and dangerous weather and bad road conditions.), safety, situational conditions, habit of using a seat belt, and avoiding punishment.) Not using a seat belt (situational conditions, not believing in the effectiveness, discomfort and having no habit.)
Routley, Ozanne-Smith, Qin, and Wu (2009)	Taxi driver/Chaina	Independent sample t-tests, a binomial distribution.	Using a seat belt (Fine avoidance, safety, high speed and long trips) Not using a seat belt (feeling trapped and uncomfortable) Seat belt reminder signs did not impact on driver seat belt use.
Kim, Depue, Spence, and Reine (2009)	Car driver and Front seat(high school)/USA	Binary choice model.	low seat belt use (males, African-Americans, accompanying occupants, weekends, inclement driving conditions, small size of school, lower socio-economic status, and rural county school locations.)
Şimşekoğlu and Lajunen (2009)	Passenger car/Turkish	Factor analyses and multiple regression analysis.	Seat belt use (driver behaviors (e.g., driving errors and violations) ,regular walking and adequate sleep) Not seat belt use (male, driving errors and smoking frequency)
Karbakhsh, Ershadi, Khaji, and Rahimi-Sharbaf (2010)	Passenger car(pregnancy) /Iran	Cross-sectional study.	Seat belt use (protects me from road traffic injuries, protects my fetus from road traffic injuries, my husband and other family members persuade me to wear it.) Not seat belt use (risk of injury to my fetus, forget to wear seat belt, seat belt is not properly installed.)
Lou, Mehta, and Turner (2011)	School bus/USA	Discrete choice modeling.	Seat belt use (age, gender, the home county of a student, a student's trip length, time of day, presence and active involvement of bus aide, and two levels of bus driver involvement.) driver involvement has a stronger influence compared to the presence and active involvement of a bus aide.

Table 2.1 Summary of related research (cont.).

Author(s)/year	Type of vehicle/Country	Analysis method	Factor of seat belt
Demirer, Durat, and Haşimoğlu (2012)	Car driver/Turkey	A sampling method. Analyzed the statistical relation with SPSS 15.0 software.	Seat belt use (Increased level of education, lower numbers of crashes and crash severities, Belief about seat belt protection, precaution signal) Not seat belt use (lack of habit, discomfort and short distance driving)
Vaughn, Salas-Wright, and Piquero (2012)	Driver and passenger car/USA	Binary logistic regression.	Not seat belt use (younger, male, African American or Hispanic, have incomes of less than $75,000, high school or college graduate, using alcohol and drugs, committing antisocial behaviors, and possess a dual diagnosis.)
Goldzweig et al. (2013)	Car driver/USA	A multiple regression analysis.	Seat belt use (white, black, Hispanic, female and drivers who had passengers in their vehicle, service-learning educational intervention and rural high school students)
Reagan, McClafferty, Berlin, and Hankey (2013)	Car driver/USA	Chi-square tests. And Univariate ANOVAs tested.	Seat belt use (fewer trips per day, and increased average trip speed)
Mehta and Lou (2013)	School bus/USA	Nested and mixed logit models	The factors predict students' seat belt usage behaviors.(age, gender, home county of a student, a student's trip length, time of day, seat location, presence and active involvement of bus aide and two levels of bus driver involvement.)
Goetzke and Islam (2015)	Car driver/USA	A binary logit model.	Seat belt use (male, young vehicle occupants, law enforcement, rural roads, nights and primary seat belt laws)
Bhat, Beck, Bergen, and Kresnow (2015)	Passenger car/USA	Multivariable regression.	Seat belt use (living in states with primary and secondary enforcement laws)
Cunill, Gras, Planes, Oliveras, and Sullman (2004)	Driver and passenger car/Spanish	Discriminant analysis.	Seat belt use (perceptions of risk, safety perceptions, the effectiveness of the seat belt and social influence)
Okamura, Fujita, Kihira, Kosuge, and Mitsui (2012)	Front seat car/japan	TPB	Self-efficacy, instrumental attitude (discomfort, convinced, penalty, effectiveness of belt, probability of detection) and descriptive norm.
Chaudhary, Solomon, and Cosgrove (2004)	Car driver/USA	T-test, ANOVA	Perceived risk of being ticketed, women and enforcement of laws

2.2 Theories used to study attitudes and seatbelt use behavioral intention of intercity bus passengers.

The theories used to study attitudes and seatbelts behavioral intention to use of intercity bus passengers included Theory of Planned Behavior (TPB), Health Belief Model (HBM) , and Locus of Control (LC) The detailed content in each theory is as follows;

2.2.1 Theory of Planned Behavior (TPB)

Theory of Planned Behavior (TPB), presented by Ajzen, which has been developed since 1985 (Ajzen, 1985) is Social Psychology advanced from a theory of Reasoned Action or TRA (Fishbein, 1979). The Theory of Planned Behavior (TPB) states that the reasons for human being behavior expression are Attitude toward behavior, Subjective norm and Perceived behavior control as shown in Figure 2.1.

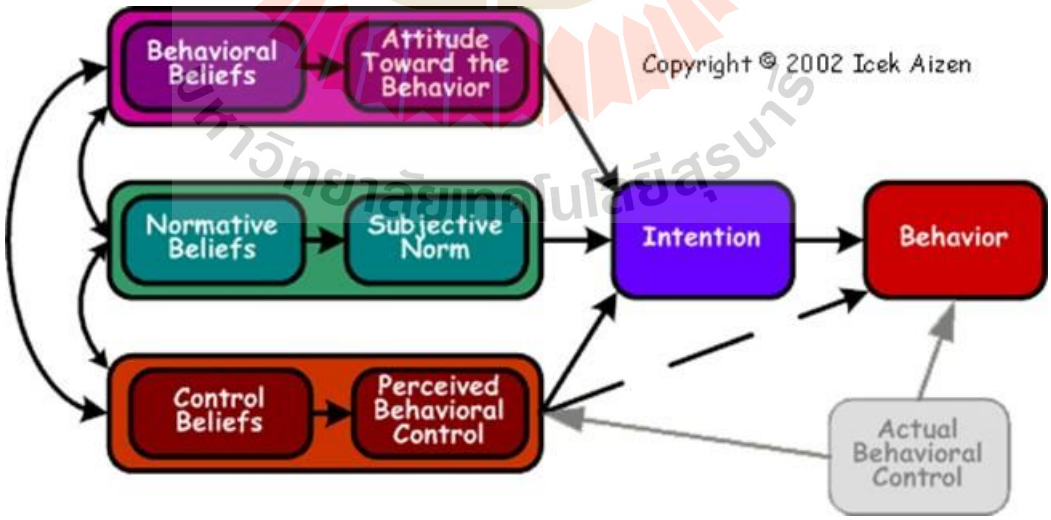


Figure 2.1 Basic model of Theory of Planned Behavior (TPB) (Ajzen, 1991)

Fundamental structure of Theory of Planned Behavior explains that the factors in individual behavior determination is Behavioral Intention since it is the intention to try to do such behavior. The intention will indicate how much effort individuals have to do that behavior. The more intention leads to the more possibility they behave. The behavioral intention as shown in Figure 2.1 is based on three determinants: Attitude toward behavior, Subjective norm and Perceived behavior control each of which can be described as follows;

2.2.1.1 Attitude toward behavior

Attitude toward behavior refers to the level of behavior results in each issue or the positive-negative assessment, the judgement whether it is a good - bad thing, support– resistance of that behavior etc. In other words, the more positive attitude individuals have toward the behavior, the stronger intention they do that behavior. On the other hand, the more negative attitude individuals have toward the behavior, the stronger intention they do not do that behavior. Moreover, the behavioral attitude measurement is the individual measurement level not general measurement. The example of constructing measures of attitude such as (Zhou, Romero, and Qin) who have investigated the factors resulting in the intention of pedestrians crossing the road before receiving traffic signals. The attitude measure is, "Do you think crossing the street before getting a signal to cross the road saves time, strongly agree - strongly disagree," etc.

2.2.1.2 Subjective norm

Subjective norm denotes that the individuals perceive that the other people who are important to them want or do not want them to do that behavior, or the beliefs that the society may put the pressure on doing or not doing that thing.

The reference group may be extensive, such as friends or colleagues, authorities or close people who are family members, son, wife, husband etc. For the example of constructing measures of Subject norm of the reference group or surrounding people, (Barton, Kologi, and Siron, 2016) have studied the people's crossing road behavior of which the measure of subject norm is " generally, I will cross the road at the area where my friend thinks that I should cross, accept– reject" etc.

2.2.1.3 Perceived behavioral Control

Perceived behavioral Control signifies the perception or the beliefs that individuals, who make decisions to do the behavior, they have ability of controlling that behavior and have opportunities for success in addition to reflect the individual feelings of the perception of the difficulty and ease of doing that behavior. The questions were used to ask samples for feelings about their ability to control such behavior. For example, (Şimşekoğlu and Lajunen, 2008a) has conducted a study on the attitude of seatbelt use while driving a car. The question that measures how you perceive yourself can be: "Do you think you can control yourself to use seatbelt while driving a car? cannot control- can control very well etc.

2.2.1.4 Behavioral Intention

Behavioral Intention is the readiness for doing behavior, intention, or the needs of trying to doing that behavior which is under the strong individual control. The example of intention measures development, or behavioral intention is such as (Lajunen and Räsänen, 2004) who have conducted the study of factors resulting in helmet use intention among teenagers. The intention measure or behavioral intention is "In the future, I will take a ride without helmet wearing , " Very likely - no trend at all" etc.

2.2.1.5 Behavior

Behavior refers to the deeds or expressions or the responses to anything.

Theory of Planned Behavior (TPB) can be used in a wide variety of disciplines, depending on which behavior individual researcher is interested in studying. In research related to transport and safety, this theory was used for analysis (Laborda et al., 2014; Lee, Geiger-Brown, and Beck, 2016; Paris and Broucke, 2008; Rowe et al., 2016; Wang et al., 2016). Even research related to health environmental and social (E. Kim, Lee, Sung, and Choi, 2016; Lin, Updegraff, and Pakpour, 2016; Yadav and Pathak, 2016), this theory has been widely applied. In the case of seatbelt use of intercity bus which there has been no researcher conducting, it is very interesting to introduce the Theory of Planned Behavior (TPB) as a part of an analysis for the attitudes and behavioral intention to use seat belts for intercity bus passengers.

2.2.2 Health Belief Model (HBM)

Health Belief Model (HBM) has been developed to understand human behavior in the field of health by considering various factors related to behaviors influencing sickness and treatment. Rosenstock (Rosenstock, 1988) was the first group studying and applying health belief patterns to describe health problems to explain health problems. The concept of health beliefs has been influenced by Kurt Lewin's Field theory (Lewin, 1939) which is taken to explain the individual behavior, individual perception and motivation. The way individuals behave to avoid the disease is on the beliefs that they are at risk for illness, the disease is severe, and it affects their way of life. In addition, their practices are able to lead to good results which reduce the risk of disease or its severity. Later, Becker (Becker, 1977) has

improved Health Belief Model to explain and predict prevention behaviors and other behaviors by adding other factors in addition to individual perception influencing the disease prevention as shown in Figure 2.2 with the details as follows;

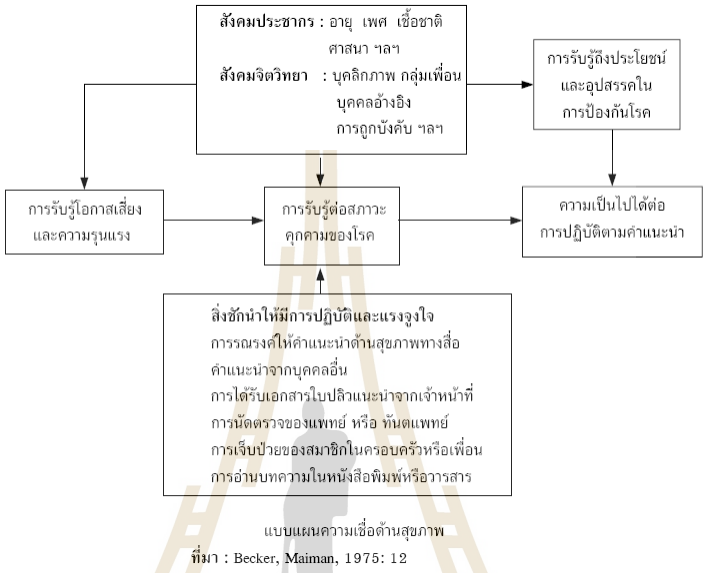


Figure 2.2 Becker and Maiman (Becker, 1977)

2.2.2.1 **Perceived Susceptibility**

Perceived Susceptibility refers to individual's beliefs directly affecting their behaviors to follow the recommendations for them both in common health and health problem conditions. Individuals have different belief levels; they avoid the sickness by following different suggestions for their health prevention and treatment which are individual beliefs to the physician diagnostic accuracy, the chance of illness recurrence predictions, or the ease of getting various sickness. There have been many research supporting the beliefs that the sickness risks positively correlated with officer’s suggestions. For example, when individuals get sick of any disease, they will feel that the sickness recurrence positively correlated with their

behavioral practice to prevent the disease to return to them, for example, “I feel that there is a chance of getting sick with an intestinal disease if I eat high non-organic food in the future " (Yazdanpanah et al., 2015) , etc.

2.2.2.2 Perceived Severity

Perceived Severity is the assessment of perceived disease severity, health problems, or the effects of disease causing disability or death. The severity assessment is based on the different levels of individual’s motivation for the illness which may be perceived that the illness severity can lead to disability or death, or may affect the job responsibility. When individuals perceive the disease or illness severity, it will affect them to follow the recommendations to prevent the sickness. According to a large number of research, it was found that perceived disease severity has positive correlation with disease preventive behavior such as “if I get sickness caused by non-organic diet, it will seriously affect the life quality” (Yazdanpanah et al., 2015) etc.

2.2.2.3 Perceived Benefits

Perceived Benefits of illness treatment and prevention refers to the individuals who seek for the ways of practice for disease recovery or disease prevention with the beliefs that it is a good, useful, and appropriate deed to cure it. Therefore, the decision to follow the recommendations consequently depends on the comparison between advantages and disadvantages of such behavior by choosing to behave in the ways originating advantages more than disadvantages such as “If I eat organic food, it will improve my health.” (Yazdanpanah et al., 2015) etc.

2.2.2.4 Perceived Barriers

Perceived Barriers denotes the advanced prediction of individual towards practice behaviors related to the individual health in a negative way. This may include costs or consequences of performing certain activities, such as blood tests or special examination causing discomfort, services or hygiene practices which obstruct occupational practices or daily life. Thus, Perceived barriers is an important factor in disease prevention behaviors. In addition, the patient behavior can predict cooperation behavior in illness treatment, for example, “Eating organic food is a waste of time and money." (Yazdanpanah et al., 2015) etc.

2.2.2.5 Cues to Action

Cues to Action is an event or thing that encourages the individual to behave in the preferred way. Becker and Maiman (Becker, 1977) have stated that in order to achieve the complete Health Belief model, the cues to action to be considered should consist of two types including Internal cues, i.e. perception of their own body conditions such as the symptoms of the illness and External Cues or external stimuli such as receiving news through the media, or warnings from beloved or respectful ones (husband, wife, parent, etc.), for example, "I have read about diet that organic food can help reduce the risk of intestinal diseases" (Yazdanpanah et al., 2015) and so on.

2.2.2.6 Health Motivation

Health Motivation refers to the emotional state triggered by health issues such as intention levels, attentions, attitudes, and health benevolence, for example, "I think nothing is more important than good health." (Yazdanpanah et al., 2015).

The Health Belief Model (HBM) is very popular in the field of science and medicine, for example, the study of motivation to participate in community cardiac rehabilitation, (Horwood, Williams, and Mandic, 2015) the knowledge assessment about Hepatitis C and Health beliefs (Rashrash, Maneno, Wutoh, Ettienne, and Daftary, 2016), the application of Health Belief Model (HBM) to correct the comprehension on the use of antihypertensive drugs (Yue, Li, Weilin, and Bin, 2015), a study of the differences between pregnant women who choose birth by surgery and natural birth (Darsareh, Aghamolaei, Rajaei, Madani, and Zare). The researchers found that the Health Belief Model (HBM) theory is another interesting theory in analyzing attitudes and seatbelt use behavioral intention of intercity bus passengers belts to search for the factors or motives for seatbelt use.

2.2.3 Locus of Control (LC)

Locus of Control (LC) was invented by Rotter (Rotter, 1966) who explained that individuals can explain the cause factors of their behaviors either originating from themselves or external environment. The different cause factors of their behaviors make individuals behave differently. Rotter classified control factors into two types:

Internal Locus of Control is that individuals believe or perceive that the events occurring to them are a result of their actions or abilities. The success or failure that they receive is successively derived from their actions and they can control them by themselves, for example, “if the pilots follow the flight rules, they can avoid accidents.” (You, Ji, and Han, 2013) and “the risk of accidents while riding a bicycle depends on the cyclist who is riding his bike by himself” (Lajunen and Räsänen, 2004) etc.

External Locus of Control is the individuals' belief or perception that the causes or effects of events or things occurring to them are from the environment or external influences which are uncontrollable such as destiny, fate, supernatural or the power of others they cannot involve. Their own success or failure has been already determined without their ability to control, such as "the casualty of an airplane accident is caused by something beyond of control" (You et al., 2013), and "An accident occurring while riding a bicycle is caused by a car driver." (Lajunen and Räsänen, 2004) etc.

In addition, Weiner (Weiner, 1976) defines Locus of Control as a result of successful experiences or the past failure of an individual. There is an assumption of the causes of success or failure occurring that they are from internal factors or external factors. Internal factors are matters of competence and effort of an individual while external factors are those of the ease and difficulty of the task and destiny.

Locus of Control (LC) has been also used in many research fields whether in the medical field such as the study of economic and social distress affecting depression (Culpin, Stapinski, Miles, Araya, and Joinson, 2015), or the belief assessment in control factors, and the hope for the intestinal diseases treatment (Moreira, Marques, Salomé, Cunha, and Pinheiro) etc., or even in the field of education such as the examination of the relationship between the belief in control factors and the perception of the excellence of elementary school executives (Isman and Kıral, 2015). However, there has never been any researcher conducting the work related to the seatbelt use of intercity bus. It is of great interest to introduce the Locus

of Control (LC) as a part of analysis in the study of attitudes and seatbelt use behavioral intention of intercity bus passengers.

2.2.4 Structural equation modeling (SEM)

Structural equation modeling: SEM is an integrated analysis between models with multiple equations at the same time, and variable measurement in psychology and sociology. All equations can use factual variables which are physical features and latent features. SEM is an ideal statistical technique to be used for Confirmatory rather than Exploratory (Bollen, 1989).

For using SEM to examine Construct Validity of Latent Variables, SEM analysis can estimate the parameters showing how much each question is the representative of the latent variables to be measured by the correlation coefficient between the observable variables and the latent feature variables, as well as measurement errors.(Kline, 2011) In addition, SEM is also used to confirm model consistency according to hypothesis identifying the details of variables relationship in order to explain the relationship of the whole set of variables both observable variables and the latent variables which cannot be directly observed.

The significant steps of SEM analysis are Model specification, Model identification, Model estimation, and Measurement model fit (Byrne, 2012).

The Model specification used in SEM analysis consists of 2 types including Specifying relationship which constructs the model showing relationship diagram of variables, and Establishing causation which builds Path diagram of variables.

The Structural Equation Model consists of the measurement model and the structural model. The analysis of the structural equation model can be conducted in two ways:

2.2.4.1 Specific Analysis of Measurement Model

Specific Analysis of Measurement Model. For quality assessment tool measuring all latent variables in the model, this part of analysis is called Confirmatory factor analysis: CFA) (Wood, 2008)

2.2.4.2 Simultaneous Structural Model Analysis

Simultaneous Structural Model Analysis or Path analysis can concurrently analyze measurement model and structural model. This benefits the Identification of specific characteristics of model which is the examination whether there are sufficient data for parameter estimation accuracy with only one answer.

For Measurement model fit examination, it is to test the data consistency with the models determined according to theories. The consistency index can be measured as follows;

(1) χ^2/df should be less than 3 (Kline, 2011).

(2) The value of root mean square residual error of approximation (RMSEA) should be less than or equal to 0.07 (Steiger, 2007).

(3) The value of comparative fit index (CFI) should be more than or equal to 0.90 (Hu, 1999).

(4) The value of Tucker–Lewis index (TLI) or Non-normed fit index (NNFI) should be more than or equal to 0.80 (Jomnonkwao, Sangphong, Khampirat, Siridhara, and Ratanavaraha, 2016).

(5) The value of standardized root mean square residual (SRMR) should be less than or equal to 0.08 (Hu, 1999).

Structural equation modeling (SEM) will be taken to be the tool for studying attitudes and seatbelt use behavioral intention of intercity bus passengers in order to know the factors that influence the choice to use, and subsequently take the factors to propose in policy planning or suggest guidelines for promoting intercity bus passenger seatbelt use. Furthermore, this measurement is the examination whether there is consistency between the data and the models which are determined according to the theories or not.

2.3 Sample size Determination

The appropriate sample size for data analysis is based on the number of variables. In other words, if the variables are numerous, the sample size should be large. The sample size should not be less than 20 times of the variables (Tabachnick, 1983) or should not be lower than 15 times of the variables (Golob, 2003). However, for the sample size determination, some researchers have suggested that sample size which is not less than 10 times is considered valid. Gorsuch (Gorsuch, 1983) has proposed that the data size which is more than at least 5-10 times of the variable number is sufficient. In addition, Knapp and Brown (Knapp, 1995) have recommended that the proportion of samples per variable, at least, should not be less than 3 cases per 1 variable etc.

2.4 Sampling

Stratified sampling is conducted by dividing population into subgroups or strata of which the population in each stratum are homogeneous. Subsequently, simple random sampling is used to acquire the samples according to the proportion of sample size and population.

2.5 References

Ajzen, I. (1985). **From intentions to actions: A theory of planned behavior**. In Action control. Springer Berlin Heidelberg.11-39.

Ajzen, I. (1991). Theories of Cognitive Self-RegulationThe theory of planned behavior. **Organizational Behavior and Human Decision Processes**. 50(2): 179-211. doi: http://dx.doi.org/10.1016/0749-5978(91)90020-T.

Barton, B. K., Kologi, S. M., and Siron, A. (2016). Distracted pedestrians in crosswalks: An application of the Theory of Planned Behavior. **Transportation Research Part F: Traffic Psychology and Behaviour**. 37: 129-137. doi: http://dx.doi.org/10.1016/j.trf.2015.12.012.

Becker, M. H., Maiman, L. A., Kirscht, J. P., Haefner, D. P., and Drachman, R. H. (1977). The Health Belief Model and Prediction of Dietary Compliance: A Field Experiment. **Journal of Health and Social Behavior**. 18(4): 348-366. doi: 10.2307/2955344.

Bhat, G., Beck, L., Bergen, G., and Kresnow, M.-j. (2015). Predictors of rear seat belt use among U.S. adults, 2012. **Journal of Safety Research**. 53: 103-106. doi: http://dx.doi.org/10.1016/j.jsr.2015.03.011.

Bollen, K. A. (1989). **Structural Equations with Latent Variables**. New York: John Wiley and Sons.

Byrne, B. M. (2012). **Structural equation modeling with Mplus : basic concepts, applications, and programming**. New York: Routledge Academic.

Chaudhary, N. K., Solomon, M. G., and Cosgrove, L. A. (2004). The relationship between perceived risk of being ticketed and self-reported seat belt use. **Journal of Safety Research**. 35(4): 383-390. doi: http://dx.doi.org/10.1016/j .jsr.2004.03.015.

Culpin, I., Stapinski, L., Miles, Ö. B., Araya, R., and Joinson, C. (2015). Exposure to socioeconomic adversity in early life and risk of depression at 18 years: **The mediating role of locus of control. Journal of Affective Disorders**. 183: 269-278. doi: http://dx.doi.org/10.1016/j.jad.2015.05.030.

Cunill, M., Gras, M. E., Planes, M., Oliveras, C., and Sullman, M. J. M. (2004). An investigation of factors reducing seat belt use amongst Spanish drivers and passengers on urban roads. **Accident Analysis & Prevention**. 36(3): 439-445. doi: http://dx.doi.org/10.1016/S0001-4575(03)00039-3.

Darsareh, F., Aghamolaei, T., Rajaei, M., Madani, A., and Zare, S. (2016). The differences between pregnant women who request elective caesarean and those who plan for vaginal birth based on Health Belief Model. **Women and Birth**. doi: http://dx.doi.org/10.1016/j.wombi.2016.05.006.

Demirer, A., Durat, M., and Haşimoğlu, C. (2012). Investigation of seat belt use among the drivers of different education levels. **Safety Science**. 50(4): 1005-1008. doi: http://dx.doi.org/10.1016/j.ssci.2011.12.013.

Eugenia Gras, M., Cunill, M., Sullman, M. J. M., Planes, M., and Font-Mayolas, S. (2007). Predictors of seat belt use amongst Spanish drivers. **Transportation Research Part F: Traffic Psychology and Behaviour**. 10(3): 263-269. doi: http://dx.doi.org/10.1016/j.trf.2006.11.003.

Fishbein, M. (1979). A theory of reasoned action: some applications and implications.

Goetzke, F., and Islam, S. (2015). Determinants of seat belt use: A regression analysis with FARS data corrected for self-selection. Journal of Safety Research. 55: 7-12. doi: http://dx.doi.org/10.1016/j.jsr.2015.07.004.

Goldzweig, I. A., Levine, R. S., Schlundt, D., Bradley, R., Jones, G. D., Zoorob, R. J., and Ekundayo, O. J. (2013). Improving seat belt use among teen drivers: Findings from a service-learning approach. **Accident Analysis & Prevention**. 59: 71-75. doi: http://dx.doi.org/10.1016/j.aap.2013.04.032.

Golob, T. F. (2003). Structural equation modeling for travel behavior research. **Transportation Research Part B: Methodological**. 37(1): 1-25. doi: http://dx.doi.org/10.1016/S0191-2615(01)00046-7.

Gorsuch, R. L. (1983). **Factor Analysis (2nd ed.)**. New Jersey: Lawrence Erlbum Associates, Hilldale.

Horwood, H., Williams, M. J. A., and Mandic, S. (2015). Examining Motivations and Barriers for Attending Maintenance Community-Based Cardiac Rehabilitation Using the Health-Belief Model. Heart, **Lung and Circulation**. 24(10): 980-987. doi: http://dx.doi.org/10.1016/j.hlc.2015.03.023.

Hu, L. t., and Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. **Structural**

Equation Modeling: A Multidisciplinary Journal. 6(1): 1-55. doi: 10.1080/10705519909540118.

Isman, A., and Kıral, E. (2015). International Conference on New Horizons in Education, INTE 2014, 25-27 June 2014, Paris, France The Relationship between Locus of Control and Perfectionism Perception of the Primary School Administrators1. **Procedia - Social and Behavioral Sciences**. 174: 3893-3902. doi: http://dx.doi.org/10.1016/j.sbspro.2015.01.1130.

Jomnonkwao, S., Sangphong, O., Khampirat, B., Siridhara, S., and Ratanavaraha, V. (2016). Public transport promotion policy on campus: evidence from Suranaree University in Thailand. **Public Transport.** 1-19. doi: 10.1007/s12469-016-0122-2.

Karbakhsh, M., Ershadi, Z., Khaji, A., and Rahimi-Sharbaf, F. (2010). Seat belt use during pregnancy in Iran: attitudes and practices. **Chinese Journal of Traumatology (English Edition)**. 13(5): 275-278. doi: http://dx.doi.org/10.3760/cma.j.issn.1008-1275.2010.05.004

Kim, E., Lee, J.-A., Sung, Y., and Choi, S. M. (2016). Predicting selfie-posting behavior on social networking sites: An extension of theory of planned behavior. **Computers in Human Behavior**. 62: 116-123. doi: http://dx.doi.org/10.1016/j.chb.2016.03.078.

Kim, S., Depue, L., Spence, L., and Reine, J. (2009). Analysis of teenage seat belt use: From the 2007 Missouri high school seat belt survey. **Journal of Safety Research**. 40(4): 311-316. doi: http://dx.doi.org/10.1016/j.jsr.2009.07.001.

Kline, R. B. (2011). **Principles and Practice of Structural Equation Modeling**: Guilford Press.

Knapp, T. R., and Brown, J. K. (1995). Ten measurement commandments that often should be broken. **Research in Nursing and Health**. 47(4): 465-469.

Laborda, J. G., Ozdamli, F., Maasoglu, Y., Koo, K. E., Nurulazam, M. D. A., Rohaida, M. Z. S., Salleh, Z. (2014). 5th World Conference on Educational SciencesExamining the Potential of Safety Knowledge as Extension Construct for Theory of Planned Behaviour: Explaining Safety Practices of Young Adults at Engineering Laboratories and Workshops. **Procedia - Social and Behavioral Sciences**. 116: 1513-1518. doi: http://dx.doi.org/10.1016/j.sbspro. 2014.01.426.

Lajunen, T., and Räsänen, M. (2004). Can social psychological models be used to promote bicycle helmet use among teenagers? A comparison of the Health Belief Model, Theory of Planned Behavior and the Locus of Control. **Journal of Safety Research**. 35(1): 115-123. doi: http://dx.doi.org/10.1016/j .jsr.2003.09.020.

Lee, C. J., Geiger-Brown, J., and Beck, K. H. (2016). Intentions and willingness to drive while drowsy among university students: An application of an extended theory of planned behavior model. **Accident Analysis & Prevention**. 93: 113-123. doi: http://dx.doi.org/10.1016/j.aap.2016.05.002.

Lewin, K. (1939). Field theory and experiment in social psychology: Concepts and methods. **American journal of sociology**. 868-896.

Lin, C.-Y., Updegraff, J. A., and Pakpour, A. H. (2016). The relationship between the theory of planned behavior and medication adherence in patients with epilepsy. **Epilepsy and Behavior**. 61: 231-236. doi: http://dx.doi.org/10.1016/ j .yebeh.2016.05.030.

Lou, Y., Mehta, G., and Turner, D. S. (2011). Factors influencing students' usage of school bus seat belts: An empirical analysis of the Alabama pilot project. **Accident Analysis & Prevention**. 43(5): 1644-1651. doi: http://dx.doi.org/ 10.1016/j. aap.2011.03.018.

Mehta, G., and Lou, Y. (2013). Modeling school bus seat belt usage: Nested and mixed logit approaches. **Accident Analysis & Prevention**. 51: 56-67. doi: http://dx.doi.org/10.1016/j.aap.2012.10.008.

Moreira, C. N. d. O., Marques, C. B., Salomé, G. M., Cunha, D. R. d., and Pinheiro, F. A. M. Health locus of control, spirituality and hope for healing in individuals with intestinal stoma. **Journal of Coloproctology**. doi: http://dx.doi.org/ 10.1016/j .jcol.2016.04.013.

Okamura, K., Fujita, G., Kihira, M., Kosuge, R., and Mitsui, T. (2012). Predicting motivational determinants of seatbelt non-use in the front seat: A field study. **Transportation Research Part F: Traffic Psychology and Behaviour**. 15(5): 502-513. doi: http://dx.doi.org/10.1016/j.trf.2012.05.001.

Paris, H., and Broucke, S. V. d. (2008). Measuring cognitive determinants of speeding: An application of the theory of planned behaviour. **Transportation Research Part F: Traffic Psychology and Behaviour**. 11(3): 168-180. doi: http://dx.doi.org/10.1016/j.trf.2007.09.002.

Rashrash, M. E., Maneno, M. K., Wutoh, A. K., Ettienne, E. B., and Daftary, M. N. (2016). An evaluation of hepatitis C knowledge and correlations with health belief model constructs among African American "baby boomers". **Journal of Infection and Public Health**. 9(4): 436-442. doi: http://dx.doi.org/ 10.1016/j.jiph.2015.11.005.

Reagan, I. J., McClafferty, J. A., Berlin, S. P., and Hankey, J. M. (2013). Using naturalistic driving data to identify variables associated with infrequent, occasional, and consistent seat belt use. **Accident Analysis & Prevention**. 50: 600-607. doi: http://dx.doi.org/10.1016/j.aap.2012.06.008.

Rosenstock, I. M., Strecher, V. J., and Becker, M. H. (1988). Social learning theory and the health belief model. **Health Education and Behavior.** 15(2): 175-183.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. **Psychol Monogr**. 80(1): 1-28.

Routley, V., Ozanne-Smith, J., Qin, Y., and Wu, M. (2009). Taxi driver seat belt wearing in Nanjing, China. **Journal of Safety Research**. 40(6): 449-454. doi: http://dx.doi.org/10.1016/j.jsr.2009.10.004.

Rowe, R., Andrews, E., Harris, P. R., Armitage, C. J., McKenna, F. P., and Norman, P. (2016). Identifying beliefs underlying pre-drivers' intentions to take risks: An application of the Theory of Planned Behaviour. **Accident Analysis & Prevention**. 89: 49-56. doi: http://dx.doi.org/10.1016/j.aap.2015.12.024.

Şimşekoğlu, Ö., and Lajunen, T. (2008). Why Turks do not use seat belts? An interview study. **Accident Analysis and Prevention**. 40(2): 470-478. doi: http://dx.doi.org/10.1016/j.aap.2007.08.002.

Şimşekoğlu, Ö., and Lajunen, T. (2009). Relationship of seat belt use to health and driver behaviors. **Transportation Research Part F: Traffic Psychology and Behaviour**. 12(3): 235-241. doi: http://dx.doi.org/10.1016/j.trf.2008.12.001.

Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. **Personality and Individual Differences**. 42(5): 893-898. doi: http://dx.doi.org/10.1016/j.paid.2006.09.017.

Studnek, J. R., and Ferketich, A. (2007). Organizational policy and other factors associated with emergency medical technician seat belt use. **Journal of Safety Research**. 38(1): 1-8. doi: http://dx.doi.org/10.1016/j.jsr.2006.09.001.

Tabachnick, B. G., and Fidell, L. S. (1983). **Using Multivariate Statistics**. New York: harpen and Row.

Vaughn, M. G., Salas-Wright, C. P., and Piquero, A. R. (2012). Buckle up: non-seat belt use and antisocial behavior in the United States. **Annals of Epidemiology**. 22(12): 825-831. doi: http://dx.doi.org/10.1016/j.annepidem .2012. 09.010.

Wang, W., Bengler, K., Wets, G., Shen, Y., Jiang, X., Li, P., Wang, H. (2016). Green Intelligent Transportation System and SafetyThe Theory of Planned Behavior and Competitive Driving in China. **Procedia Engineering**. 137, 362-371. doi: http://dx.doi.org/10.1016/j.proeng.2016.01.270.

Weiner, B., Nierenberg, R., and Goldstein, M. (1976). Social learning (locus of control) versus attributional (causal stability) interpretations of expectancy of success1. **Journal of Personality**. 44(1): 52-68. doi: 10.1111/j.1467-6494.1976. tb00583.x.

Wood, P. (2008). Confirmatory factor analysis for applied research. **The American Statistician**. 62(1): 91-92.

Yadav, R., and Pathak, G. S. (2016). Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned

behavior. **Journal of Cleaner Production**. 135: 732-739. doi: http://dx.doi.org/ 10.1016/j.jclepro.2016.06.120.

Yazdanpanah, M., Forouzani, M., and Hojjati, M. (2015). Willingness of Iranian young adults to eat organic foods: Application of the Health Belief Model. **Food Quality and Preference**. 41: 75-83. doi: http://dx.doi.org/10.1016/j. foodqual.2014.11.012.

You, X., Ji, M., and Han, H. (2013). The effects of risk perception and flight experience on airline pilots' locus of control with regard to safety operation behaviors. **Accident Analysis & Prevention**. 57: 131-139. doi: http://dx.doi .org /10.1016/j.aap.2013.03.036.

Yue, Z., Li, C., Weilin, Q., and Bin, W. (2015). Application of the health belief model to improve the understanding of antihypertensive medication adherence among Chinese patients. **Patient Education and Counseling**. 98(5): 669-673. doi: http://dx.doi.org/10.1016/j.pec.2015.02.007.

Zhou, H., Romero, S. B., and Qin, X. An extension of the theory of planned behavior to predict pedestrians' violating crossing behavior using structural equation modeling. **Accident Analysis & Prevention**. doi: http://dx.doi.org/10.1016 /j.aap.2015.09.009.

CHAPTER III

FACTORS AFFECTING THE INTENTION OF USING A SEAT BELT AMONG TEENAGE AND ADULT INTERCITY-BUS PASSENGERS: APPLICATION OF THE THEORY OF PLANNED BEHAVIOUR USING STRUCTURAL-EQUATION MODELLING

3.1 Abstract

Increasing problems of accidents involving intercity buses have caused a large number of passengers to suffer injury and death. However, the number can be reduced by use of seat belts when passengers are travelling. This research aims to use the theory of planned behaviour (TPB) to identify factors affecting the seat-belt-use behavioural intention of intercity-bus passengers, whom we have divided into two groups: teenagers and adults. The factors considered in this analysis include instrumental attitude, emotional attitude, subjective norm and perceived behavioural control, which are standard for TPB. The theory was extended by adding perceived seat belt enforcement, injury risk and past experience for analysis. Structural-equation modelling was used to analyse factors affecting intention of using a seat belt among both groups of intercity-bus passengers. According to this analysis, every factor was found to influence the seat-belt-use behavioural intention of both adults and teenagers. The difference between the groups was that perceived seat belt enforcement ranked as a greater influence on adults

than on teenagers. Therefore, according to the analysis, these factors should be considered when policy plans are proposed to the government for promoting more seat belt usage. The issued policy should be relevant in the context of each passenger's age range to potentially decrease the severity of injuries and reduce passengers' death rates in future.

3.2 Introduction

Currently, in Thailand, people's need for travel is rising because each area of the country is extensively growing in population. Transportation infrastructure has been developed to meet travel needs in the future. Using the intercity bus is considered to be the population's favourite mode of transport for different purposes (Nickel, 1988) such as business, touring, education and returning home. For these reasons, intercity-bus accidents are an increasing problem, causing a large number of injuries and deaths. In the past two years, the data collected by the Academic Centre for Road Safety from online media in 2017 indicated that the total number of public intercity bus accidents in 2016 was 43 out of a total of 49 accidents with 55 fatalities and more than 602 injuries. According to the estimation of the total number of injuries and deaths, nearly 2000 families have been affected by public intercity bus accidents (Department of Land Transport, 2017). Critically, the occurrence of specific accidents cannot be predicted or controlled. They may be caused by the driver's behaviour, including drunk driving (Ameratunga, Herman, Wainiqolo, and Kafoa, 2015) and driving above the speed limit (Agusdinata, van der Pas, Walker, and Marchau, 2009), unsuitability of the buses' condition (Aceves-González, Cook, and May, 2015), physical attributes of the roads or climate (Michalaki, Quddus, Pitfield, and Huetson, 2016). Currently, Thailand

continuously faces these problems, and each accident always results in immense health issues and loss of life or assets (Tainio, 2015). However, passengers can decrease the risk of severe injury or death by wearing a seat belt (Bilgic, Barut, Karacasu, Er, and Yaliniz, 2011), which is a well-known safety measure around the globe (Abay, Paleti, and Bhat, 2013).

Seat belts have been found to decrease the likelihood of serious injuries and fatalities by 60% (Eugenia Gras, Cunill, Sullman, Planes, and Font-Mayolas, 2007). In Thailand, the rate of bus passengers wearing seat belts is 40% (Thai Health Promotion Foundation, 2017); this is less than that in developed countries, which have levels as high as 80%–90% (Bilgic et al., 2011). For this reason, countries all over the world recognise the importance of passengers' wearing of seat belts while they travel (Barua and Tay, 2010). A wide range of research on seat belt wearing has been conducted, as presented in Table 3.1.

Table 3.1 Summary of related research.

Author(s)	**Type of vehicle /Country**	**Analysis method**	**Factor of seat belt**
Eugenia Gras et al. (2007)	Car driver/Spain	Discriminant analysis	Unbelted drivers (the seat belt limited their movement; it was uncomfortable; or there was a negative social influence) Seat belt use (beliefs about their friends' seat belt use and the number of years driving experience)
Studnek and Ferketich (2007)	Front-seat ambulance/USA	Multivariable logistic regression model	Seat belt usage while in the front compartment of an ambulance increased when employees were aware of a written organisational-seat belt policy
Şimşekoğlu and Lajunen (2008b)	Car driver/Turkey	Conducting principal component analysis and multiple-regression analysis	Using a seat belt (travelling conditions such as a long trip, high speed, dangerous weather and bad road conditions; safety; situational conditions; habit of using a seat belt; and avoiding punishment) Not using a seat belt (situational conditions, not believing in the seat belt's effectiveness, discomfort and having no habit)

Table 3.1 Summary of related research (cont.).

Author(s)	Type of vehicle /Country	Analysis method	Factor of seat belt
Şimşekoğlu and Lajune (2009)	Passenger car/Turkey	Factor analyses and multiple-regression analysis	Seat belt use (driver behaviours (e.g. driving errors and violations), regular walking and adequate sleep) No seat belt use (male, driving errors and smoking frequency)
Karbakhsh, Ershadi, Khaji, and Rahimi-Sharbaf (2010)	Passenger car (pregnancy)/Iran	Cross-sectional study	Seat belt use (protects me from road traffic injuries; protects my foetus from road traffic injuries; or my husband and other family members persuade me to wear it) No seat belt use (risk of injury to my foetus, I forget to wear the seat belt; or the seat belt is not properly installed)
Lou, Mehta, and Turner (2011)	School bus/USA	Discrete choice modelling	Seat belt use (age, gender, the home county of a student, length of a student's trip, time of day, presence and active involvement of a bus aide, and two levels of bus driver involvement); driver involvement has a stronger influence compared with the presence and active involvement of a bus aide
Vaughn, Salas-Wright, and Piquero (2012)	Driver and passenger car/USA	Binary logistic regression	No seat belt use (younger, male, African-American or Hispanic, having incomes of less than $75,000, high school or college graduate, use of alcohol and drugs, antisocial behaviours and possession of a dual diagnosis)
Goetzke and Islam (2015)	Car driver/USA	A binary logit model	Seat belt use (male, young vehicle occupants, law enforcement, rural roads, nights and primary seat belt laws)
Bhat, Beck, Bergen, and Kresnow (2015)	Passenger car/USA	Multivariable regression	Seat belt use (living in states with primary and secondary enforcement laws)
Cunill, Gras, Planes, Oliveras, and Sullman, (2004)	Driver and passenger car/Spain	Discriminant analysis	Seat belt use (perceptions of risk, safety perceptions, effectiveness of the seat belt and social influence)
Okamura, Fujita, Kihira, Kosuge, and Mitsui, (2012)	Front-seat car/Japan	Theory of planned behaviour	Self-efficacy, instrumental attitude (discomfort, convinced, penalty, effectiveness of belt, probability of detection) and descriptive norm

From Table 3.1, it can be concluded that factors influencing seat-belt-use selection by private-car drivers are social influence (Cunill, Gras, Planes, Oliveras, and Sullman, 2004; Eugenia Gras, Cunill, Sullman, Planes, and Font-Mayolas, 2007), number of years of driving experience (Eugenia Gras et al., 2007), travelling condition (Şimşekoğlu and Lajunen, 2008b), safety (Cunill et al., 2004; Şimşekoğlu and Lajunen, 2008b), habit of use (Şimşekoğlu and Lajunen, 2008b), avoidance of punishment (Şimşekoğlu and Lajunen, 2008b), gender (Goetzke and Islam, 2015), perception of risk (Cunill et al., 2004) and enforcement by law (Goetzke and Islam, 2015). Factors leading private-car drivers to not using seat belts include discomfort (Eugenia Gras et al., 2007; Şimşekoğlu and Lajunen, 2008b), negative social influence (Eugenia Gras et al., 2007), situational conditions (Şimşekoğlu and Lajunen, 2008b), disbelief in their effectiveness (Şimşekoğlu and Lajunen, 2008b), socio-economic status (Vaughn, Salas-Wright, and Piquero, 2012), age and driver behaviour (Vaughn et al., 2012).

For passengers in private cars and emergency cars, pregnant individuals, or passengers on school buses, seat belt use was increased by organisational-seat belt policy (Studnek and Ferketich, 2007), driver behaviour (Şimşekoğlu and Lajunen, 2009), safety, social influence (Karbakhsh, Ershadi, Khaji, and Rahimi-Sharbaf, 2010), age, gender, travelling condition, socio-economic class, presence of a bus aide (Lou, Mehta, and Turner, 2011), enforcement laws (Bhat, Beck, Bergen, and Kresnow, 2015), self-efficacy, instrumental attitude and descriptive norm (Okamura, Fujita, Kihira, Kosuge, and Mitsui, 2012); seat belt use among passengers was discouraged by risk of injury to a foetus, forgetfulness and improper installation of seat belts (Karbakhsh et al., 2010).

Most studies have focused on the use of seat belts in private vehicles, not only for drivers or front-seat passengers in general, but also for specific groups such as pregnant individuals, emergency-car passengers and school-bus passengers. However, no research has been conducted on intercity-bus passengers, in spite of it being an important worthy of being studied. Furthermore, previous research has analysed only data on single groups. As far as the authors know, there has not been research comparing separated groups in terms of the severity of accidents in which large numbers of passengers are killed.

Therefore, this study aims to determine factors that influence the seat-belt-use behavioural intention of intercity-bus passengers divided into two data groups: teenagers aged 12–20 years and adults aged 21–60 years, according to sexual development (Hines, 1982). The reason for two groups for the sample is that the proportion of the people of Thailand using the seat belt is only 38% in teenagers and only 41% in adults, which is very low (Thai Health Promotion Foundation, 2017) and would like to know that factors influence the seat-belt-use behavioural intention of intercity-bus passengers for teenagers and adults are similar or different. Notably, this research has considered outstanding factors from the reviewed literature when analysing seat belt use by applying the theory of planned behaviour (TPB), which is a psychological model for determining factors influencing seat belt use. To the government, the analysed factors will be used to make recommendations suitable to each age range, leading to effective campaigns for making passengers recognise the safety of seat belt use while they travel by intercity bus (Kamal, Masuri, Dahlan, and Isa, 2015). Furthermore, the campaign will help increase the proportion of passengers wearing seat belts to reduce injury severity from accidents in future. This study

hypothesizes that the theory of planned behaviour (TPB) was consistent with the empirical data model and the assessment of parameter invariance in the model forms for each group were different groups.

3.3 Theory of planned behaviour

TPB presented by Ajzen has been developed since 1985 (Ajzen, 1985). In the field of social psychology, it was derived from the theory of reasoned action (Fishbein, 1979). TPB holds that the main factor determining individual behaviour is behavioural intention, which indicates the extent to which someone will try to engage in the behaviour in question. The stronger the intention, the more likely they are to engage in that behaviour (Ajzen, 1991). Behavioural intention depends on three indicators:

3.3.1 Attitude towards behaviour

Attitude towards behaviour, which is the level of attitude results. If an individual has a positive attitude to the action at any high level, it is possible for them to accomplish that behaviour in accordance with that level (Zhou, Romero, and Qin, 2015).

3.3.2 Subjective norm

Subjective norm is an individual's perception that other people who have influence on him/her (such as friends, colleagues, bosses, family members, children and spouses) have a certain behaviour (Barton, Kologi, and Siron, 2016).

3.3.3 Perceived behavioural control

Perceived behavioural control is the perception that an individual has the power to control his/her own behaviour. It also reflects people's emotional

perception of the difficulty or ease of engaging in that behaviour (Şimşekoğlu and Lajunen, 2008b).

This research has extended the theory by including additional factors such as perception of seat belt enforcement, risk of injury and past experience; these factors have been incorporated into structural-equation modelling (SEM) for analysis seeking factors that influence behavioural intention in seat belt use. TPB can be used for different behaviours in which researchers are interested, not only in transport and safety (Laborda et al., 2014; Lee, Geiger-Brown, and Beck, 2016; Paris and Broucke, 2008; Rowe et al., 2016; Wang et al., 2016) but also in the fields of health, environmental studies and social science (Kim, Lee, Sung, and Choi, 2016; Lin, Updegraff, and Pakpour, 2016; Yadav and Pathak, 2016). However, TPB does not appear to have been used in any previous behavioural-intention analysis of intercity-bus passengers' seat belt use.

3.4 Methodology

3.4.1 Survey and questionnaire

In this study, The data used to study factors influencing the seat-belt-use intention of intercity-bus passengers were obtained from the questionnaires provided to such passengers at intercity-bus terminals in four Thai provinces (ChiangMai, Songkla, Nakhon Ratchasima and Bangkok), in which there are major cities of north, southern, northeastern and central region, respectively. Face-to-face interviews were conducted to ensure a full understanding of the questionnaire. The interviewer explained the reasons for the questionnaire and the research to the respondents. Questionnaires were used paper-based and were divided into two parts.

The first part concerned general information and travelling behaviour. The second part asked questions pertaining to the factors considered in TPB analysis, including instrumental attitude, emotional attitude, subjective norm, perceived behavioural control, perceived seat belt enforcement, injury risk, past experience and behavioural intention. The questionnaires were designed based on a review of previous research that could be used in the present study (Barton, Kologi, and Siron, 2016; Chaudhary, Solomon, and Cosgrove, 2004; Lajunen and Räsänen, 2004; Okamura, Fujita, Kihira, Kosuge, and Mitsui, 2012; Rowe et al., 2016; Şimşekoğlu and Lajunen, 2008a; Zhou, Romero, and Qin, 2015), as presented in Table 3.2.

Table 3.2 Questions used for the seat-belt-use behavioural-intention model.

Variables used in the research		**Number of items**	**N = 911**	
			Scoring	**Source**
	Instrumental attitude			
IA1	I think that the seat belt is an effective device for life-saving when accidents occur.	Four items	1 = Strongly disagree 5 = Strongly agree	(Lajunen and Räsänen, 2004; Şimşekoğlu and Lajunen, 2008a; Zhou, Romero, and Qin, 2015)
IA2	I think that wearing a seat belt while travelling by intercity bus makes me feel safer.			
IA3	I think that wearing a seat belt can help protect against serious injuries from accidents.			
IA4	I think that wearing a seat belt will save money for expensive medical care in case of accident occurrences.			
	Emotional attitude			
EA1	When wearing a seat belt, I feel uncomfortable and sick.	two items	1 = Strongly disagree 5 = Strongly agree	(Lajunen and Räsänen, 2004; Şimşekoğlu and Lajunen, 2008a)
EA2	I feel terrible and like a freak when everyone does not wear a seat belt, except me.			

Table 3.2 Questions used for the seat-belt-use behavioural-intention model (cont.).

Variables used in the research		Number of items	N = 911	
			Scoring	Source
	Subjective norm			
SN1	My close friend thinks that I should wear a seat belt while travelling by intercity bus.	four items	1 = Strongly disagree 5 = Strongly agree	(Barton, Kologi, and Siron, 2016; Rowe et al., 2016)
SN2	My parents encourage me to wear a seat belt.			
SN3	I have a lot of friends regularly wearing seat belts when travelling by intercity buses.			
SN4	My family members agree with behavioural control of wearing seat belts when travelling by intercity buses.			
	Behavioural control			
BC1	Wearing a seat belt or not when travelling is my own decision. It does not depend on anyone.	two items	1 = Strongly disagree 5 = Strongly agree	(Okamura, Fujita, Kihira, Kosuge, and Mitsui, 2012)
BC2	My own awareness of my ability to reduce the risk of fatality by wearing a seat belt when accidents occur.			
	Perception of seat belt enforcement			
PE1	Do you know or not that there is 'the legislation of law enforcing passengers to wear seat belts?	two items	1 = know 0 = do not know	(Chaudhary, Solomon, and Cosgrove, 2004)
PE2	Do you know 'the punishment for passengers not wearing seat belts on buses' or not?			
	Injury risk			
IR1	Having a risk of accidents crashing against other vehicles while travelling.	four items	1 = Strongly disagree 5 = Strongly agree	(Zhou et al., 2015)
IR2	Getting very high possibilities to have an accident while travelling on wet or slippery roads or mountainous routes by intercity buses.			
IR3	Having the risks of fatality caused by not wearing a seat belt when accidents occur.			
IR4	Having the risks of handicaps and disabilities requiring prolonged therapy in case of accident occurrence caused by not wearing a seat belt when accidents occur.			
	Past experience			
PA	During your past travelling by the intercity bus, do you wear a seat belt or not?	-	1 = wear 0 = do not wear	(Şimşekoğlu and Lajunen, 2008a)
	Behavioural intention			
BI1	I will wear a seat belt whenever I take a bus.	two items	1 = Strongly disagree 5 = Strongly agree	(Lajunen and Räsänen, 2004)
BI2	I plan to wear a seat belt in future because it is a device for saving life when accidents occur.			

Data was collected from January 2017 to March 2017 in four main provinces: ChiangMai, Songkla, Nakhon Ratchasima and Bangkok, all of which have a high population and a high intercity-bus passengers. This study targeted respondents who are in the intercity-bus terminals during the interview period. Respondents were selected using the stratified random sampling technique. Respondents over 12 years who are in the intercity-bus terminals during the interview period were interviewed in order to understand question. The number of respondents for each provinces was determined based on the number of intercity-bus passengers in each provinces. Prior to the interviews, the reasons for the questionnaire and the research were explained to the respondents. Then, the interviewer asked the respondents about their general information, travelling behavior, instrumental attitude, emotional attitude, subjective norm, perceived behavioural control, perceived seat belt enforcement, injury risk, past experience and behavioural intention. Face-to-face interviews were conducted to ensure a full understanding of the questionnaire. Golob suggested that the minimum sample size should be 15 times the number of variables should be used (Golob, 2003). In this study, the number of variables were 21.

Data were obtained from 1200 surveys. In all, 911 questionnaires were completed returned, probably because of an incomplete question asked by the interviewer. However, the response rate was 75.92%, which were sufficient for analysis and this survey did not use any incentive for participation.

3.4.2 Analysis

3.4.2.1 Data reliability and validity

The questionnaire was used as the tool of examination, and the quality of research was evaluated in three ways:

(1) Content validation using the index of concordance (IOC) of expert opinion, of which the value should be more than 0.50 (Tavakol and Dennick, 2011).

(2) Reliability according to Cronbach's alpha, of which the value should be at least 0.6–0.7 (George and Mallery, 2003; Tavakol and Dennick, 2011).

(3) Internal consistency using confirmatory-factor analysis (CFA) to insist that the set of taken indicators for analysis was a valid and reliable measurement model for each factor (Muthén and Muthén, 2010).

The Mplus 7.12 programme was used for the analysis.

3.4.2.2 Structural-equation modelling

The present study used SEM analysis which allowed for an assessment of the complex relationships between the latent variables—latent variable and latent variable—observed variables or self-report variables. SEM comprises two sub-models: the measurement model and the structural model (Bollen and Long, 1993).

3.4.2.3 Multi-group SEM

The multi-group SEM is data analysis starting from parameters' estimate values in the structural-equation model of each group, for example, teenagers and adults. The determination of the compulsory condition is that all parameters in the population model of each group are equal. This makes the model valid. The results of analysis by the programme display report goodness-of-fit indices of hypothesis testing. If the results of analysis found that the difference of the chi-square value is not statistical of significance, then the model is valid between groups (not different). However, if the difference of the chi-square value between groups is of

statistical significance, then the model between groups is invalid (different) (Byrne, 2012).

3.4.3 Variables and the structure of the hypothetical model

The factors previously found to directly influence seat-belt-use selection were acknowledged and used to establish the hypothetical-model structure according to TPB. The 21 factors considered for both groups are presented in Table 3.2, and the hypothetical-model structure is illustrated in Figure 3.1.

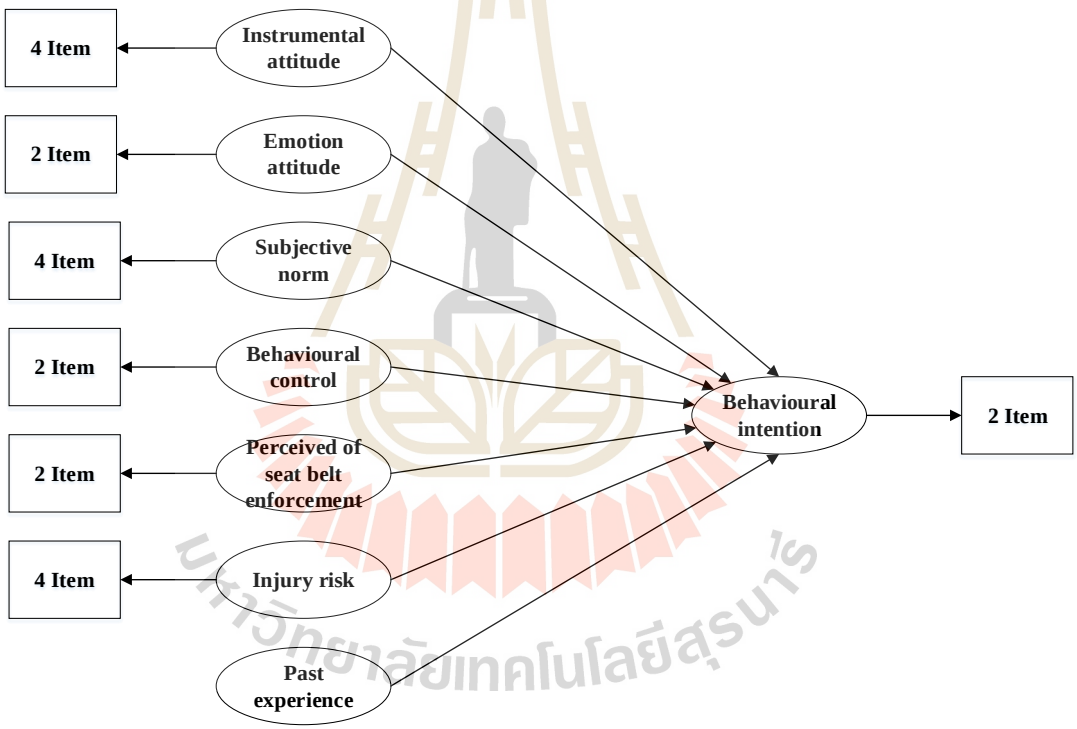


Figure 3.1 Hypothetical-model structure of TPB.

3.5 Results

3.5.1 Descriptive statistics

Of the 911 intercity-bus passengers, 397 were males (43.6%) and 514 were females (56.4%); 334 respondents (36.7%) were from teenagers (12–20 years), and 577 respondents (63.3%) were from adults (21–60 years). This analysis grouped early, middle and late adulthood together because group separation would make the sample size less than 15 times the number of variables, which is neither sufficient nor suitable for analysis (Golob, 2003). The data also included education (lower than a bachelor's degree: 695 (76.3%); bachelor's degree: 155 (17%); and higher than a bachelor's degree: 61 (6.7%) and occupation (pupils/students: 458 (50.3%); general workers: 158 (17.3%); private-company officers: 115 (12.6%); government/state-enterprise officers: 70 (7.7%); business owners: 23 (2.5%); and farmers: 11 (1.2%)), as presented in Table 3.3.

Table 3.3 Sample profile.

		Frequency	Percentages
Sex	Male	397	43.6
	Female	514	56.4
	Total	**9**11	**100.0**
Age	12–20 years **(**teenagers**)**	334	36.7
	Mean score for teenagers = 19 years.		
	21–30 years **(**early adulthood)	269	29.5
	31–45 years **(**middle adulthood)	182	20.0
	46–60 years (late adulthood)	126	13.8
	Mean score for adulthood = 35 years.		
	Total	**911**	**100.0**
Education	Elementary school	92	10.1
	Secondary school	74	8.1
	High school/vocational education	426	46.8
	Diploma/higher vocational education	103	11.3
	Bachelor's degree	155	17
	Master's degree	60	6.6
	Doctoral degree	1	0.1
	Total	**9**11	**100.0**
Occupation	Government officials/employees in state enterprises	76	8.3
	Employees in private companies	115	12.6
	Business owners	70	7.7
	Farmers	23	2.5
	Pupils/students	458	50.3
	Workers	158	17.3
	Other	11	1.2
	Total	**9**11	**100.0**

Table 3.4 presents an analysis of the relationship between variables for both groups. In the teenage group, perceived seat belt enforcement, past experience, instrumental attitude, subjective norm, behavioural control and injury risk had a positive correlation with behavioural intention, at a significance level of 0.01, and

emotional attitude had a negative correlation with behaviour intention, also at a significance level of 0.01. Bartlett's test of sphericity (chi-square = 1891.339 (df = 210, p = 0.01)) indicated that those variables were related to each other and could be taken for analysis, and the value of the Kaiser–Meyer–Olkin (KMO) close to 1 (KMO = 0.830) indicated high suitability of data in the overall picture for this analysis. In the adult group, the correlation between variables resembled that of the teenage group, at a significance level of 0.01, and Bartlett's test of sphericity yielded a value of chi-square = 3455.966 (df = 210, p = 0.01) and a KMO value close to 1 (KMO = 0.815). It can be concluded that the overall data of both groups were very suitable for analysis.

From the average results of the overall picture of each factor in each group, as presented in Table 3.5, it could be concluded that passengers intended to wear seat belts in future while travelling on intercity buses (mean = 3.85, 4.20), had a good attitude towards seat belt use (mean = 4.09, 4.14), had uncomfortable sentiments or felt like freaks (mean = 3.60, 3.09), had the belief or conformed with important people in life (mean = 3.75, 3.69), felt that they could control decision making or reduce the risk alone (mean = 4.07, 4.22), perceived the rules and legal penalties (mean = 0.63, 0.75), perceived the risk of injury when not wearing seat belts (mean = 4.05, 4.15) and used seat belts during past travels (mean = 0.32, 0.51). The values of skewness and kurtosis used for determining a data distribution should be near 1 or within the acceptable range of −1.50 to 1.50 (Hu, 1999). For this research, the values of skewness and kurtosis of both groups were within the determined range. Thus, the data for both groups had normal distributions and were suitable for analysis.

3.5.2 Results of data reliability and validity analysis

To evaluate content validity, it was found that the IOC values for the question items considered by 11 experts were between 0.55 and 1.00. These items are thus considered suitable (Tavakol and Dennick, 2011). When we checked the instrumental reliability using Cronbach's alpha value (as presented in Table 3.5), we found that the values for each factor fell within the range between 0.627 and 0.873, which were more than 0.5 or 0.7. The reliability of the research instrument could thus be concluded (George and Mallery, 2003; Tavakol and Dennick, 2011).

CFA was used to determine the convergent validity of the data; the measurement model reliability was determined by dividing the construct-reliability (CR) value by the average-variance-extracted (AVE) value indicating the proportion of all indicators' covariance for the single latent variable (Hair, Black, and Babin, 2010). Both values were obtained by taking the standardised loading obtained from CFA using equations 3.1 and 3.2:

$$CR = \frac{(\sum_{i=1}^{n} \text{Standardised loading})^2}{(\sum_{i=1}^{n} \text{Standardised loading})^2 + (\sum_{i=1}^{n} e_i)} \quad (3.1)$$

and

$$AVE = \frac{\sum_{i=1}^{n} (\text{Standardised loading}^2)}{\sum_{i=1}^{n} (\text{Standardised loading}^2) + (\sum_{i=1}^{n} e_i)} \quad (3.2)$$

where i is the number of n items, and ei is the error-variance term for a construct of which the value of CR is greater than or equal to 0.7. If the value of AVE is greater than or equal to 0.5, internal consistency can be accepted (Hair, Black, and

Babin, 2010). Results of examination of internal consistency for each factor in the teenage and adult groups are presented in Tables 3.6 and 3.7.

In the Tables 3.6 and 3.7, the CR value of each factor of the teenage group was in the range of 0.709–0.923, and the AVE value was within the range of 0.465 (near 0.5) to 0.858; for the adult group, the CR value of each factor was in the range of 0.704–0.902, and the AVE value was in the range of 501–0.825. Therefore, each factor of both groups was appropriate for the instrument or model used for measurement in this research.

3.5.3 Model-fit indices

In this research, SEM was used to analyse factors affecting the seat-belt-use behavioural intention of teenage and adult intercity-bus passengers using Mplus 7.11. The consistency of the data with the hypothetical TPB model was analysed, and the following IOC values were used for measurement:

(1) $\chi 2$ /df should be less than 3 (Kline, 2011).

(2) The root-mean-square residual error of approximation (RMSEA) value should be less than or equal to 0.07 (Steiger, 2007).

(3) The comparative-fit index (CFI) should be greater than or equal to 0.90 (Hu, 1999).

(4) The Tucker–Lewis index (TLI) and non-normed-fit index should be greater than or equal to 0.80 (Jomnonkwao, Sangphong, Khampirat, Siridhara, and Ratanavaraha, 2016).

(5) The standardised-root-mean-square residual (SRMR) should be less than or equal to 0.08. (Hu, 1999).

Table 3.4 Correlation coefficients for the self-report variables of all samples.

Item	PE1	PE2	PA	IA1	IA2	IA3	IA4	EA1	EA2	SN1	SN2	SN3	SN4	BC1	BC2	IR1	IR2	IR3	IR4	BI1	BI2
Teenagers: Kaiser–Meyer–Olkin Measure of Sampling Adequacy = 0.830																					
Bartlett's Test of Sphericity: chi-square = 1891.339, df = 210, P = 0.01.																					
PE1	1.000	**.563**	**.374**	**.110**	**−.040**	**−.057**	**−.083**	**.032**	**−.135**	**−.044**	**.067**	**−.090**	**−.034**	**.128**	**.100**	**.147**	**.178**	**.173**	**.160**	**.166**	**.258**
PE2	.447	1.000	**.442**	**.084**	**.069**	**−.028**	**.042**	**.033**	**−.059**	**.097**	**.164**	**.134**	**.132**	**.118**	**.053**	**.202**	**.111**	**.136**	**.184**	**.243**	**.213**
PA	.215	.180	1.000	**.104**	**.122**	**.009**	**.017**	**.020**	**.028**	**.098**	**.112**	**.134**	**.102**	**.091**	**.077**	**.155**	**.098**	**.087**	**.094**	**.381**	**.269**
IA1	.021	−.089	.057	1.000	**.230**	**.363**	**.233**	**.072**	**.061**	**.173**	**.300**	**.131**	**.132**	**.284**	**.320**	**.192**	**.272**	**.294**	**.223**	**.157**	**.277**
IA2	−.010	−.092	.126	.456	1.000	**.313**	**.242**	**.084**	**.095**	**.197**	**.268**	**.173**	**.206**	**.272**	**.256**	**.266**	**.250**	**.271**	**.206**	**.233**	**.268**
IA3	−.011	−.103	.027	.452	.357	1.000	**.426**	**.100**	**.044**	**.132**	**.260**	**.145**	**.179**	**.321**	**.356**	**.185**	**.199**	**.279**	**.276**	**.073**	**.229**
IA4	−.014	−.109	−.068	.346	.258	.424	1.000	**.139**	**.149**	**.149**	**.249**	**.199**	**.182**	**.235**	**.169**	**.157**	**.111**	**.196**	**.132**	**.063**	**.134**
EA1	−.023	−.005	−.090	−.094	−.104	−.071	.065	1.000	**.461**	**.129**	**.090**	**.253**	**.232**	**.160**	**.163**	**.134**	**.060**	**.146**	**.025**	**−.082**	**−.025**
EA2	−.013	.022	−.106	−.135	−.137	−.107	−.030	.612	1.000	**.229**	**.194**	**.355**	**.346**	**.149**	**.116**	**.209**	**−.022**	**.099**	**.032**	**−.144**	**−.071**
SN1	.124	−.003	.107	.223	.199	.398	.167	−.095	−.029	1.000	**.406**	**.374**	**.412**	**.224**	**.201**	**.342**	**.140**	**.182**	**.209**	**.361**	**.176**
SN2	.140	.011	.101	.266	.201	.278	.109	.007	.030	.485	1.000	**.335**	**.501**	**.294**	**.388**	**.277**	**.200**	**.328**	**.286**	**.281**	**.227**
SN3	.111	−.026	.166	.154	.151	.215	.140	.127	.138	.523	.419	1.000	**.488**	**.147**	**.141**	**.226**	**.091**	**.171**	**.213**	**.261**	**.105**
SN4	.160	.026	.123	.179	.168	.274	.094	.004	.068	.600	.636	.505	1.000	**.155**	**.194**	**.277**	**.062**	**.192**	**.169**	**.259**	**.101**
BC1	.064	−.026	.118	.282	.207	.196	.125	−.013	−.155	.066	.120	.046	.066	1.000	**.455**	**.165**	**.344**	**.325**	**.306**	**.109**	**.260**
BC2	.039	.008	.116	.318	.242	.307	.246	−.079	−.118	.170	.229	.057	.113	.406	1.000	**.272**	**.373**	**.332**	**.332**	**.126**	**.331**
IR1	−.009	−.068	.113	.294	.319	.274	.181	−.092	−.062	.246	.278	.211	.223	.175	.225	1.000	**.369**	**.361**	**.287**	**.308**	**.285**
IR2	−.001	−.023	.077	.226	.241	.321	.169	−.121	−.128	.274	.274	.148	.193	.178	.282	.535	1.000	**.387**	**.370**	**.128**	**.307**
IR3	−.041	−.102	.072	.277	.281	.319	.221	−.030	−.025	.213	.222	.226	.143	.146	.192	.439	.372	1.000	**.567**	**.203**	**.256**
IR4	.020	−.074	.081	.330	.295	.382	.202	−.067	−.067	.239	.232	.227	.187	.225	.264	.332	.422	.533	1.000	**.126**	**.212**
BI1	.051	.038	.343	.200	.249	.166	.104	−.104	−.081	.234	.210	.303	.256	.198	.127	.343	.286	.303	.283	1.000	**.394**
BI2	.031	.013	.115	.293	.278	.210	.223	−.016	−.044	.131	.151	.163	.118	.295	.306	.279	.302	.311	.295	.428	1.000
Adults: Kaiser–Meyer–Olkin Measure of Sampling Adequacy = 0.815																					
Bartlett's Test of Sphericity: chi-square = 3455.966, df = 210, P = 0.01.																					

Note: PE = Perception of seat belt enforcement; PA = Past experience; IA = Instrumental attitude; EA = Emotion attitude; SN = Subjective norm; BC = Behavioural control; IR = Injury risk; BI = Behavioural intention.
Bold coefficients are for teenagers' results.

Table 3.5 Mean, standard deviation, skewness and kurtosis values of variables.

Variables used in the research		Teenagers (N = 334)				Adults (N = 577)				Total (N = 911)			
		x̄	SD	SK	Ku	x̄	SD	SK	Ku	x̄	SD	SK	Ku
	Instrumental attitude (Cronbach's α = 0.856)	4.09				4.14							
IA1	The seat belt is an effective device for life-saving when accidents occur.	4.10	0.734	−0.166	−1.127	4.20	0.714	−0.461	−0.433	4.17	0.722	−0.350	−0.733
IA2	Wearing a seat belt while travelling by intercity bus makes me feel safer.	4.17	0.749	−0.284	−1.170	4.20	0.810	−0.848	0.656	4.19	0.787	−0.667	0.102
IA3	Wearing a seat belt can help protect against serious injuries from accidents.	4.11	0.688	−0.151	−0.884	4.12	0.756	−0.550	0.034	4.12	0.731	−0.428	−0.216
IA4	Wearing a seat belt will save money for expensive medical care in case of accident occurrences.	3.98	0.714	0.026	−1.031	4.05	0.730	−0.070	−1.117	4.02	0.724	−0.033	−1.092
	Emotion attitude (Cronbach's α = 0.654)	3.60				3.09							
EA1	When wearing a seat belt, I feel uncomfortable and sick.	3.71	0.918	−0.586	0.180	3.25	1.110	−0.019	−0.972	3.42	1.066	−0.247	−0.773
EA2	I feel terrible like a freak when I wear a seat belt alone.	3.49	1.125	−0.595	−0.249	2.94	1.217	0.046	−1.003	3.14	1.213	−0.185	−0.932
	Subjective norm (Cronbach's α = 0.873)	3.75				3.69							
SN1	My close friend thinks that I should wear a seat belt while travelling by intercity buses.	3.76	0.860	−0.379	0.112	3.71	1.005	−0.470	−0.298	3.73	0.954	−0.460	−0.134
SN2	My parents encourage me to wear a seat belt.	3.88	0.848	−0.484	0.295	3.84	0.935	−0.643	0.238	3.86	0.904	−0.601	0.286
SN3	I have a lot of friends regularly wearing seat belts while travelling by intercity buses.	3.64	0.950	−0.418	−0.102	3.57	1.041	−0.452	−0.349	3.59	1.009	−0.451	−0.252
SN4	My family members agree with wearing seat belts while travelling by intercity buses.	3.71	1.000	−0.571	0.005	3.63	1.104	−0.748	0.074	3.66	1.067	−0.705	0.100
	Behavioural control (Cronbach's α = 0.627)	4.07				4.22							
BC1	Whether wearing a seat belt or not is my own decision.	3.96	0.766	−0.060	−0.995	4.26	0.730	−0.526	−0.687	4.15	0.757	−0.351	−0.900
BC2	My own awareness ability of reducing the risk of fatality by wearing a seat belt when accidents occur.	4.18	0.750	−0.307	−1.168	4.18	0.748	−0.585	0.121	4.18	0.748	−0.482	−0.358
	Perception of seat belt enforcement (Cronbach's α = 0.679)	0.63				0.75							
PE1	Acknowledgement of 'the law enforcing passengers to wear seat belts'.	0.75	0.431	−1.188	−0.592	0.88	0.323	−1.495	1.498	0.84	0.371	−1.492	1.284
PE2	Acknowledgement of 'the punishment for passengers not wearing seat belts on buses'.	0.51	0.501	−0.024	−1.490	0.62	0.485	−0.505	−1.450	0.58	0.494	−0.323	−1.495
	Injury risk (Cronbach's α = 0.838)	4.05				4.15							
IR1	Having a risk of accidents crashing against other vehicles while travelling.	3.96	0.821	−0.310	−0.628	4.08	0.837	−0.816	0.803	4.04	0.833	−0.628	0.221
IR2	Getting very high possibilities to have an accident while travelling on wet or slippery roads or mountainous routes by intercity buses.	4.15	0.795	−0.527	−0.533	4.15	0.806	−0.410	0.942	4.15	0.801	−0.451	0.413
IR3	Having the risks of fatality caused by not wearing a seat belt when accidents occur.	4.01	0.773	−0.497	0.360	4.19	0.787	−0.865	0.948	4.13	0.786	−0.716	0.634
IR4	Having the risks of handicaps and disabilities requiring prolonged therapy in case of accident occurrence caused by not wearing a seat belt when accidents occur.	4.07	0.779	−0.470	−0.119	4.19	0.766	−0.521	−0.436	4.15	0.773	−0.501	−0.320
	Past experience (Cronbach's α = NS)	0.32				0.51							
PA	During your past travelling by the intercity bus, do you wear a seat belt or not?	0.32	0.466	0.788	−1.387	0.51	0.500	−0.059	−1.471	0.44	0.497	0.232	−1.498
	Behavioural intention (Cronbach's α = 0.726)	3.85				4.20							
BI1	I will wear a seat belt whenever travelling by regular buses.	3.62	0.918	−0.392	0.268	4.12	0.865	−0.847	0.674	3.94	0.916	−0.646	0.280
BI2	I have the intention to use a seat belt in future because it will save life when an accident occurs.	4.08	0.799	−0.466	−0.301	4.28	0.712	−0.778	0.793	4.21	0.751	−0.668	0.275

Table 3.6 CFA results for testing construct validity (teenagers).

Variables used in research	CFA (N = 334)			
	Loading	t-value	Error variances	CR/AVE
Instrumental attitude				
IA1	0.536**	10.417	0.303	0.774/0.465
IA2	0.534**	10.541	0.350	
IA3	0.598**	11.694	0.253	
IA4	0.408**	6.885	0.354	
Emotion attitude				
EA1	0.528**	7.918	0.506	0.709/0.564
EA2	0.873**	9.722	0.299	
Subjective norm				
SN1	0.539**	11.154	0.472	0.800/0.503
SN2	0.720**	16.905	0.305	
SN3	0.656**	14.188	0.468	
SN4	0.700**	18.545	0.461	
Behavioural control				
BC1	0.648**	14.029	0.339	0.739/0.586
BC2	0.687**	14.780	0.291	
Perception of seat belt enforcement				
PE1	0.813**	10.773	0.063	0.923/0.858
PE2	0.700**	10.340	0.127	
Injury risk				
IR1	0.565**	11.600	0.460	0.802/0.503
IR2	0.614**	13.295	0.333	
IR3	0.641**	14.282	0.291	
IR4	0.580**	11.852	0.342	
Past experience				
PA	-	-	-	-
Behavioural intention				
BI1	0.515**	8.188	0.395	0.701/0.548
BI2	0.746**	10.271	0.283	

Note: χ^2 = 255.007; df = 143; χ^2/df = 1.783, p < 0.001, RMSEA = 0.048 (<0.07), CFI = 0.931 (>0.9), TLI = 0.909 (>0.8), SRMR = 0.054 (<0.08)

Table 3.7 Results of CFA for testing construct validity (adults).

Variables used in the research	CFA (N = 577)			
	Loading	t-value	Error variances	CR/AVE
Instrumental attitude				
IA1	0.676**	19.216	0.271	0.797/0.501
IA2	0.577**	14.667	0.431	
IA3	0.661**	19.228	0.314	
IA4	0.457**	10.855	0.416	
Emotion attitude				
EA1	0.614**	23.574	0.623	0.782/0.655
EA2	0.997**	28.690	0.100	
Subjective norm				
SN1	0.774**	20.618	0.398	0.804/0.508
SN2	0.683**	14.787	0.466	
SN3	0.658**	15.772	0.613	
SN4	0.753**	21.654	0.527	
Behavioural control				
BC1	0.602**	13.965	0.339	0.717/0.560
BC2	0.675**	15.240	0.304	
Perception of seat belt enforcement				
PE1	0.780**	8.110	0.041	0.902/0.825
PE2	0.572**	7.627	0.158	
Injury risk				
IR1	0.671**	18.419	0.385	0.826/0.544
IR2	0.623**	16.654	0.396	
IR3	0.649**	17.724	0.358	
IR4	0.685**	18.608	0.312	
Past experience				
PA	-	-	-	-
Behavioural intention				
BI1	0.629**	15.011	0.451	0.704/0.543
BI2	0.681**	15.980	0.271	

Note: χ^2 = 398.005; df = 159; χ^2/df = 2.503, p < 0.001, RMSEA = 0.051 (<0.07), CFI = 0.928 (>0.9), TLI = 0.904 (>0.8), SRMR = 0.052 (<0.08)

3.5.4 Structural-equation model for seat-belt-use intention among teenagers

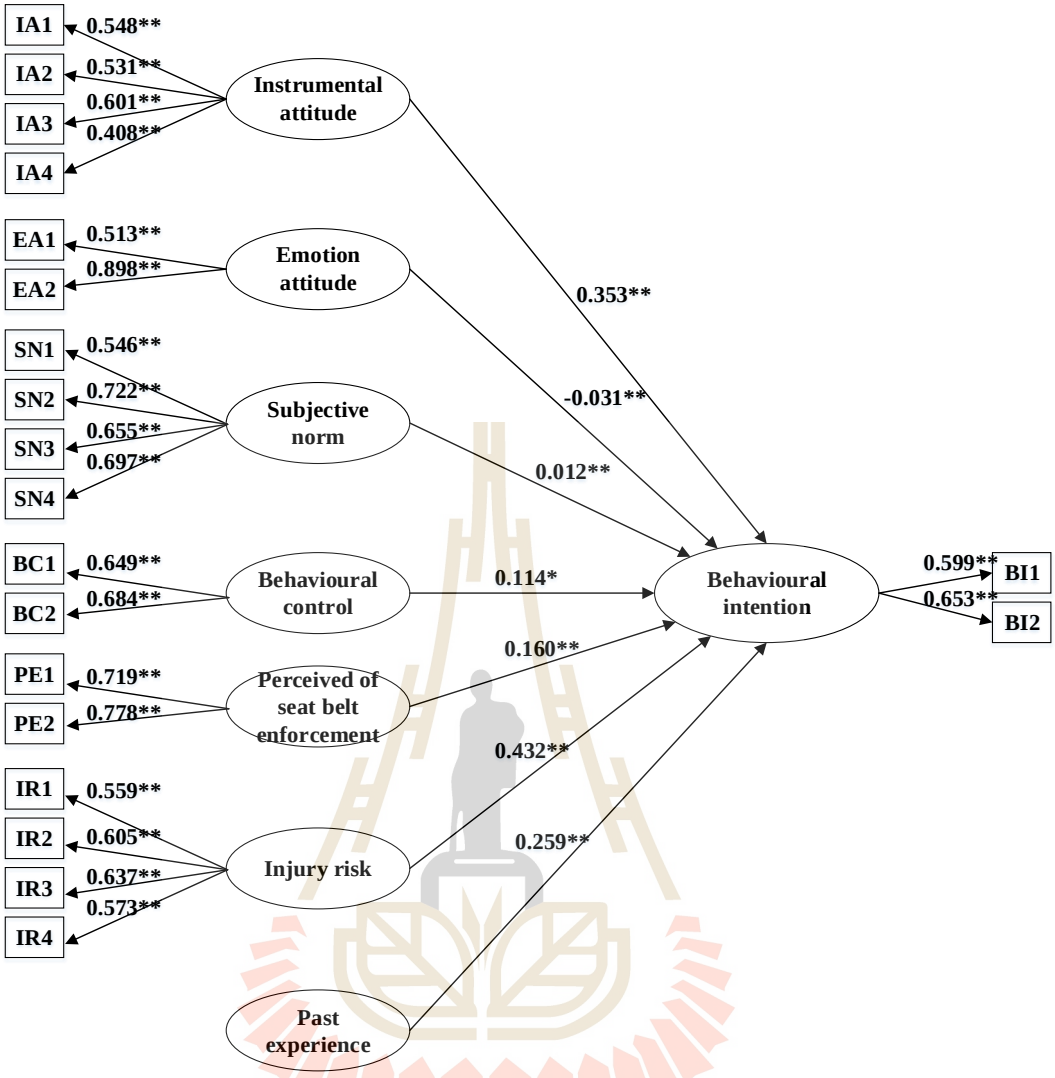
According to the SEM analysis of the seat-belt-use behavioural intention of teenage intercity-bus passengers (Table 3.8 and Figure 3.2), the goodness-of-fit indices of the model were as follows: the chi-square (χ^2) value was 271.741; there were 161 degrees of freedom (df); p-value was <0.001; $\chi 2$ /df was 1.69; RMSEA was 0.045; CFI was 0.936; TLI was 0.917; and SRMR was 0.052. When compared with the criteria of goodness-of-fit index, it was found that it was consistent with the criteria. Thus, the SEM analysis for seat-belt-use behavioural intention of intercity-bus passengers was consistent with the empirical data.

Injury risk (i.e. the chance of accidental occurrences and the consequences of not wearing a seat belt) was the factor with the most significantly positive influence on seat-belt-use behaviour (as measured by standardised-factor loading) (β = 0.432), followed in order by instrumental attitude (i.e. attitude towards seat belts and their effectiveness) (β = 0.353), past experience (β = 0.259), perceived enforcement of seat belt laws (i.e. the perception of current laws on seat belt use being enforced) (β = 0.160), behavioural control (i.e. one's own perception of seat belt use) (β = 0.114) and subjective norm (i.e. belief that important people in life use seat belts) (β = 0.012). Emotional attitude (i.e. the sentiment while using a seat belt) was found to have the most significant negative influence (β = −0.031).

Table 3.8 Results of SEM for seat-belt-use intention (teenagers).

Variables used in the research		SEM (N = 334)		
		Loading	SE	Z
	Instrumental attitude BY			
	IA1	0.548**	0.049	11.234
	IA2	0.531**	0.051	10.392
	IA3	0.601**	0.050	12.031
	IA4	0.408**	0.059	6.940
	Emotion attitude BY			
	EA1	0.513**	0.068	7.509
	EA2	0.898**	0.097	9.301
	Subjective norm BY			
	SN1	0.546**	0.046	11.772
	SN2	0.722**	0.042	17.175
	SN3	0.655**	0.046	14.263
	SN4	0.697**	0.038	18.560
	Behavioural control BY			
	BC1	0.649**	0.046	14.011
	BC2	0.684**	0.046	14.797
	Perception of seat belt enforcement BY			
	PE1	0.719**	0.044	16.255
	PE2	0.778**	0.043	18.045
	Injury risk BY			
	IR1	0.559**	0.048	11.596
	IR2	0.605**	0.046	13.045
	IR3	0.637**	0.044	14.332
	IR4	0.573**	0.048	11.832
	Behavioural intention BY			
	BI1	0.599**	0.048	12.457
	BI2	0.653**	0.052	12.463
	Behavioural intention ON			
IA	Instrumental attitude	0.353**	0.030	11.946
EA	Emotion attitude	−0.031**	0.003	−11.611**
SN	Subjective norm	0.012**	0.001	11.755
BC	Behavioural control	0.114*	0.066	2.021
PE	Perception of seat belt enforcement	0.160**	0.018	8.876
IR	Injury risk	0.432**	0.033	13.116
PA	Past experience	0.259**	0.048	5.383

Note: χ^2 = 271.741; df = 161; χ^2/df = 1.69, p < 0.001, RMSEA = 0.045 (<0.07), CFI = 0.936 (>0.9), TLI = 0.917 (>0.8), SRMR = 0.052 (<0.08)



χ^2 = 271.741, df = 161, χ^2/df = 1.69, P < 0.001, RMSEA = 0.045 (<0.07), CFI = 0.936 (>0.9), TLI = 0.917 (>0.8) and SRMR = 0.052 (<0.08)
*p < 0.05, **p < 0.01 (Mplus 7.12 standardised estimates)

Figure 3.2 SEM of teenagers' intention to use a seat belt.

3.5.5 Structural-equation model for seat-belt-use intention among adults

The results of SEM analysis of the seat-belt-use behavioural intention of adult intercity-bus passengers are presented in Table 3.9 and Figure 3.3. The goodness-of-fit indices were found as follows: χ^2 = 353.822, df = 158, p-value < 0.001,

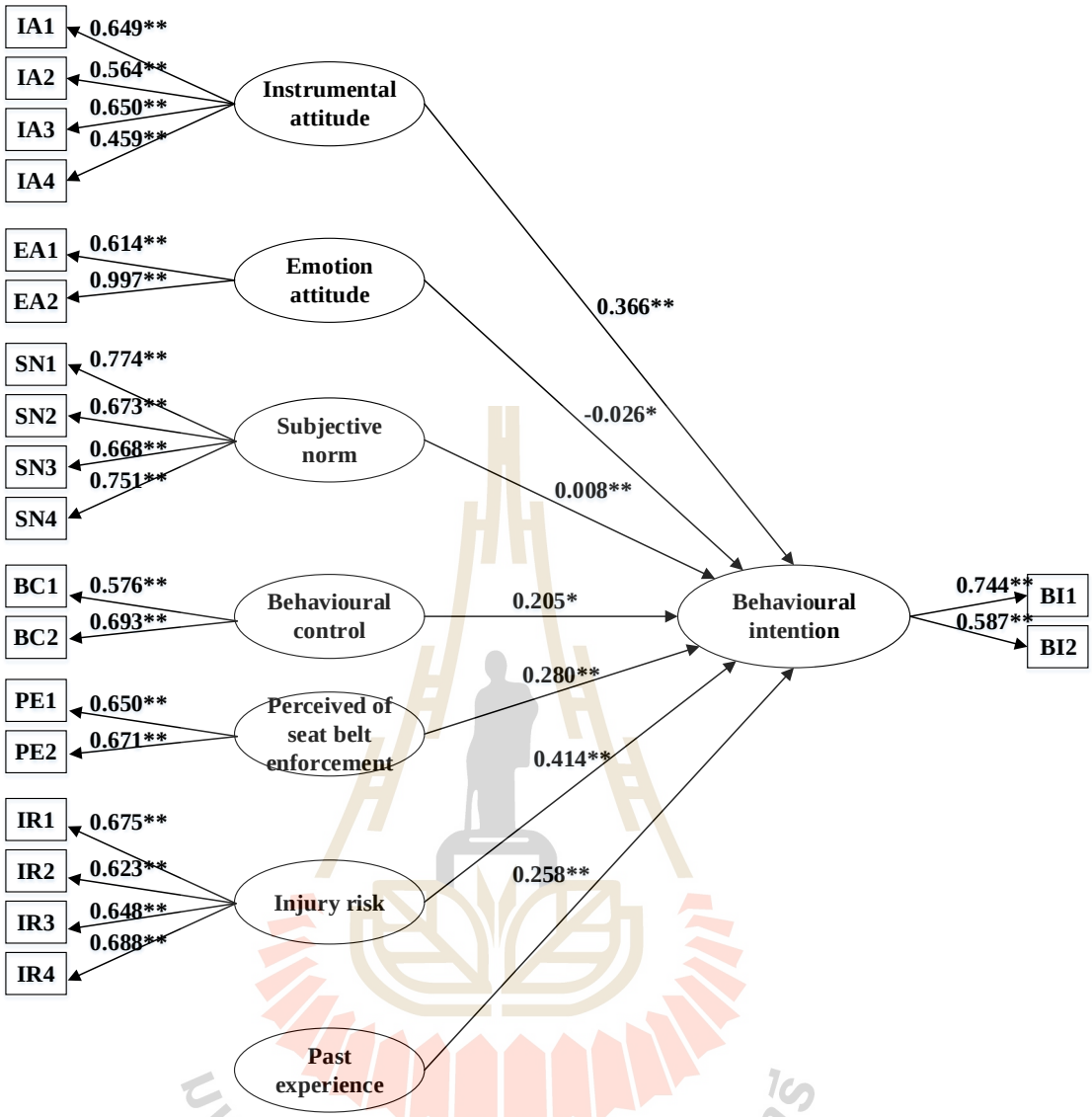
$\chi 2$ /df = 2.24, RMSEA = 0.046, CFI = 0.941, TLI = 0.921 and SRMR = 0.044. When compared with the goodness-of-fit index, it was found that it was consistent with the measurement criteria. Thus, SEM analysis of the seat-belt-use behavioural intention of adult intercity-bus passengers was consistent with the empirical data.

Injury risk was the factor with the most significantly positive influence on seat-belt-use behaviour (as measured by standardised-factor loading) (β = 0.414), followed in order by instrumental attitude (β = 0.366), perceived enforcement of seat belt laws (β = 0.280), past experience (β = 0.258), behavioural control (β = 0.205) and subjective normalcy (β = 0.008). The factor with the most significantly negative influence was emotional attitude (β = −0.026).

Table 3.9 SEM results for seat-belt-use intention (adults).

Variables used in the research		SEM (N = 577)		
		Loading	SE	Z
	Instrumental attitude BY			
	IA1	0.649**	0.034	18.929
	IA2	0.564**	0.039	14.544
	IA3	0.650**	0.033	19.444
	IA4	0.459**	0.042	10.929
	Emotion attitude BY			
	EA1	0.614**	0.026	23.509
	EA2	0.997**	0.032	28.689
	Subjective norm BY			
	SN1	0.774**	0.037	20.945
	SN2	0.673**	0.045	14.925
	SN3	0.668**	0.041	16.202
	SN4	0.751**	0.034	21.827
	Behavioural control BY			
	BC1	0.576**	0.043	13.435
	BC2	0.693**	0.045	15.324
	Perception of seat belt enforcement BY			
	PE1	0.650**	0.059	10.990
	PE2	0.671**	0.064	10.529
	Injury risk BY			
	IR1	0.675**	0.034	19.657
	IR2	0.623**	0.038	16.501
	IR3	0.648**	0.037	17.598
	IR4	0.688**	0.037	18.808
	Behavioural intention BY			
	BI1	0.744**	0.038	19.729
	BI2	0.587**	0.040	14.570
	Behavioural intention ON			
IA	Instrumental attitude	0.366**	0.051	7.195
EA	Emotion attitude	−0.026**	0.004	−5.684
SN	Subjective norm	0.008**	0.001	7.570
BC	Behavioural control	0.205*	0.096	2.136
PE	Perception of seat belt enforcement	0.280**	0.034	8.324
IR	Injury risk	0.414**	0.053	7.796
PA	Past experience	0.258**	0.070	3.698

Note: χ^2 = 353.822; df = 158; χ^2/df = 2.24, p < 0.001, RMSEA = 0.046 (<0.07), CFI = 0.941 (>0.9), TLI = 0.921 (>0.8), SRMR = 0.044 (<0.08)



χ^2 = 353.822, df = 158, χ^2/df = 2.24, P < 0.001, RMSEA = 0.046 (<0.07), CFI = 0.941 (>0.9), TLI = 0.921 (>0.8) and SRMR = 0.044 (<0.08)
*p < 0.05, **p < 0.01 (Mplus 7.12 standardised estimates)

Figure 3.3 SEM of adults' intention to use a seat belt.

3.5.6 Multi-group SEM

An analysis of the parameter invariance in the model for seat-belt-use intention among teenagers and adults is presented in Table 3.10. The results of the invariance in the model were assessed using a hypothesis stating that the values of factor loading, intercepts, and the structural path were not different for the simultaneous model and the strict model. A chi-square difference test between models 3 and 4 found that $\Delta\chi^2$ = 194.525, Δdf = 33, and p < 0.0001, indicating that the hypothesis cannot be accepted. Therefore, the model forms for each group indicated different groups. Thus, it is essential to consider models for teenagers and adults separately to develop an appropriate policy intention for intercity-bus passengers to use a seat belt.

Table 3.10 Model-fit indices for the invariance test between groups.

Description	χ^2	df	χ^2/df	CFI	TLI	RMSEA (90% CI)	SRMR	$\Delta\chi^2$	Δdf	p
Individual group:										
Model 1: Teenagers	271.741	161	1.69	0.936	0.917	0.045 (0.036-0.055)	0.052			
Model 2: Adults	353.822	158	2.24	0.941	0.921	0.046 (0.040-0.053)	0.044			
Measurement of invariance:										
Simultaneous model	572.333	293	1.95	0.944	0.920	0.046(0.040-0.051)	0.046			
Factor Loading, Intercepts, Structural paths held equally across groups	766.858	326	2.35	0.912	0.887	0.054(0.050-0.059)	0.059	194.525	33	<0.0001

3.6 Discussion

The present study has considered factors affecting seat-belt-use behavioural intention of both teenage and adult intercity-bus passengers, using TPB and SEM to examine the conformation of the model. Our aim was to use the identified factors to propose recommendations for planning policy and to present the government with guidelines for modifying passengers' seat-belt-use behavioural intention.

3.6.1 Predictors of seat-belt-use behavioural intention among teenagers and adults

Injury risk had the greatest influence on the seat-belt-use behavioural intention of teenage intercity-bus passengers, followed by instrumental attitude, past experience, perceived enforcement of seat belt laws, behavioural control and subjective normalcy. The influence of all six factors was significantly positive. Emotional attitude was the factor with the greatest negative influence on seat-belt-use intention.

The factors influencing the seat-belt-use behavioural intention of adult intercity-bus passengers had almost the same order of influence as they did for teenagers, except that perceived enforcement of seat belt laws had a greater influence than past experience. All six factors had a significantly positive influence on seat-belt-use behavioural intention. As for teenagers, emotional attitude was the factor with the most significantly negative influence. Analysis of both groups indicates that the perception of law enforcement was not sufficiently effective in raising teenage passengers' awareness of this factor. The assessment of parameter invariance in the model forms for each group indicated that there were different groups. Thus, it is essential to consider models for teenagers and adults separately to develop an appropriate policy intention for intercity-bus passengers to use a seat belt. From the

analysis of both groups, the results of the overall picture can be explained as described below.

Injury risk was the most influential factor affecting the seat-belt-use behavioural intention of teenagers and adult passengers. The teenage group had a higher standardised-factor-loading value than the adult group. If passengers perceive the risks of accidents when travelling (owing to physical characteristics such as roads, climate conditions or collisions) as well as the attendant risk of injuries, loss of life and destruction of assets, then their intention to wear a seat belt is enhanced. This is consistent with previous research, which reported that the physical characteristics of roads and climate conditions influenced the seat-belt-use behavioural intention of personal-car drivers (Şimşekoğlu and Lajunen, 2008), as well as findings that the perceived risks of collision with other vehicles had similar effects among both private-car drivers and passengers (Cunill, Gras, Planes, Oliveras, and Sullman, 2004).

Instrumental attitude had a relatively minor influence on the intention of both passenger groups. If the passengers had good attitudes towards seat belt devices or believed that they were effective at saving lives or protecting against severe injury, their intention to wear a seat belt when travelling would increase. This was consistent with other research that reported that good attitudes towards the device and belief in its effectiveness would positively influence the use intention of private-car drivers and passengers (Cunill et al., 2004). Even related research involved in travel behaviour found that the attitude also influenced travel behaviour (van Wee and Ettema, 2016).

Perceived enforcement of seat belt laws influenced the intentions of both passenger groups. However, it was a more important factor for the adult group than for the teenager group. When passengers felt likely to incur legal penalties, they

were more likely to use seat belts when travelling. Previous research also indicated that seat belt enforcement was effective in increasing the use proportion (Strine et al., 2010). However, although this factor had more influence on the intention of adults than it did on that of teenagers, the value of standardised-factor loading was still small. This reflects that law enforcement in Thailand was still feeble.

Past experience influenced the seat-belt-use behavioural intention of both passenger groups, but the influence ranked in order of importance in the teenage group was better that in the adult group. If passengers tended not to use the seat belt in past, or if passengers were not in the habit of using the seat belt, then the passengers decreased seat-belt-use behavioural intention while travelling. Similar to the previous research that indicated that private-car drivers habit of not wearing the seat belt had an influence on the drivers not wearing a seat belt in the future (Demirer, Durat, and Haşimoğlu, 2012; Şimşekoğlu and Lajunen, 2008).

Behavioural control was the factor influencing the seat-belt-use behavioural intention of both passenger groups, but the adult group had a higher standardised-factor-loading value than that of the teenage group. It was certain that the adult group could have better self-behavioural control than that of the teenage group because of their maturity or past experience. If passengers perceive or believe that they can have self-behavioural control in seat belt use or that they can reduce the risk of fatality by using the seat belt, their seat-belt-use behavioural intention while travelling increases. The result of this analysis was consistent with research in other areas such as behavioural control influencing bicycle-helmet-use behavioural intention (Lajunen and Räsänen, 2004) and zebra-crossing use behavioural intention (Zhou, Romero, and Qin, 2015).

Subjective norm was the least influencing factor towards the seat-belt-use behavioural intention of both passenger groups. Regarding the teenage group, the value of standardised-factor loading was greater in the teenage group. If other people who are important to the passengers (not only friends but also members of the family) needed or encouraged them to use a seat belt, the passengers' seat-belt-use behavioural intention would also be positively influenced: this is consistent with other research that reported that friends or members in the family who were important to passengers influenced the seat-belt-use behavioural intention of private-car drivers, passengers in front seats and even pregnant women (Eugenia Gras, Cunill, Sullman, Planes, and Font-Mayolas, 2007; Karbakhsh, Ershadi, Khaji, and Rahimi-Sharbaf, 2010; Okamura, Fujita, Kihira, Kosuge, and Mitsui, 2012). Moreover, it still affected other behaviours such as motorcycle-helmet-use behaviour (Haqverdi, Seyedabrishami, and Groeger, 2015).

Emotion attitude was the factor negatively influencing the seat-belt-use behavioural intention of both passenger groups. If passengers had uncomfortable emotions or felt like a freak when wearing a seat belt, then their seat-belt-use behavioural intention increased. In addition, it was consistent with previous research in which uncomfortable emotions and the difficult movement of taxi drivers or passengers in front seats influenced the decrease of seat-belt-use intention (Okamura et al., 2012).

3.6.2 Establishment of a policy

The structural-equation model for the seat-belt-use behavioural intention of two intercity-bus passenger groups was consistent with the empirical data. The result of data analysis could be used to propose a policy, or guidelines, for the government's campaign encouraging passengers to use a seat belt while travelling by intercity bus. For example, there should be campaigns imparting knowledge on seat belt use to teenage groups through the organisation of exhibitions in educational institutes or unique and easily understandable advertising media attracting teenagers' interest in seat belt use (for instance, making comic strips demonstrating the severity of accidents because when an individual perceives fear, he/she becomes more aware of the importance of wearing a seat belt) (Akbaş et al., 2010). There should be more public relations in educational institutes about law enforcement and the penalty punishment. 'Perception of seat belt enforcement' or the content involved in seat belt enforcement should be turned into lessons. The research analysis reflects that the perception of law enforcement in the teenage group is not as effective as it should be. In addition, there should be campaigns educating parents or important people in life about the benefits of seat belt use as another seat-belt-use support, because teenagers accept family members or friends are accepted as important people in life who can push or induce them to behaviour a certain way, for example, giving parents knowledge in educational institutes or making advertising media reflecting the difficulty of other family members in case of their family members' injuries or deaths caused by accidents.

For adults, there should be campaigns imparting knowledge on seat belt use in the adult group as in the teenage group, for example, exhibitions in governmental or private organisations or advertising media reflecting the consequences of not using

a seat belt while travelling (such as serious injuries or disabilities, and fatalities), because the perception of these consequences will increase the realisation of the advantage of using a seat belt. In governmental or private organisations, knowledge about the benefits or the core content of wearing a seat belt should be imparted. The policy of seat belt use should be applied in each company. The reviewed literature indicated that the implementation of this policy in organisations influenced personnel to increasingly use seat belts (Studnek and Ferketich, 2007). Additionally, there should be stricter measures of 'seat belt law enforcement', for example, setting up police checkpoints to examine the seat belt use of intercity-bus passengers, installation of CCTV cameras in intercity buses, and the availability of bus staff checking passengers' seat belt use on intercity buses.

The proposal of all the recommended policies indicates that the policies for both groups may have similarities and differences. Thus, the government and all the involved sectors can apply them in accordance with the target group to promote and cultivate a conscious mind of safety by using a seat belt in intercity buses. This helps reduce both accident severity and death rate and promote the quality of the population.

3.7 Conclusions

In the analysis of seeking factors affecting seat-belt-use behavioural intention of teenage and adult intercity-bus passengers by applying TPB, factors included instrumental attitude, emotion attitude, subjective norm and perceived behavioural control (the basic factors of TPB). The theory was extended by including factors such as the perception of seat belt enforcement, injury risk and past experience. Each factor of both groups influenced seat-belt-use behavioural intention. In the teenage group,

injury risk had a significantly positive influence on seat-belt-use behavioural intention, followed in order by instrumental attitude, past experience, perception of seat belt enforcement, behavioural control and subjective norm. The emotion attitude had a significantly negative influence. In the adult group, injury risk also had a significantly positive influence on seat-belt-use behavioural intention, followed in order by instrumental attitude, perception of seat belt enforcement, past experience, behavioural control and subjective norm. The emotional attitude had the same significantly negative influence as the teenage group.

From all the results of the analysis, recommendations were proposed to the government promoting intercity-bus passengers to use the seat belt more. We can tell which factor should be first supported or corrected by looking at the greatest amount of respective standardised coefficient values and the guidelines for planning suitable policies for the target group. The present study proposes production of advertising media to demonstrate accident severity and the consequences of not wearing a seat belt. Educational institutes or the government and private organisations should organise campaigns that raise awareness and educate students or personnel in organisations about the importance of seat belt use. Campaigns or advertising media are used to present the benefits of seat belt use. The government should support these efforts, impart knowledge to people in the country, and have public relations about law enforcement and a penalty for contravening 'perception of seat belt enforcement'. It is important to now have stricter inspection measures than before.

The results of the present study will be beneficial because the government or relevant sectors can apply the recommendations in campaigns promoting the cultivation of passengers' conscious behaviour and the awareness of seat belt use

safety. They will also help reduce the severity of injuries and decrease passengers' death rates.

3.8 Acknowledgements

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3.9 References

Abay, K. A., Paleti, R., and Bhat, C. R. (2013). The joint analysis of injury severity of drivers in two-vehicle crashes accommodating seat belt use endogeneity. **Transportation Research Part B**: Methodological. 50: 74-89. doi: http://dx.doi.org/10.1016/j.trb.2013.01.007.

Aceves-González, C., Cook, S., and May, A. (2015). Bus use in a developing world city: Implications for the health and well-being of older passengers. **Journal of Transport & Health**. 2(2): 308-316. doi: http://dx.doi.org/10.1016/j.jth.2015.04.001.

Agusdinata, D. B., van der Pas, J. W. G. M., Walker, W. E., and Marchau, V. A. W. J. (2009). Multi-criteria analysis for evaluating the impacts of intelligent speed adaptation. **Journal of Advanced Transportation**. 43(4): 413-454. doi: 10.1002/atr.5670430402.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In Action control. **Springer Berlin Heidelberg**. 11-39.

Ajzen, I. (1991). Theories of Cognitive Self-RegulationThe theory of planned behavior. **Organizational Behavior and Human Decision Processes**. 50(2): 179-211. doi: http://dx.doi.org/10.1016/0749-5978(91)90020-T.

Akbaş, O., Güven, R., Cebeci, G., Bertlek, S. B., Aldemir, G., and Bal, E. (2010). A study on the effects of seat belt posters on drivers. **Procedia - Social and Behavioral Sciences**. 2(2): 1002-1007. doi: http://dx.doi.org/10.1016/j.sbspro.2010.03.141.

Ameratunga, S., Herman, J., Wainiqolo, I., and Kafoa, B. (2015). A83 Road traffic injuries and Alcohol: Double jeopardy in Pacific Island nations fuelled by inequitably distributed determinants of health. **Journal of Transport & Health**. 2(2, Supplement): S48-S49. doi: http://dx.doi.org/10.1016/j.jth.2015.04.571.

Barton, B. K., Kologi, S. M., and Siron, A. (2016). Distracted pedestrians in crosswalks: An application of the Theory of Planned Behavior. **Transportation Research Part F: Traffic Psychology and Behaviour**. 37: 129-137. doi: http://dx.doi.org/10.1016/j.trf.2015.12.012.

Barua, U., and Tay, R. (2010). Severity of urban transit bus crashes in Bangladesh. **Journal of Advanced Transportation**. 44(1): 34-41. doi: 10.1002/atr.104

Bhat, G., Beck, L., Bergen, G., and Kresnow, M.-j. (2015). Predictors of rear seat belt use among U.S. adults, 2012. **Journal of Safety Research**. 53: 103-106. doi: http://dx.doi.org/10.1016/j.jsr.2015.03.011.

Bilgic, S., Barut, H. B., Karacasu, M., Er, A., and Yaliniz, P. (2011). The changes in usage of seat belts in Antalya, Turkey. **Procedia - Social and Behavioral Sciences**. 20: 588-593. doi: http://dx.doi.org/10.1016/j.sbspro.2011.08.065.

Bollen, K. A., and Long, J. S. (1993). **Testing Structural Equation Models**: SAGE Publications.

Byrne, B. M. (2012). **Structural equation modeling with Mplus: Basic concepts, applications, and programming**: Taylor and Francis Group.

Chaudhary, N. K., Solomon, M. G., and Cosgrove, L. A. (2004). The relationship between perceived risk of being ticketed and self-reported seat belt use. **Journal of Safety Research**. 35(4): 383-390. doi: http://dx.doi.org/10.1016/j.jsr.2004.03.015.

Cunill, M., Gras, M. E., Planes, M., Oliveras, C., and Sullman, M. J. M. (2004). An investigation of factors reducing seat belt use amongst Spanish drivers and passengers on urban roads. **Accident Analysis and Prevention**. 36(3): 439-445. doi: http://dx.doi.org/10.1016/S0001-4575(03)00039-3.

Demirer, A., Durat, M., and Haşimoğlu, C. (2012). Investigation of seat belt use among the drivers of different education levels. **Safety Science**. 50(4): 1005-1008. doi: http://dx.doi.org/10.1016/j.ssci.2011.12.013.

Department of Land Transport. (2017). **Thailand Transport Statistics**. Retrieved from http://apps.dlt.go.th/statistics_web/statistics.html.

Eugenia Gras, M., Cunill, M., Sullman, M. J. M., Planes, M., and Font-Mayolas, S. (2007). Predictors of seat belt use amongst Spanish drivers. **Transportation Research Part F: Traffic Psychology and Behaviour**. 10(3): 263-269. doi: http://dx.doi.org/10.1016/j.trf.2006.11.003.

Fishbein, M. (1979). **A theory of reasoned action: some applications and implications**.

George, D., and Mallery, P. (2003). **SPSS for Windows Step by Step: A Simple Guide and Reference**. 11.0 Update: Allyn and Bacon.

Goetzke, F., and Islam, S. (2015). Determinants of seat belt use: A regression analysis with FARS data corrected for self-selection. **Journal of Safety Research**. 55: 7-12. doi: http://dx.doi.org/10.1016/j.jsr.2015.07.004.

Golob, T. F. (2003). Structural equation modeling for travel behavior research. **Transportation Research Part B: Methodological**. 37(1): 1-25. doi: http://dx.doi.org/10.1016/S0191-2615(01)00046-7.

Hair, J. F., Black, W. C., and Babin, B. J. (2010). **Multivariate Data Analysis: A Global Perspective: Pearson Education**.

Haqverdi, M. Q., Seyedabrishami, S., and Groeger, J. A. (2015). Identifying psychological and socio-economic factors affecting motorcycle helmet use. **Accident Analysis and Prevention**. 85: 102-110. doi: http://dx.doi.org/10.1016 /j.aap. 2015.09.007.

Hines, M. (1982). Prenatal gonadal hormones and sex differences in human behavior. **Psychological Bulletin**. 92(1): 56-80.

Hu, L. t., Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. **Structural Equation Modeling: A Multidisciplinary Journal**. 6(1): 1-55.

Jomnonkwao, S., Sangphong, O., Khampirat, B., Siridhara, S., and Ratanavaraha, V. (2016). Public transport promotion policy on campus: evidence from Suranaree University in Thailand. **Public Transport**. 1-19. doi: 10.1007/s 12469-016-0122-2.

Kamal, W. N. H. W. A., Masuri, M. G., Dahlan, A., and Isa, K. A. M. (2015). Seat Belt Compliance and Quality of Life among Educated Young Adults in an Urban University. **Procedia - Social and Behavioral Science**s. 202: 442-447. doi: http://dx.doi.org/10.1016/j.sbspro.2015.08.249.

Karbakhsh, M., Ershadi, Z., Khaji, A., and Rahimi-Sharbaf, F. (2010). Seat belt use during pregnancy in Iran: attitudes and practices. **Chinese Journal of Traumatology (English Edition)**. 13(5): 275-278. doi: http://dx.doi.org/10. 3760/ cma.j.issn.1008-1275.2010.05.004.

Kim, E., Lee, J.-A., Sung, Y., and Choi, S. M. (2016). Predicting selfie-posting behavior on social networking sites: An extension of theory of planned behavior. **Computers in Human Behavior**. 62: 116-123. doi: http://dx.doi .org/ 10.1016/j.chb.2016.03.078.

Kline, R. B. (2011). **Principles and Practice of Structural Equation Modeling: Guilford Press**.

Laborda, J. G., Ozdamli, F., Maasoglu, Y., Koo, K. E., Nurulazam, M. D. A., Rohaida, M. Z. S., Salleh, Z. (2014). Theory of Planned Behaviour: Explaining Safety Practices of Young Adults at Engineering Laboratories and Workshops. **Procedia - Social and Behavioral Sciences**. 116: 1513-1518. doi: http://dx.doi.org/10.1016/j.sbspro.2014.01.426.

Lajunen, T., and Räsänen, M. (2004). Can social psychological models be used to promote bicycle helmet use among teenagers? A comparison of the Health Belief Model, Theory of Planned Behavior and the Locus of Control. **Journal of Safety Research**. 35(1): 115-123. doi: http://dx.doi.org/10.1016/j.jsr.2003. 09.020.

Lee, C. J., Geiger-Brown, J., and Beck, K. H. (2016). Intentions and willingness to drive while drowsy among university students: An application of an extended theory of planned behavior model. **Accident Analysis and Prevention**. 93: 113-123. doi: http://dx.doi.org/10.1016/j.aap.2016.05.002.

Lin, C.-Y., Updegraff, J. A., and Pakpour, A. H. (2016). The relationship between the theory of planned behavior and medication adherence in patients with epilepsy. **Epilepsy and Behavior**. 61: 231-236. doi: http://dx.doi.org/ 10.1016/j .yebeh.2016.05.030.

Lou, Y., Mehta, G., and Turner, D. S. (2011). Factors influencing students' usage of school bus seat belts: An empirical analysis of the Alabama pilot project. **Accident Analysis and Prevention**. 43(5): 1644-1651. doi: http://dx.doi.org /10.1016/j.aap.2011.03.018.

Michalaki, P., Quddus, M., Pitfield, D., and Huetson, A. (2016). A time-series analysis of motorway collisions in England considering road infrastructure, socio-demographics, traffic and weather characteristics. **Journal of Transport & Health**. 3(1): 9-20. doi: http://dx.doi.org/10.1016/j.jth.2015. 10.005.

Muthén, L. K., and Muthén, B. O. (2010). **Mplus : statistical analysis with latent variables : User's Guide**. Los Angeles: Muthén and Muthén.

Nickel, B. E. (1988). Facing the challenge of the future by strategic planning for public transport in Germany. **Journal of Advanced Transportation**. 22(2): 134-153. doi: 10.1002/atr.5670220204.

Okamura, K., Fujita, G., Kihira, M., Kosuge, R., and Mitsui, T. (2012). Predicting motivational determinants of seatbelt non-use in the front seat: A field study.

Transportation Research Part F: Traffic Psychology and Behaviour. 15(5): 502-513. doi: http://dx.doi.org/10.1016/j.trf.2012.05.001.

Paris, H., and Broucke, S. V. d. (2008). Measuring cognitive determinants of speeding: An application of the theory of planned behaviour. **Transportation Research Part F: Traffic Psychology and Behaviour**. 11(3): 168-180. doi: http://dx.doi .org/10.1016/j.trf.2007.09.002.

Rowe, R., Andrews, E., Harris, P. R., Armitage, C. J., McKenna, F. P., and Norman, P. (2016). Identifying beliefs underlying pre-drivers' intentions to take risks: An application of the Theory of Planned Behaviour. **Accident Analysis and Prevention**. 89: 49-56. doi: http://dx.doi.org/10.1016/j.aap.2015.12.024.

Şimşekoğlu, Ö., and Lajunen, T. (2008a). Social psychology of seat belt use: A comparison of theory of planned behavior and health belief model. Transportation Research Part F: **Traffic Psychology and Behaviour**. 11(3): 181-191. doi: http://dx.doi.org/10.1016/j.trf.2007.10.001.

Şimşekoğlu, Ö., and Lajunen, T. (2008b). Why Turks do not use seat belts? An interview study. **Accident Analysis and Prevention**. 40(2): 470-478. doi: http://dx.doi.org/10.1016/j.aap.2007.08.002.

Şimşekoğlu, Ö., and Lajunen, T. (2009). Relationship of seat belt use to health and driver behaviors. **Transportation Research Part F: Traffic Psychology and Behaviour**. 12(3): 235-241. doi: http://dx.doi.org/10.1016/j.trf.2008.12.001.

Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. **Personality and Individual Differences**. 42(5): 893-898. doi: http://dx.doi.org/10.1016/j.paid.2006.09.017.

Strine, T. W., Beck, L. F., Bolen, J., Okoro, C., Dhingra, S., and Balluz, L. (2010). Geographic and sociodemographic variation in self-reported seat belt use in the United States. **Accident Analysis and Prevention**. 42(4): 1066-1071. doi: http://dx.doi.org/10.1016/j.aap.2009.12.014.

Studnek, J. R., and Ferketich, A. (2007). Organizational policy and other factors associated with emergency medical technician seat belt use. **Journal of Safety Research**. 38(1): 1-8. doi: http://dx.doi.org/10.1016/j.jsr.2006.09.001.

Tainio, M. (2015). Burden of disease caused by local transport in Warsaw, Poland. **Journal of Transport & Health**. 2(3): 423-433. doi: http://dx.doi.org/ 10.1016/j.jth.2015.06.005.

Tavakol, M., and Dennick, R. (2011). Making sense of Cronbach's alpha. **International Journal of Medical Education**. 2: 53-55. doi: 10.5116/ijme. 4dfb.8dfd.

Thai Health Promotion Foundation. (2017). **Thailand Seat Belt Use in 2017**. Retrieved Feb 20. 2018. from http://resource.thaihealth.or.th/library/hot/14971.

Van Wee, B., and Ettema, D. (2016). Travel behaviour and health: A conceptual model and research agenda. **Journal of Transport & Health**. 3(3): 240-248. doi: http://dx.doi.org/10.1016/j.jth.2016.07.003.

Vaughn, M. G., Salas-Wright, C. P., and Piquero, A. R. (2012). Buckle up: non-seat belt use and antisocial behavior in the United States. **Annals of Epidemiology**. 22(12): 825-831. doi: http://dx.doi.org/10.1016/j.annepidem. 2012.09.010.

Wang, W., Bengler, K., Wets, G., Shen, Y., Jiang, X., Li, P., Wang, H. (2016). Green Intelligent Transportation System and Safety The Theory of Planned Behavior

and Competitive Driving in China. **Procedia Engineering**. 137: 362-371. doi: http://dx.doi.org/10.1016/j.proeng.2016.01.270.

Yadav, R., and Pathak, G. S. (2016). Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned behavior. **Journal of Cleaner Production**. 135: 732-739. doi: http://dx.doi. org / 10.1016 / j.jclepro.2016.06.120.

Zhou, H., Romero, S. B., and Qin, X. (2015). An extension of the theory of planned behavior to predict pedestrians' violating crossing behavior using structural equation modeling. **Accident Analysis and Prevention**. doi: http://dx.doi.org /10.1016/j.aap.2015.09.009.

CHAPTER IV

MODELLING OF SEAT BELT USE INTENTION FOR INTERCITY BUSES BASED ON HEALTH BELIEF MODEL

4.1 Abstract

The increasing severity and number of intercity bus accident occurrences result in huge loss of lives and assets. However, we can reduce these risks and the severity by wearing seat belts while travelling in buses. This study aims to determine the factors that affect the seat belt use behavioural intention of intercity bus passengers. These factors could be considered for policy plans are proposed to the government for promoting more seat belt use, divided into teenager and adult groups, by applying of health belief model (HBM). The factors used in the study include health motivation, perceived benefits, perceived barriers, perceived susceptibility, perceived severity and cue to action, which were the fundamental factors of HBM, as well as the extended factors of perceived enforcement, past experience and self-efficacy for additional analysis. Structural equation modelling (SEM) was used to further analyse the factors affecting the seat belt use behavioural intention. The results of the study shows that the two models were different. Every factor of the two groups influenced the seat belt use behavioural intention. Perceived severity had the most significant positive influence on the seat belt use behavioural intention in the teenager group, while perceived benefits

had the most significant positive influence in the adult group. Perceived barriers had the most significant negative influence in both groups.

4.2 Introduction

At present, Thailand is developing its public transportation system to serve future travelling needs. The public intercity bus system is held as a popular transportation system used in both Thailand and foreign countries (Nickel, 1988). However, with increasing needs, the problems associated with Road Traffic Crashes also increase. One of the problems is intercity bus road traffic crashes that result in a large number of fatalities and injuries (Barua and Tay, 2010; Mehmet A. Guler, Atahan, and Bayram, 2011). The factors causing RTCs are three conventional, types-human such as drivers' behaviour (Agusdinata, van der Pas, Walker, and Marchau, 2009), vehicular such as unsuitable condition of buses (Aceves-González, Cook, and May, 2015; M. A. Guler, Elitok, Bayram, and Stelzmann, 2007) and environmental such as physical characteristics of roads or unfavorable climate (Michalaki, Quddus, Pitfield, and Huetson, 2016), which has been increasingly extreme.

Nevertheless, injuries or fatalities to the passengers can be prevented or reduced if the passengers wear seat belts (Bilgic, Barut, Karacasu, Er, and Yaliniz, 2011; Guler and O. Atahan, 2009); passenger seat belts have gained increasing attention both in Thailand and worldwide and have been given importance as an international product (Olsen, Cook, Keenan, and Olson, 2010) to prevent passengers from suffering serious injuries or fatalities due to accidents. The number of fatalities and serious injuries has been reduced by 60% by the use of seat belts (Høye, 2016). However, the rate of seat belt use among drivers and passengers is still low in Thailand compared to the

developed countries where the rate seat belt use is high (Bilgic et al., 2011). For this reason, Thailand has copiously given importance to seat belt use. Furthermore, many studies have been conducted on seat belt usage, as shown in Table 4.1.

Table 4.1 Summary of related research.

Author(s)	Type of vehicle/Country	Analysis method	Factors affecting seat belt usage
Routley et al. (2009)	Taxi driver/China	Independent sample t-tests, a binomial distribution	Seat belt use (fine avoidance, safety high speed and long trips) Not using a seat belt (feeling trapped and uncomfortable)
Kim et al.(2009)	Car driver and front seat (high school)/USA	Binary choice model	Low seat belt use (males, African-Americans, accompanying occupants, weekends, inclement driving conditions, small size of school, lower socio-economic status and rural country school locations.)
Şimşekoğlu and Lajunen (2009)	Passenger car/Turkey	Factor analyses and multiple regression analysis	Seat belt use (driver behaviours (e.g., driving errors and violations), regular walking and adequate sleep) No seat belt use (male and smoking frequency)
Demirer et al. (2012)	Car driver/Turkey	A sampling method, the statistical relation analysis with SPSS 15.0 software	Seat belt use (higher level of education, lower numbers of crashes and crash severities, belief about seat belt protection, precaution signal) No seat belt use (lack of habit, discomfort and short distance driving)
Vaughn et al. (2012)	Driver and passenger car/USA	Binary logistic regression	No seat belt use (younger, male, African-American or Hispanic, income less than $75,000, high school or college graduate, using alcohol and drugs, exhibiting antisocial behaviours, and possess a dual diagnosis)

Table 4.1 Summary of related research. (Cont.)

Author(s)	Type of vehicle/Country	Analysis method	Factors affecting seat belt usage
Goldzweig et al. (2013)	Car driver/USA	A multiple regression analysis	Seat belt use (white, black, Hispanic, female and drivers who had passengers in their vehicle, service-learning educational intervention and rural high school students)
Reagan et al. (2013)	Car driver/USA	Chi-square tests, Univariate ANOVA	Seat belt use (fewer trips per day and increased average trip speed)
Bhat et al. (2015)	Passenger car/USA	Multivariable regression	Seat belt use (living in states with primary and secondary enforcement laws)
Cunill et al. (2004)	Driver and passenger car/Spain	Discriminant analysis	Seat belt use (perceptions of risk, safety perceptions, the effectiveness of the seat belt and social influence)
Chaudhary et al. (2004)	Car driver/USA	T-test, ANOVA	Seat belt use (perceived risk of being ticketed, women and enforcement of laws)

According to the table summarizing the review of literature related to the safety belt use, all literature review research demonstrated that most of the studies on seat belt use considered personal car drivers or passengers as the target group for their analysis. However, there has not been any study focusing on passengers using intercity buses, which is an interesting target group because of the currently increasing problems of accidents of intercity buses. Thus, a comprehensive study on this group is required. The samples in this study were divided into two groups: teenagers and adults.

This research aimed to determine the factors affecting the behavioural intention of seat belt use of intercity bus passengers by applying of Health Belief Model (HBM), which is a psychological model used to determine the factors influencing seat belt use. The analysis was conducted by dividing the target subjects into two groups: teenagers (12–20 years) and adults (21–60 years) because teenagers are divided into three group,

early teens (11-14 years), middle teens (15-17 years) and late teens (18-20 years). For adults are divided into three group, early adulthood (21-30 years), middle adulthood (31-45 years) and late adulthood (46-60 years) according to sexual development (Gidding et al., 2006; Kail and Cavanaugh, 1996). So we combine teenagers into one group (12-20 years) and (21-60 years) for adulthood. The present study has considered different factors obtained from the previous review literature to design a questionnaire as the measuring tool (measurement model), providing variables that cover most researches on seat belt use. The factors obtained from the analysis will be used to prepare guidelines targeting the age range and current situations, which will be proposed to the government for the effective campaign for promoting passenger awareness of using safety seat belts while travelling in intercity buses.

4.3 Health Belief Model (HBM)

The HBM was developed to comprehend human behaviours related to health by considering various factors involved in behaviours that influence illness and procurement when the illness occurs. Rosenstock et al. (Rosenstock, 1988) applied HBM to explain the individual perception and motivation. When a person wants to avoid getting a disease, they believe that they are susceptible to contract the serious disease and it would affect their lifestyle. Furthermore, this practice initiates a favourable consequence of reducing the risks of diseases or disease severity. Becker (Becker, 1977) improved HBM to explain or predict prevention and other behaviours; the fundamental descriptors of HBM are as follows. (1) Perceived Susceptibility, which refers to an individual's prediction of the potential risks of various incidents, (2) Perceived Severity, which is the assessment of severity perception of the impact of

accidents causing disabilities and fatalities, (3) Perceived Benefits, which is an individual's perception of benefits of practicing preventive measures for diverse serious accidents, (4) Perceived Barriers, which is an individual's perception of barriers against adopting practices, such as expenses or the results of doing some activities, (5) Cues to Action, which is the inductance originating practice or issues stimulating individuals to express needed behaviour, such as the perception of information received through mass media or warnings from the beloved or respected people and (6) health motivation, which is the condition of emotion initiated by the health stimulation, including the levels of interest, attitudes and healthcare goodwill (Yazdanpanah, Forouzani, and Hojjati, 2015).

To determine the factors influencing seat belt use behavioural intention, the theory is extended by adding factors perceived enforcement, past experience and self-efficacy by using structural equation modelling (SEM) and HBM. HBM is the most widely applied in the field of science and medical science; for example, the study of motivation of attending a cardiac rehabilitation community (Horwood, Williams, and Mandic, 2015), and the assessment of knowledge of Hepatitis Virus C and health belief (Rashrash, Maneno, Wutoh, Ettienne, and Daftary, 2016).

In addition, there is research related to the use of seat belt of a private passenger car by applying HBM, which found that perceived benefits and barriers as strong affect the use of seat belts(Şimşekoğlu and Lajunen, 2008a). However, there has not been any study focusing on passengers using intercity buses, which is an interesting target group. Thus, the current author recognizes HBM to be one of the interesting theories and adopted it to analyse seat belt use behavioural intention of intercity bus passengers,

which has not been researched thus far. Furthermore, it is very interesting to take HBM as a part of seat belt use behavioural intention of intercity bus passengers.

4.4 Methodology

4.4.1 Survey and questionnaire

This research obtained data from 1,200 intercity bus passengers of four provinces (Chiangmai, Songkla, Nakornratchasrima and Bangkok). Face-to-face interviews were conducted to ensure a full understanding of the questionnaire. The interviewer explained the reasons for the questionnaire and the research to the respondents. This study targeted respondents who are in the intercity-bus terminals during the interview period. Respondents were selected using the stratified random sampling technique. Respondents over 12 years who are in the intercity-bus terminals during the interview period were interviewed in order to understand question. Prior to the interviews, the reasons for the questionnaire and the research were explained to the respondents. Then, the interviewer asked the respondents about their general information, travelling behaviour, health motivation, perceived benefits, perceived barriers, perceived susceptibility, perceived severity, cues to action, perceived enforcement, past experience, self-efficacy and behavioural intention. Of these, 911 complete questionnaires were taken as samples (75.92%) for the analysis, as the optimal sample size should not be below 10 times the number of variables (Gorsuch, 1983). The questionnaire based on HBM was designed by reviewing the previous researches (Baskan et al., 2012; Chaudhary, Solomon, and Cosgrove, 2004; Darsareh, Aghamolaei, Rajaei, Madani, and Zare; Lajunen and Räsänen, 2004; Şimşekoğlu and

Lajunen, 2008a, 2008b; Yang et al.; Yazdanpanah, Forouzani, and Hojjati, 2015). The question items that were taken in this study are shown in Table 4.2.

Table 4.2 Questions used for the seat belt use behavioural intention model.

	Variables used in the present research	N = 911	
		Scoring	Source
	Behavioural intention		
BI1	I will wear a seat belt whenever travelling by intercity buses.	1 = strongly disagree 5 = strongly agree	(Lajunen and Räsänen, 2004; Yazdanpanah et al., 2015)
BI2	I plan to wear a seat belt in the future because it is the equipment for saving life when accidents occur.		
	Health motivation		
HM1	I think that encountering road accidents is the worst issue.	1 = strongly disagree 5 = strongly agree	(Lajunen and Räsänen, 2004; Şimşekoğlu and Lajunen, 2008a)
HM2	I think that health is the most important concern.		
HM3	I give importance to safety most when travelling by bus.		
	Perceived benefits		
BN1	I think that wearing safety belts is the duty to help save oneself.	1 = strongly disagree 5 = strongly agree	(Darsareh et al.; Yazdanpanah et al., 2015)
BN2	A seat belt is effective equipment to reduce the severity of injuries when accidents occur.		
BN3	Wearing seat belts results in lower chance of fatality than not wearing seat belts when accidents occur while travelling by intercity buses.		
BN4	Wearing seat belts can reduce the severity of injuries when accidents occur.		
BN5	Wearing seat belts will help save money by avoiding expensive medical care when accidents occur.		
	Perceived barriers		
BR1	When wearing a safety belt, I feel uncomfortable and sick.	1 = strongly disagree 5 = strongly agree	(Lajunen and Räsänen, 2004; Şimşekoğlu and Lajunen, 2008a; Yang et al.)
BR2	I look like a monster when there is no one wearing a seat belt and I wear a seat belt alone.		
BR3	I think that installing seat belts is expensive.		

Table 4.2 Questions used for the seat belt use behavioural intention model (Cont.).

	Variables used in the present research	N = 911	
		Scoring	Source
	Perceived susceptibility		
SU1	I feel that when travelling by an intercity bus, I have risks of accidental crashes with other vehicles.	1 = strongly disagree 5 = strongly agree	(Darsareh et al.; Yazdanpanah et al., 2015)
SU2	I think that travelling by regular bus on the wet/slippery roads has a high chance of accidents.		
SU3	I think that travelling by intercity bus on the mountainous routes has a high chance of accidents; the passengers should wear seat belts.		
SU4	Wearing standard seat belts cannot prevent oneself from the danger of accident occurrences.		
SU5	Travelling by regular intercity buses is a very dangerous activity.		
	Perceived severity		
SV1	If I do not wear a seat belt while travelling by intercity buses, fatality may be caused when an accident occurs.	1 = strongly disagree 5 = strongly agree	(Yang et al.; Yazdanpanah et al., 2015)
SV2	If I do not wear a safety belt while travelling by intercity buses, there can be an injury that causes disability which requires long-term treatment in case an accident occurs.		
SV3	If I do not wear a seat belt while travelling by an intercity bus, in case an accident occurs, it may immensely affect my study or my work.		
SV4	If I do not wear a seat belt while travelling by an intercity bus, in case an accident occurs, it may affect the ways of the life of people I know such as friends and relatives.		
	Cue to action		
CU1	A lot of my friends regularly wear seat belts when travelling by intercity buses.	1 = strongly disagree 5 = strongly agree	(Şimşekoğlu and Lajunen, 2008a; Yang et al.; Yazdanpanah et al., 2015)
CU2	I feel terrible if I do not wear a seat belt because my parents and guardians pay attention to seat belt use.		
CU3	My friend thinks that I should wear a seat belt when travelling by intercity buses.		
CU4	I always receive praise or agreement of seat belt use from my family members while travelling by intercity buses.		
CU5	I have recently seen an advertisement on television, cutouts or posters about the importance of seat belt usage while travelling by intercity buses.		

Table 4.2 Questions used for the seat belt use behavioural intention model (Cont.).

	Variables used in the present research	N = 911	
		Scoring	Source
	Perceived enforcement		
EN1	Do you know whether the law enforces passengers to wear seat belts?	1 = know 0 = do not know	(Chaudhary et al., 2004)
EN2	Do you know whether there is legal punishment against people not wearing safety belt on buses?		
	Past experience		
PA	When travelling by regular intercity buses, do you wear a seat belt?	1 = wear; 0 = do not wear	(Şimşekoğlu and Lajunen, 2008b)
	Self-efficacy		
SE1	The decision whether or not to wear a seat belt every time depends on me not anyone else.	1 = strongly disagree 5 = strongly agree	(Baskan et al., 2012; Yazdanpanah et al., 2015)
SE2	I think that safety belt use is my own issue. It depends on me whether I want to wear or not.		
SE3	I can reduce the risk of fatality myself by using a safety belt when the accidents occur.		

4.4.2 Analysis

4.4.2.1 Data reliability and validity

For measuring research quality, the questionnaire used as the tool was divided into three parts: (1) the measurement of content validity using the index of item-objective congruency (IOC) obtained from the experts' consideration, which should be more than 0.50 (Tavakol and Dennick, 2011); (2) the measurement of tool reliability using the confidence value by Cronbach's alpha method, which should be minimum 0.5 (Tavakol and Dennick, 2011) and (3) the measurement of internal consistency by confirmatory factor analysis (CFA) was used to confirm that the set of indicators could measure the validity or the accuracy of model of each factor (Muthén and Muthén, 2010) by using Mplus 7.11 program for analysis.

For testing content validity, the IOC values of question items obtained from 10 experts' consideration were found to be in the range 0.55–1.00. Thus, the question items are considered suitable (Tavakol and Dennick, 2011); in addition, the reliability test of tool employed in this research using Cronbach's alpha value, as shown in Table 4.3, found that the value of each factor was in the range 0.552–0.844, which was more than 0.5. This indicates that the tool employed in this study was reliable (Tavakol and Dennick, 2011).

For the measurement of internal consistency, CFA was used to indicate the accuracy of the measurement model; in this measurement, the construct reliability (CR) value and average variance extracted (AVE) value were determined to specify the covariance of all indicators in the same latent variables (Hair, Black, and Babin, 2010). These values were obtained by considering standardized loading acquired from CFA, as given by equations 1 and 2:

$$CR = \frac{(\sum_{i=1}^{n} \text{Standardised loading})^2}{(\sum_{i=1}^{n} \text{Standardised loading})^2 + (\sum_{i=1}^{n} e_i)} \quad (4.1)$$

$$AVE = \frac{\sum_{i=1}^{n} (\text{Standardised loading}^2)}{\sum_{i=1}^{n} (\text{Standardised loading}^2) + (\sum_{i=1}^{n} e_i)} \quad (4.2)$$

Here i was the number of n items, e_i was the error variance terms for a construct, CR value should be more than or equal to 0.7, and AVE value should be more than or equal to 0.5 for acceptance of the model (Hair, Black, and Babin, 2010). The results of the internal consistency measurement of each factor in the teenager group and the adult group are illustrated in Table 4.3.

Table 4.3 CFA results for testing construct validity.

Variables used in research	N = 334,**(N = 577)**					
	Stand. estimates	S.E.	t-value	Error Variances	CR	AVE
Behavioural intention (BI)	(Cronbach α = 0.726)					
BI1	0.598,**(0.692)**	0.059,**(0.041)**	8.247,**(14.303)**	0.609,**(0.550)**	0.701,**(0.713)**	0.547,**(0.556)**
BI2	0.869,**(0.824)**	0.070,**(0.041)**	10.961,**(17.475)**	0.311,**(0.376)**		
Health motivation (HM)	(Cronbach α = 0.797)					
HM1	0.714,**(0.711)**	0.035,**(0.025)**	20.271,**(27.934)**	0.491,**(0.494)**	0.796,**(0.806)**	0.566,**(0.582)**
HM2	0.816,**(0.811)**	0.030,**(0.021)**	27.274,**(38.670)**	0.335,**(0.343)**		
HM3	0.723,**(0.763)**	0.034,**(0.023)**	21.446,**(33.567)**	0.477,**(0.418)**		
Perceived benefits (BN)	(Cronbach α = 0.742)					
BN1	0.675,**(0.712)**	0.043,**(0.031)**	13.550,**(19.863)**	0.499,**(0.475)**	0.830,**(0.846)**	0.494,**(0.528)**
BN2	0.685,**(0.749)**	0.041,**(0.029)**	15.448,**(22.257)**	0.487,**(0.429)**		
BN3	0.753,**(0.820)**	0.041,**(0.025)**	15.747,**(28.436)**	0.404,**(0.331)**		
BN4	0.729,**(0.754)**	0.046,**(0.029)**	12.418,**(22.939)**	0.435,**(0.422)**		
BN5	0.663,**(0.534)**	0.054,**(0.038)**	6.666,**(11.347)**	0.698,**(0.662)**		
Perceived barriers (BR)	(Cronbach α = 0.782)					
BR1	0.526,**(0.627)**	0.046,**(0.027)**	11.388,**(22.984)**	0.723,**(0.607)**	0.765,**(0.762)**	0.529,**(0.524)**
BR2	0.835,**(0.897)**	0.035,**(0.029)**	23.854,**(30.730)**	0.303,**(0.196)**		
BR3	0.784,**(0.613)**	0.037,**(0.027)**	21.412,**(22.405)**	0.386,**(0.624)**		
Perceived susceptibility (SU)	(Cronbach α = 0.790)					
SU1	0.694,**(0.614)**	0.047,**(0.031)**	12.570,**(19.963)**	0.377,**(0.573)**	0.829,**(0.834)**	0.496,**(0.502)**
SU2	0.737,**(0.755)**	0.053,**(0.026)**	12.081,**(28.987)**	0.324,**(0.380)**		
SU3	0.656,**(0.761)**	0.063,**(0.024)**	8.777,**(31.441)**	0.420,**(0.471)**		
SU4	0.502,**(0.682)**	0.060,**(0.028)**	6.753,**(24.099)**	0.568,**(0.485)**		
SU5	0.630,**(0.667)**	0.056,**(0.027)**	9.543,**(24.475)**	0.449,**(0.449)**		
Perceived severity (SV)	(Cronbach α = 0.781)					
SV1	0.760,**(0.659)**	0.039,**(0.033)**	16.740,**(20.053)**	0.525,**(0.515)**	0.805,**(0.805)**	0.509,**(0.508)**
SV2	0.732,**(0.712)**	0.042,**(0.027)**	15.137,**(25.915)**	0.560,**(0.443)**		
SV3	0.790,**(0.753)**	0.038,**(0.027)**	18.159,**(27.758)**	0.484,**(0.382)**		
SV4	0.708,**(0.650)**	0.042,**(0.031)**	14.525,**(21.176)**	0.591,**(0.527)**		
Cue to action (CU)	(Cronbach α = 0.844)					
CU1	0.810,**(0.695)**	0.040,**(0.027)**	17.903,**(25.862)**	0.476,**(0.516)**	0.835,**(0.855)**	0.505,**(0.544)**
CU2	0.794,**(0.801)**	0.040,**(0.022)**	17.174,**(35.892)**	0.498,**(0.359)**		
CU3	0.769,**(0.844)**	0.039,**(0.019)**	17.281,**(44.539)**	0.532,**(0.288)**		
CU4	0.732,**(0.707)**	0.042,**(0.027)**	15.102,**(25.903)**	0.580,**(0.500)**		
CU5	0.641,**(0.620)**	0.048,**(0.030)**	11.274,**(20.938)**	0.687,**(0.615)**		
Perceived enforcement (EN)	(Cronbach α = 0.679)					
EN1	0.818,**(0.819)**	0.094,**(0.033)**	8.726,**(24.542)**	0.331,**(0.279)**	0.726,**(0.709)**	0.572,**(0.553)**
EN2	0.689,**(0.646)**	0.083,**(0.022)**	8.337,**(24.625)**	0.526,**(0.601)**		
Past experience (PA)						
PA	-	-	-	-	-	-

Table 4.3 CFA results for testing construct validity (Cont.).

Variables used in research	N = 334,**(N = 577)**					
	Stand. estimates	S.E.	t-value	Error Variances	CR	AVE
Self-efficacy (SE)	(Cronbach α = 0.552)					
SE1	0.731,**(0.737)**	0.045,**(0.039)**	14.165,**(16.198)**	0.522,**(0.435)**	0.755,**(0.748)**	0.509,**(0.501)**
SE2	0.637,**(0.596)**	0.050,**(0.044)**	10.750,**(9.074)**	0.631,**(0.663)**		
SE3	0.820,**(0.771)**	0.042,**(0.039)**	17.188,**(17.147)**	0.401,**(0.390)**		

Teenager; χ^2 = 656.370; df = 412; χ^2/df = 1.593, P < 0.001, RMSEA = 0.042 (< 0.07), CFI = 0.930 (>0.9), TLI = 0.916 (>0.8), SRMR = 0.060 (<0.08)

Adult; χ^2 = 785.336; df = 408; χ^2/df = 1.925, P < 0.001, RMSEA = 0.040 (< 0.07), CFI = 0.947 (>0.9), TLI = 0.935 (>0.8), SRMR = 0.048 (<0.08)

Note: Standardized coefficients of CFA for teenager group,**(Standardized coefficients of CFA for adult group)**

From these results, it could be concluded that the CR values of each factor in the teenager group were within 0.701–0.835 and the AVE values were within 0.494 (close to 0.5)–0.572. For the adult group, the CR values of each factor were within 0.709–0.855 and the AVE values were within 0.501–0.582. Thus, every factor of the two groups were appropriate for being the tool or measurement model in this research (Hair, Black, and Babin, 2010).

4.4.2.2 Structural equation modelling (SEM)

SEM is an statistical analysis model integrated into many models simultaneously to measure construct validity between latent variables as well as between those latent variables and the observed variables by estimating a parameter that indicates how much each question item is representative of the latent variables that need to be measured with the correlation coefficients between the observed variables and latent variables and measurement errors (Kline, 2011). Furthermore, SEM is used to confirm the relevance of model according to the hypothesis identifying the detailed relationship of variables to explain the correlation of all sets of variables.(Sarnacchiaro and Boccia, 2017)

As SEM consists of a measurement model and a structural model(González-Rodríguez, Díaz Fernández, and Simonetti, 2016), the analysis of the structural equation can be conducted in two aspects, that is, the specified analysis of the measurement model, called CFA (Wood, 2008) and the coincident analysis of the structural model, called path analysis.

4.4.2.3 Multi-group SEM

SEM can be used for multi-group analysis using the data of invariance analysis between groups(Adegboye and Jawid, 2016), for example, between teenager and adult groups, to compare the two models by determining the equality of condition between groups in testing the path coefficient in the model. Then, this condition is tested by considering the difference of chi-square value between the models without the determination of equality of condition. If the difference of the chi-square values of the models is significant at the degrees of freedom (df) equal to the difference of the degrees of freedom of both models, then there is a difference between the groups (Bollen, 1989; Byrne, 2012).

4.4.3 Variables and structure of hypothesis model

From reviewing theories and related research on seat belt usage, the factors affecting or resulting in seat belt use were obtained. These different factors obtained from the previous research were taken to build hypothetical models. The structure of the HBM in this research employed 33 variables involved in seat belt use behavioural intention between two groups of intercity bus passengers, as shown in Table 4.2 The structure of the hypothetical HBM is shown in Figure 4.1.

4.5 Results

4.5.1 Descriptive statistics

According to the data collected from 911 samples of intercity bus passengers, it was found that the samples consisted 43.6% of males and 56.4% of females. Of these, 36.7% of the teenager group (12–20 years) and 63.3% of the adult group (21–60 years). For education levels, had 76.3% of education level lower than bachelor's degree, 17% of bachelor's degree and had 6.7% of education level higher than bachelor's degree. For occupations, the samples consisted 50.3% of students, followed by common employees, private company employees, government officials, state enterprise employees, business owners, farmers and others as 17.3%, 12.6%, 8.3%, 7.7%, 2.5% and 1.2% respectively.

In terms of the correlation analysis between two groups of variables, it was found that in the teenager group, health motivation, perceived benefits, perceived susceptibility, perceived severity, cue to action, perceived enforcement, past experience and self-efficacy were positively correlated with behavioural intention at a statistical significance level of 0.01. In addition, perceived barriers had a negative correlation with behavioural intention at a 0.01 significance level with a value of Bartlett's test of sphericity: chi-square of 3968.046 (df = 528, P = 0.00). This showed that various variables correlated with each other and could be taken for the analysis. The value of Kaiser–Meyer–Olkin (KMO) was close to 1 (KMO = 0.858), indicating that the overall data were actually appropriate for analysis. Regarding adults group, it was found that the correlation between variables was the same as that of teenagers at a 0.01 significance level with a value of Bartlett's test of sphericity: chi square of 7541.302

(df = 528, P = 0.00) and KMO was close to 1 (KMO = 0.895). Therefore, the overall data of the two groups can be concluded to be precisely appropriate for analysis.

In terms of the test of the data distribution, the value of skewness and kurtosis should be close to 0 or within -1.50–1.50 (Kline, 2011). In this research, the skewness and kurtosis values were at the determined criterion in both groups, indicating that the data used for the analysis had a normal distribution and were appropriate for the analysis.

4.5.2 Model fit indices

This research adopted structural equation modelling (SEM) as the tool for analysing factors affecting the seat belt use behavioural intention of intercity bus passengers in the teenager and adult groups by using Mplus 7.11 program to test the congruence of data and the hypothetical model of HBM, whose IOC value was used as the criteria, as follows.

(1) $\chi 2$ /df should be less than 3 (Kline, 2011).

(2) The root-mean-square residual error of approximation (RMSEA) value should be less than or equal to 0.07 (Steiger, 2007).

(3) The comparative-fit index (CFI) should be greater than or equal to 0.90 (Hu, 1999).

(4) The Tucker–Lewis index (TLI) and non-normed-fit index should be greater than or equal to 0.80 (Jomnonkwao, Sangphong, Khampirat, Siridhara, and Ratanavaraha, 2016).

(5) The standardised-root-mean-square residual (SRMR) should be less than or equal to 0.08. (Hu, 1999).

4.5.3 Structural equation model for behavioural intention to use seat belt among teenagers

The results of SEM for the seat belt use behavioural intention of intercity bus passengers in the teenager group are shown in Table 4.4 and Figure 4.1. The values of the goodness of fit index were as follows: chi-square (χ^2) = 761.258, df = 442, P-value < 0.001, χ^2/df = 1.722, RMSEA = 0.047, CFI = 0.911, TLI = 0.894 and SRMR = 0.077. The criterion of goodness of fit index was found to match the criterion of measurement. Thus, SEM for the seat belt use behavioural intention of intercity bus passengers in the teenager group was found to be relevant to the empirical data.

Table 4.4 SEM results for seat belt use behavioural intention.

Variables used in research	N = 334,**(N = 577)**		
	Stand. estimates	S.E.	t-value
Behavioural intention (BI) BY			
BI1	0.677,**(0.649)**	0.047,**(0.034)**	14.416,**(19.306)**
BI2	0.810,**(0.799)**	0.033,**(0.024)**	21.268,**(33.153)**
Health motivation (HM) BY			
HM1	0.700,**(0.708)**	0.036,**(0.026)**	19.315,**(27.002)**
HM2	0.815,**(0.806)**	0.030,**(0.021)**	27.285,**(37.603)**
HM3	0.747,**(0.764)**	0.032,**(0.023)**	23.185,**(33.040)**
Perceived benefits (BN) BY			
BN1	0.622,**(0.650)**	0.056,**(0.034)**	7.597,**(16.039)**
BN2	0.645,**(0.708)**	0.047,**(0.031)**	11.595,**(19.636)**
BN3	0.748,**(0.811)**	0.043,**(0.026)**	14.971,**(26.918)**
BN4	0.704,**(0.752)**	0.045,**(0.029)**	13.310,**(22.442)**
BN5	0.592,**(0.531)**	0.056,**(0.038)**	7.051,**(11.312)**

Table 4.4 SEM results for seat belt use behavioural intention (Cont.).

Variables used in research	N = 334,**(N = 577)**		
	Stand. estimates	S.E.	t-value
Perceived barriers (BR) BY			
BR1	0.541,**(0.617)**	0.045,**(0.076)**	11.988,**(8.110)**
BR2	0.827,**(0.800)**	0.034,**(0.086)**	24.246,**(9.344)**
BR3	0.775,**(0.577)**	0.035,**(0.061)**	21.860,**(7.818)**
Perceived susceptibility (SU) BY			
SU1	0.653,**(0.613)**	0.054,**(0.032)**	10.205,**(19.446)**
SU2	0.717,**(0.759)**	0.057,**(0.027)**	10.886,**(28.512)**
SU3	0.638,**(0.761)**	0.057,**(0.025)**	9.505,**(31.025)**
SU4	0.487,**(0.689)**	0.061,**(0.028)**	6.389,**(24.340)**
SU5	0.612,**(0.615)**	0.067,**(0.031)**	7.659,**(19.838)**
Perceived severity (SV) BY			
SV1	0.703,**(0.653)**	0.043,**(0.032)**	14.088,**(20.443)**
SV2	0.701,**(0.692)**	0.045,**(0.030)**	13.289,**(23.399)**
SV3	0.786,**(0.753)**	0.040,**(0.028)**	17.131,**(26.742)**
SV4	0.675,**(0.638)**	0.047,**(0.040)**	12.233,**(13.627)**
Cue to action (CU) BY			
CU1	0.809,**(0.698)**	0.040,**(0.027)**	17.685,**(26.297)**
CU2	0.798,**(0.795)**	0.040,**(0.022)**	17.252,**(35.392)**
CU3	0.766,**(0.851)**	0.039,**(0.019)**	17.194,**(45.976)**
CU4	0.735,**(0.704)**	0.042,**(0.027)**	15.293,**(26.136)**
CU5	0.637,**(0.618)**	0.048,**(0.030)**	11.182,**(20.876)**
Perceived enforcement (EN) BY			
EN1	0.884,**(0.838)**	0.049,**(0.072)**	15.915,**(10.304)**
EN2	0.716,**(0.609)**	0.049,**(0.060)**	14.608,**(10.141)**
Self-efficacy (SE) BY			
SE1	0.713,**(0.711)**	0.047,**(0.042)**	13.129,**(14.696)**

Table 4.4 SEM results for seat belt use behavioural intention (Cont.).

Variables used in research	N = 334,**(N = 577)**		
	Stand. estimates	S.E.	t-value
SE2	0.628,**(0.434)**	0.051,**(0.048)**	10.339,**(6.968)**
SE3	0.821,**(0.776)**	0.043,**(0.043)**	16.699,**(15.870)**
Behavioural intention ON			
HM	0.072,**(0.063)**	0.007,**(0.004)**	10.700,**(15.350)**
BN	0.251,**(0.321)**	0.031,**(0.022)**	8.189,**(14.565)**
BR	-0.129,**(-0.126)**	0.016,**(0.018)**	-8.149,**(-7.026)**
SU	0.172,**(0.180)**	0.020,**(0.012)**	8.625,**(14.968)**
SV	0.274,**(0.245)**	0.027,**(0.019)**	10.272,**(13.099)**
CU	0.087,**(0.089)**	0.009,**(0.006)**	10.205,**(14.797)**
EN	0.073,**(0.120)**	0.013,**(0.008)**	9.473,**(8.696)**
SE	0.060,**(0.054)**	0.006,**(0.005)**	9.314,**(11.336)**
PA	0.222,**(0.178)**	0.054,**(0.039)**	4.093,**(4.542)**

Teenager; χ^2 = 761.258; df = 442; χ^2/df = 1.722, P < 0.001, RMSEA = 0.047 (<0.07), CFI = 0.911 (>0.9), TLI = 0.894 (>0.8), SRMR = 0.077 (<0.08)

Adult; χ^2 = 893.992; df = 431; χ^2/df = 2.074, P < 0.001, RMSEA = 0.043 (<0.07), CFI = 0.936 (>0.9), TLI = 0.921 (>0.8), SRMR = 0.072 (<0.08)

Note: Standardized coefficients of SEM for teenager group,**(Standardized coefficients of SEM for adult group)**

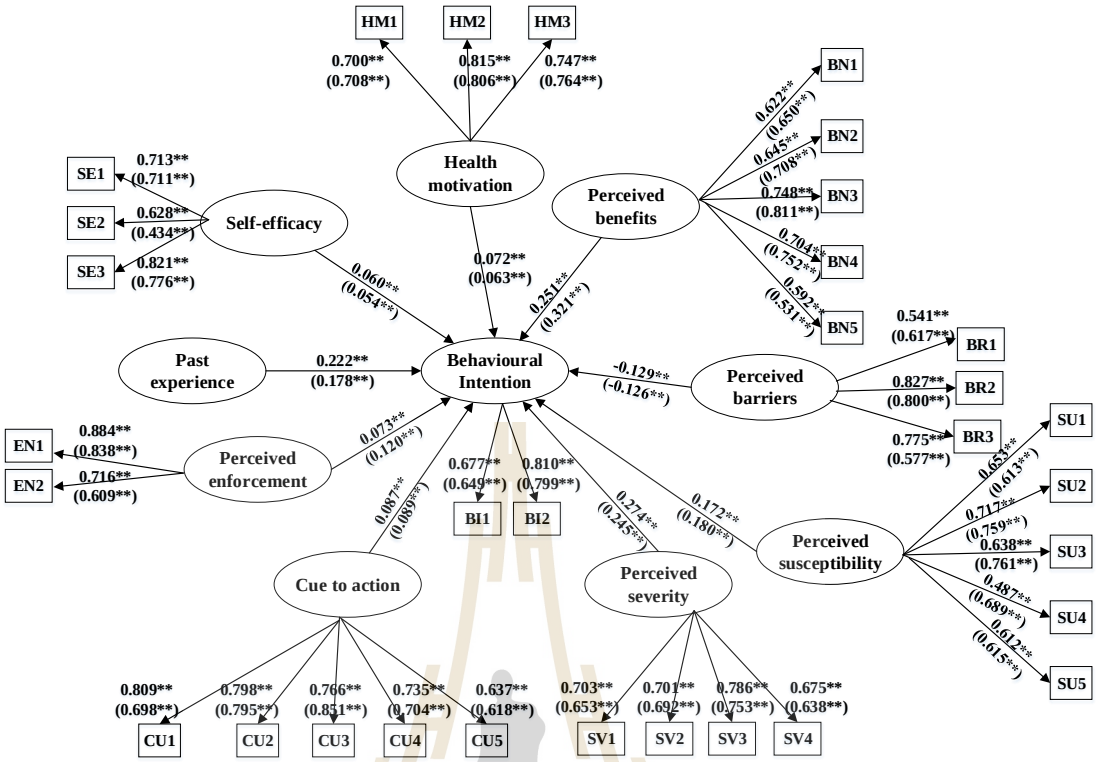

Figure 4.1 Structure of hypothetical HBM and results of SEM.

Teenager; χ^2 = 761.258, df = 442, χ^2/df = 1.722, P < 0.001, RMSEA = 0.047 (<0.07),
CFI = 0.911 (>0.9), TLI = 0.894 (>0.8) and SRMR = 0.077 (<0.08),
*P < 0.05, **P < 0.01 (Mplus 7.12 standardised estimates)

Adult; χ^2 = 893.992, df = 431, χ^2/df = 2.074, P < 0.001, RMSEA = 0.043 (<0.07),
CFI = 0.936 (>0.9), TLI = 0.921 (>0.8) and SRMR = 0.072 (<0.08)
*P < 0.05, **P < 0.01 (Mplus 7.12 standardised estimates)

Note: Standardized coefficients of SEM for teenager group (Standardized coefficients of SEM for adult group)

The factors having significantly positive influence with the highest coefficients values of standardized factor loading on seat belt use behavioural intention was perceived severity, which is the perception of severity of injuries caused by not using seat belts (β= 0.274); followed by perceived benefits, which is the perception of the benefits of using seat belts (β= 0.251); past experience, which is the past experience in using seat belts (β= 0.222); perceived susceptibility, which is the chance prediction

of accident risks while travelling (β= 0.172); cue to action, which is the perception of information through mass media or the warnings of beloved or respected people (β= 0.087); perceived enforcement, which is the perception of law and legal punishment (β= 0.073); health motivation, which is the attitudes of health towards seat belt use (β= 0.072) and self-efficacy, the control ability of deciding and reducing the risks by one's own self (β = 0.060). The factor which had significantly negative influence was perceived barriers, the perception of barriers against seat belt use (β= −0.129).

4.5.4 Structural equation model for behavioural intention to use seat belt among adults

The results of SEM analysis for the seat belt use behavioural intention of intercity bus passengers in the adults group are shown in Table 4.4 and Figure 4.1. The following values of goodness of fit index were found: χ^2 = 893.992, df = 431, P-value < 0.001, χ^2/df = 2.074, RMSEA = 0.043, CFI = 0.936, TLI = 0.921 and SRMR = 0.072. The criterion of goodness of fit was found to meet the criterion of measurement. Thus, SEM analysis for seat belt use behavioural intention of intercity bus passengers in the adult group was relevant to empirical data.

The factors having significantly positive influence with the highest coefficients of standardized factor loading on the seat belt use behavioural intention were perceived benefits (β = 0.321), followed by perceived severity (β = 0.245), perceived susceptibility (β = 0.180), past experience (β = 0.178), perceived enforcement (β = 0.120), cue to action (β = 0.089), health motivation (β = 0.063) and self-efficacy (β = 0.054). The factor having significantly negative influence was perceived barriers (β = −0.126).

4.5.5 Multi–group analysis

The invariance test results of the model are shown in Table 4.5. The invariance of the model forms was assessed using a hypothesis stating that the values of factor loading, intercept and structural path were not different when using the simultaneous model and the strict model. The difference of chi-square values of the models was 383.296, and difference of the degrees of freedom was 37 ($P < 0.0001$), indicating that the hypothesis cannot be accepted. Therefore, the model for behavioural intention of seat belt use of intercity bus passengers indicated different values of factor loadings, intercepts, and structural paths between the intention to use seat belts in teenagers and adults. Thus, the intention to use seat belts of intercity bus passenger must be developed separately for teenagers and adults.

Table 4.5 Model fit indices for the invariance test between groups.

Description	χ^2	df	χ^2/df	CFI	TLI	RMSEA (90% CI)	SRMR	$\Delta\chi^2$	Δ df	p
Individual group:										
Model 1: Teenagers	761.258	442	1.722	0.911	0.894	0.047 (0.041-0.052)	0.077			
Model 2: Adults	893.992	431	2.074	0.936	0.921	0.043 (0.039-0.047)	0.072			
Measurement of invariance:										
Simultaneous model	1412.833	827	1.71	0.946	0.931	0.039 (0.036-0.043)	0.049			
Factor Loadings, Intercepts, Structural Paths held equal across group	1796.129	864	2.07	0.914	0.894	0.049 (0.045-0.052)	0.075	383.296	37	< 0.0001

Note: χ^2 = Chi-squared statistic; df = Degree of freedom; P = Level of significance; CFI = Comparative fit index; TLI = Tucker-Lewis index; RMSEA = Root mean square error of approximation; SRMR = standardized root mean square residual.

4.6 Conclusions and Discussion

This research aimed to determine the factors affecting seat belt use behavioural intention of intercity bus passengers among teenager and adult groups by applying of health belief model (HBM). In addition, structural equation analysis (SEM) was used to measure the congruence of the models. The factors obtained from the analysis will be adopted to propose recommendations on the policy plan for promoting seat belt use for passengers travelling by intercity buses.

Predictors of behavioural intention seatbelt usage among teenagers and adults. The most affecting factors of the seat belt use behavioural intention of intercity bus passengers in the teenager group were perceived severity, followed by perceived

benefits, past experience, perceived susceptibility, cue to action, perceived enforcement, health motivation and self-efficacy. These eight factors had significantly positive influence on the seat belt use behavioural intention of passengers. Perceived barriers had the most significantly negative influence on the seat belt use behavioural intention. The most-affecting factors of the seat belt use behavioural intention of intercity bus passengers in the adult group was perceived benefits, followed by perceived severity, perceived susceptibility, past experience, perceived enforcement, cue to action, health motivation and self-efficacy. These factors had significantly positive influence on the seat belt use behavioural intention. Perceived barriers was the factor having the most significantly negative influence on the seat belt use behavioural intention. According to the analysis, the overall picture of the two groups showed that the adult group recognized the benefits of using seat belt more than the teenager group, although the teenager group recognized the severity of not wearing seat belts. In addition, the adult group gave importance to the perception or the law enforcement more than the teenager group. This reflected that for teenagers, the perception or the law enforcement may not be effective enough to make them be aware of this issue. In other words, seat belt use will reflect each country's adherence of law faithfulness (Curtis, Rodi, and Sepulveda, 2007). The results of the multi-group analysis showed that the models of the two groups were different. Thus, to recommend the policy plan to the government, age range-specific development must be considered, and effective campaigns must be implemented encouraging passengers to recognize safety by using seat belts while travelling in intercity buses. According to the results, the overall picture of every factor of the two groups could be explained as follows.

Although perceived severity affected the seat belt use behavioural intention of

both groups, it influenced the teenager group the most. The passengers' perception of potential severity or outcomes of accidents resulting from not wearing seat belts, such as the possibility of disability or fatality or the impact on work and family members' ways of lives, will enhance their intention to use seat belts. This agrees with the previous researches that indicate that the perception of accident severity results in fear in humans and in greater attention (Akbaş et al., 2010).

Although perceived benefits affected the seat belt use behavioural intention of both groups of passengers, it influenced the adult group the most. The passengers' perception of benefits of fastening seat belts, such as the belief that it is equipment meant to reduce the severity and fatality when accidents occur, will result in enhanced seat belt use behavioural intention. This agrees with the past researches that showed that good attitude towards seat belt use would result in drivers and passengers of personal vehicles having greater behavioural intention to use seat belts (Rowe et al., 2016).

Although past experience influenced the seat belt use behavioural intention of both groups of passengers, in the teenager group, the order of influential factors was better than that in the adult group. If the passengers have the habit of using seat belt in the past, it resulted in greater behavioural intention to use seat belts. This agrees with the past researches that indicated that drivers and personal vehicle passengers who have social resistance habit or who do not have the habit of using seat belts show decreased seat belt use behavioural intention (Vaughn, Salas-Wright, and Piquero, 2012).

Perceived susceptibility affected the seat belt use behavioural intention of both groups of passengers, but the order of influential factors in the adult group was better than that in the teenager group. If the passengers had the perception of accident risks

while travelling, either on the streets or the mountains, slippery roads, or the car crashes, it resulted in greater seat belt use behavioural intention. This agrees with the past researches that indicated that car drivers who had the perception of the risks of accident occurrence showed greater intention of seat belt use (Fernandes, Hatfield, and Soames Job, 2010).

Cue to action influenced the seat belt use behavioural intention of both groups of passengers. However, the order of influential factors in the teenager group was better than that in the adult group. If the passengers had the perception of information through mass media or warnings for seat belt use from the beloved and regularly respected people such as friends or family members, it resulted in greater seat belt use behavioural intention while travelling. This agrees with the past researches that indicated that paying attention to family members' seat belt use resulted in teenage drivers of personal cars having more intention of using seat belts (Goldzweig et al., 2013).

Perceived enforcement influenced the seat belt use behavioural intention of both groups of passengers. The order of influential factors was better in among adults than that among teenagers. If the passengers had the perception of law and legal punishment, the seat belt use enforcement resulted in more seat belt use behavioural intention. This agrees with the past researches that indicated that the availability of a master law that effectively enforces seat belt use helps in increasing its use rate in the Unites States. Furthermore, it was found to be another important strategy for reducing fatalities from accidents (Strine et al., 2010).

Health motivation influenced the seat belt use behavioural intention of both groups of passengers with equal order of influential factors. If the passengers had good health attitudes towards seat belt usage, such as the belief that health was the most

important issue, and gave significant importance to safety, it resulted in greater seat belt use behavioural intention. This agrees with the past researches that presented that the personal car drivers' health promotion behaviours or their own attention to health result in greater seat belt use rate (Şimşekoğlu and Lajunen, 2009).

Self-efficacy influenced the seat belt use behavioural intention of both passenger groups with equal rank of influential factors. If the passengers had abilities to control the decision and reduced the risks by themselves, such as making decision whether they use seat belts or not, or reduced their risks by fastening seat belts, it result in greater seat belt use behavioural intention while travelling. This agrees with the previous researches that indicated that controlling decision by themselves results in greater bicycle helmet use behavioural intention (Lajunen and Räsänen, 2004).

Perceived barriers negatively influenced the seat belt use behavioural intention of both passenger groups. If the passengers had a perception of barriers against seat belt usage, such as when wearing a seat belt, they feel uncomfortable and sick, it resulted in the decrease in seat belt use behavioural intention while travelling. This agrees with the previous researches that showed that the taxi drivers in China felt uncomfortable wearing seat belts, which subsequently resulted in the decline of seat belt use (Routley, Ozanne-Smith, Qin, and Wu, 2009).

According to the analysis, the overall picture can be considered to propose the following recommendations to the government sector for promoting passengers' seat belt use while travelling by intercity buses:

According to the analysis, the overall picture can be considered to propose the following recommendations to the government sector for promoting passengers' seat belt use while travelling by intercity buses:

(1) The internal exhibition in educational institutes and government or private organizations should be held to show the severity of accident occurrence. Advertising media should be made to reflect the severity of not wearing seat belts while travelling, such as serious injuries or disabilities. Furthermore, parents or adult relatives of children must be provided awareness, since they are accepted as the adult group that can encourage teenagers to pay attention to seat belt use while travelling.

(2) Educational institutes and government or private organizations should implement campaigns, or advertising media should show the benefits of seat belt use and create images showing that seat belt use indicates the new generation's sense of responsibility towards themselves and the society.

(3) The public relations in educational institutes should be directed by including the content related to "the law enforcement for passenger seat belt use" in the lessons. In addition, the government or private organizations should determine policies that enforce seat belt use within organizations. Furthermore, there should be more stringent measures of law enforcement such as the determination of check points for investigating seat belt use of intercity bus passengers. In case of law violation, both service providers and users should be penalized.

From the aforementioned recommendations, the cultivation of good attitude towards seal belt usage in both teenagers and adults will make them be aware of safety, pay more attention to their own health, and overcome various barriers against seat belt use in the future. Importantly, it will decrease the severity of injuries and fatality rate in accidents in the future.

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4.8 References

Aceves-González, C., Cook, S., and May, A. (2015). Bus use in a developing world city: Implications for the health and well-being of older passengers. **Journal of Transport & Health**. 2(2): 308-316. doi: http://dx.doi.org/10.1016/j.jth. 2015.04.001.

Adegboye, O. A., and Jawid, A. (2016). Multivariate multilevel models for attitudes toward statistics: multi-disciplinary settings in Afghanistan. **Journal of Applied Statistics**. 43(1): 244-261. doi: 10.1080/02664763.2015.1091445.

Agusdinata, D. B., van der Pas, J. W. G. M., Walker, W. E., and Marchau, V. A. W. J. (2009). Multi-criteria analysis for evaluating the impacts of intelligent speed adaptation. **Journal of Advanced Transportation**. 43(4): 413-454. doi: 10.1002/atr.5670430402.

Akbaş, O., Güven, R., Cebeci, G., Bertlek, S. B., Aldemir, G., and Bal, E. (2010). A study on the effects of seat belt posters on drivers. **Procedia - Social and Behavioral Sciences**. 2(2): 1002-1007. doi: http://dx.doi.org/10.1016/j.sbspro .2010.03.141.

Barua, U., and Tay, R. (2010). Severity of urban transit bus crashes in Bangladesh. **Journal of Advanced Transportation**. 44(1): 34-41. doi: 10.1002/atr.104.

Baskan, P. D. G. A., Ozdamli, A. P. D. F., Özcan, S. K., Deniz, Khorsandi, M., Ghofranipour, F., Ghobadzadeh, M. (2012). 4th WORLD CONFERENCE ON EDUCATIONAL SCIENCES (WCES-2012) 02-05 February 2012 Barcelona, Spain The Effect of PRECEDE PROCEED Model Combined with the Health Belief Model and the Theory of Self-Efficacy to Increase Normal Delivery Among Nulliparous Women. **Procedia - Social and Behavioral Sciences**. 46: 187-194. doi: http://dx.doi.org/10.1016/j.sbspro.2012.05.091.

Becker, M. H., Maiman, L. A., Kirscht, J. P., Haefner, D. P., and Drachman, R. H. (1977). The Health Belief Model and prediction of dietary compliance: a field experiment. **Journal of Health and Social Behavior**. 348-366.

Bilgic, S., Barut, H. B., Karacasu, M., Er, A., and Yaliniz, P. (2011). The changes in usage of seat belts in Antalya, Turkey. **Procedia - Social and Behavioral Sciences**. 20: 588-593. doi: http://dx.doi.org/10.1016/j.sbspro.2011.08.065.

Bollen, K. A. (1989). **Structural Equations with Latent Variables**. New York: John Wiley and Sons.

Byrne, B. M. (2012). **Structural equation modeling with Mplus: Basic concepts, applications, and programming**: Taylor and Francis Group.

Chaudhary, N. K., Solomon, M. G., and Cosgrove, L. A. (2004). The relationship between perceived risk of being ticketed and self-reported seat belt use. **Journal of Safety Research**. 35(4): 383-390. doi: http://dx.doi.org/10.1016/j.jsr.2004.03.015.

Curtis, K. M., Rodi, S. W., and Sepulveda, M. G. (2007). The lack of an adult seat belt law in New Hampshire: Live free and die? **Accident Analysis & Prevention**. 39(2): 380-383. doi: http://dx.doi.org/10.1016/j.aap.2006.08.008.

Darsareh, F., Aghamolaei, T., Rajaei, M., Madani, A., and Zare, S. The differences between pregnant women who request elective caesarean and those who plan for vaginal birth based on Health Belief Model. **Women and Birth**. doi: http://dx.doi.org/10.1016/j.wombi.2016.05.006.

Fernandes, R., Hatfield, J., and Soames Job, R. F. (2010). A systematic investigation of the differential predictors for speeding, drink-driving, driving while fatigued, and not wearing a seat belt, among young drivers. **Transportation Research Part F: Traffic Psychology and Behaviour**. 13(3): 179-196. doi: http://dx.doi. org / 10.1016/ j.trf.2010.04.007.

Gidding, S. S., Dennison, B. A., Birch, L. L., Daniels, S. R., Gilman, M. W., Lichtenstein, A. H., Van Horn, L. (2006). Dietary Recommendations for Children and Adolescents: A Guide for Practitioners. **Pediatrics**. 117(2): 544-559. doi: 10.1542/peds.2005-2374.

Goldzweig, I. A., Levine, R. S., Schlundt, D., Bradley, R., Jones, G. D., Zoorob, R. J., and Ekundayo, O. J. (2013). Improving seat belt use among teen drivers: Findings from a service-learning approach. **Accident Analysis & Prevention**. 59: 71-75. doi: http://dx.doi.org/10.1016/j.aap.2013.04.032.

González-Rodríguez, M. R., Díaz Fernández, M. C., and Simonetti, B. (2016). Corporate Social Responsibility perception versus human values: a structural equation modeling approach. **Journal of Applied Statistics**. 43(13): 2396-2415. doi: 10.1080/02664763.2016.1163528.

Gorsuch, R. L. (1983). **Factor Analysis**: Psychology Press.

Guler, M., and O. Atahan, A. (2009). **Effectiveness of seat belut sage on the rollover crashworthiness of an tntercity coach**.

Guler, M. A., Atahan, A. O., and Bayram, B. (2011). Crashworthiness evaluation of an intercity coach against rollover accidents. **International Journal of Heavy Vehicle Systems**. 18(1): 64-82. doi: 10.1504/ijhvs.2011.03796.

Guler, M. A., Elitok, K., Bayram, B., and Stelzmann, U. (2007). The influence of seat structure and passenger weight on the rollover crashworthiness of an intercity coach. **International Journal of Crashworthiness**. 12(6): 567-580. doi: 10.1080/13588260701485297.

Hair, J. F., Black, W. C., and Babin, B. J. (2010). **Multivariate Data Analysis: A Global Perspective**: Pearson Education.

Horwood, H., Williams, M. J. A., and Mandic, S. (2015). Examining Motivations and Barriers for Attending Maintenance Community-Based Cardiac Rehabilitation Using the Health-Belief Model. **Heart, Lung and Circulation**. 24(10): 980-987. doi: http://dx.doi.org/10.1016/j.hlc.2015.03.023.

Høye, A. (2016). How would increasing seat belt use affect the number of killed or seriously injured light vehicle occupants? **Accident Analysis & Prevention**. 88: 175-186. doi: http://dx.doi.org/10.1016/j.aap.2015.12.022

Hu, L. t., Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. **Structural Equation Modeling: A Multidisciplinary Journal**. 6(1): 1-55.

Jomnonkwao, S., Sangphong, O., Khampirat, B., Siridhara, S., and Ratanavaraha, V. (2016). Public transport promotion policy on campus: evidence from Suranaree University in Thailand. **Public Transport**. 1-19. doi: 10.1007 /s12469-016-0122-2.

Kail, R. V., and Cavanaugh, J. C. (1996). **Human development**: Brooks/Cole Pub.

Kline, R. B. (2011). **Principles and Practice of Structural Equation Modeling**: Guilford Press.

Lajunen, T., and Räsänen, M. (2004). Can social psychological models be used to promote bicycle helmet use among teenagers? A comparison of the Health Belief Model, Theory of Planned Behavior and the Locus of Control. **Journal of Safety Research**. 35(1): 115-123. doi: http://dx.doi.org/10.1016/j.jsr.2003 .09.020.

Michalaki, P., Quddus, M., Pitfield, D., and Huetson, A. (2016). A time-series analysis of motorway collisions in England considering road infrastructure, socio-demographics, traffic and weather characteristics. **Journal of Transport & Health**. 3(1): 9-20. doi: http://dx.doi.org/10.1016/j.jth.2015. 10.005.

Muthén, L. K., and Muthén, B. O. (2010). **Mplus : statistical analysis with latent variables : User's Guide**. Los Angeles: Muthén and Muthén.

Nickel, B. E. (1988). Facing the challenge of the future by strategic planning for public transport in Germany. **Journal of Advanced Transportation**. 22(2): 134-153. doi: 10.1002/atr.5670220204.

Olsen, C. S., Cook, L. J., Keenan, H. T., and Olson, L. M. (2010). Driver seat belt use indicates decreased risk for child passengers in a motor vehicle crash. **Accident Analysis & Prevention**. 42(2): 771-777. doi: http://dx.doi.org/ 10.1016/j .aap.2009.11.009.

Rashrash, M. E., Maneno, M. K., Wutoh, A. K., Ettienne, E. B., and Daftary, M. N. (2016). An evaluation of hepatitis C knowledge and correlations with health belief model constructs among African American “baby boomers”. **Journal of**

Infection and Public Health. 9(4): 436-442. doi: http://dx.doi.org/10.1016/j.jiph.2015.11.005

Rosenstock, I. M., Strecher, V. J., and Becker, M. H. (1988). Social learning theory and the health belief model. **Health Education and Behavior**. 15(2): 175-183.

Routley, V., Ozanne-Smith, J., Qin, Y., and Wu, M. (2009). Taxi driver seat belt wearing in Nanjing, China. **Journal of Safety Research**. 40(6): 449-454. doi: http://dx.doi.org/10.1016/j.jsr.2009.10.004

Rowe, R., Andrews, E., Harris, P. R., Armitage, C. J., McKenna, F. P., and Norman, P. (2016). Identifying beliefs underlying pre-drivers' intentions to take risks: An application of the Theory of Planned Behaviour. **Accident Analysis & Prevention**. 89: 49-56. doi: http://dx.doi.org/10.1016/j.aap.2015.12.024

Sarnacchiaro, P., and Boccia, F. (2017). Some remarks on measurement models in the structural equation model: an application for socially responsible food consumption. **Journal of Applied Statistics**. 1-16. doi: 10.1080/02664763.2017 .1363162.

Şimşekoğlu, Ö., and Lajunen, T. (2008a). Social psychology of seat belt use: A comparison of theory of planned behavior and health belief model. **Transportation Research Part F: Traffic Psychology and Behaviou**r. 11(3): 181-191. doi: http://dx.doi.org/10.1016/j.trf.2007.10.001.

Şimşekoğlu, Ö., and Lajunen, T. (2008b). Why Turks do not use seat belts? An interview study. **Accident Analysis & Prevention**. 40(2): 470-478. doi: http://dx.doi.org/10.1016/j.aap.2007.08.002.

Şimşekoğlu, Ö., and Lajunen, T. (2009). Relationship of seat belt use to health and driver behaviors. T**ransportation Research Part F: Traffic Psychology and Behaviour**. 12(3): 235-241. doi: http://dx.doi.org/10.1016/j.trf.2008.12.001.

Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. **Personality and Individual Differences**. 42(5): 893-898. doi: http://dx.doi.org/10.1016/j.paid.2006.09.017.

Strine, T. W., Beck, L. F., Bolen, J., Okoro, C., Dhingra, S., and Balluz, L. (2010). Geographic and sociodemographic variation in self-reported seat belt use in the United States. **Accident Analysis & Prevention**. 42(4): 1066-1071. doi: http://dx.doi.org/10.1016/j.aap.2009.12.014.

Tavakol, M., and Dennick, R. (2011). Making sense of Cronbach's alpha. **International Journal of Medical Education**. 2: 53-55. doi: 10.5116/ijme. 4dfb.8dfd.

Vaughn, M. G., Salas-Wright, C. P., and Piquero, A. R. (2012). Buckle up: non-seat belt use and antisocial behavior in the United States. **Annals of Epidemiology**. 22(12): 825-831. doi: http://dx.doi.org/10.1016/j.annepidem. 2012.09.010.

Wood, P. (2008). **Confirmatory Factor Analysis for Applied Research**. The American Statistician, 62(1), 91-92. doi: 10.1198/tas.2008.s98.

Yang, S., He, C., Zhang, X., Sun, K., Wu, S., Sun, X., and Li, Y. Determinants of antihypertensive adherence among patients in Beijing: Application of the health belief model. **Patient Education and Counseling**. doi: http://dx.doi.org/10.1016/ j.pec.2016.06.014.

Yazdanpanah, M., Forouzani, M., and Hojjati, M. (2015). Willingness of Iranian young adults to eat organic foods: Application of the Health Belief Model. **Food**

Quality and Preference. 41: 75-83. doi: http://dx.doi.org/10.1016/j. foodqual .2014.11.012.

CHAPTER V

THE INTERCITY BUS PASSENGER'S LOCUS OF CONTROL WITH REGARD TO SEAT BELT USE INTENTION

5.1 Abstract

In Thailand, the number of accidents caused by intercity buses and their severity are increasing while the rate of seat belt use of intercity passengers is decreasing. This study aims to identify the factors affecting the seat belt use behavioural intention (BI) of intercity bus passengers. For analysis, the samples were divided into two groups: teenage group (334 samples) and adult group (577 samples). The theory of locus of control (LC) was applied to analyse internality (IN) and externality (EX), which were both based on LC basic components. The theory was extended by additionally analysing factors that consist of knowledge of seat belt enforcement (EN) and past experience. Structural equation modelling was used to analyse the factors affecting seat belt use BI. Analysis results showed that the two models have differences and that all factors influenced the seat belt use BI of the two groups. For the teenage group, IN had the most positive influence to seat belt use BI, followed by past experience, EX and EN ($\beta = 0.369, 0.290, 0.240$ and 0.190, respectively). For the adult group, IN factor also had the most positive influence, followed by EX, EN and past experience ($\beta = 0.388, 0.273, 0.244$, and 0.236, respectively). Thus, the factors obtained from the result analysis can be proposed to

the government as guidelines for formulating policies or practical methods to encourage passengers to increasingly use seat belts while travelling.

5.2 Introduction

At present, Thailand is developing public transportation systems to serve future needs. Travelling by public intercity bus is accepted as the most popular type of public transportation in Thailand or even in foreign countries, such as Germany (Nickel, 1988). Consequently, the increasing need for intercity bus services has also resulted in increased intercity bus accidents. Each accident causes a large number of fatalities or injuries (Barua and Tay, 2010). In the past two or three years, each intercity bus accident in Thailand caused a large number of passenger injuries and fatalities. The data collected by the Academic Center for Road Safety from online media in 2017 showed that the total number of public intercity bus accidents in 2016 was 43, as well as 49 accidents with 55 cases of fatalities and more than 602 cases of injuries. According to the estimation of the total number of injuries and deaths, nearly 2000 families have been affected by public intercity bus accidents (Department of Land Transport, 2017). Studies showed that the feasible causes of public intercity bus accidents include road characteristics, unsuitable weather conditions (Michalaki et al., 2016), unsuitable service bus conditions (Aceves-González et al., 2015), or driver behaviour (Agusdinata et al., 2009). Passengers can protect themselves from injuries or fatalities by wearing seat belts (Bilgic et al., 2011). However, the rate of seat belt use among bus passengers in Thailand is 40% (Department of Land Transport, 2017) still low even though government organisations have continuously encouraged seat belt use and implemented policies such as the mandatory installation of seat belts in public

buses and the enforcement of passenger seat belt use while travelling. The low rate of seat belt use has increased the number of injuries and fatalities. Thailand considers this issue highly important. Moreover, seat belt use is given importance worldwide (Olsen et al., 2010) because seat belts can protect passengers from serious injuries or death due to road accidents. Seat belts have decreased the number of deaths or serious injuries by 60% (Høye, 2016). Table 5.1 shows the various studies that have investigated seat belt use behaviour.

Table 5.1 Summary of related research.

Author(s)	**Type of vehicle/Country**	**Analysis method**	**Factor of seat belt**
Routley et al., (2009)	Taxi driver/China	Independent sample t-tests, a binomial distribution	Using a seat belt (fine avoidance, safety, high speed and long trips) Not using a seat belt (feeling trapped and uncomfortable)
Eugenia Gras et al. (2007)	Car driver/Spain	Discriminant analysis	Unbelted drivers **(**the seat belt limited their movement, uncomfortable, negative social influence**)** Seat belt use **(**beliefs about their friends' seat belt use, years of driving experience**)**
Şimşekoğlu and Lajunen (2009)	Passenger car/Turkey	Factor analyses and multiple regression analysis	Seat belt use (driver behaviour, e.g. driving errors and violations, regular walking and adequate sleep) Not seat belt use (male, and smoking frequency)

Table 5.1 Summary of related research (cont.).

Author(s)	Type of vehicle/Country	Analysis method	Factor of seat belt
Şimşekoğlu and Lajunen (2008)	Car driver/Turkey	Conducting principal component analysis and multiple regression analysis	Using a seat belt (travelling conditions, e.g. long trips, high speeds, dangerous weather and bad road conditions; safety conditions, e.g. situational conditions, habit of using a seat belt and punishment avoidance) Not using a seat belt (situational conditions, not believing in the effectiveness, discomfort and no habit of seat belt use)
Vaughn et al. (2012)	Driver and passenger car/United States	Binary logistic regression	No seat belt use (young, male, African American or Hispanic, income < USD 75,000, high school or college graduate, use of alcohol and drugs, antisocial behaviour and dual diagnosis.)
Karbakhsh et al. (2010)	Passenger car(pregnancy)/Iran	Cross-sectional study	Seat belt use (protects me from road traffic injuries, protects my foetus from road traffic injuries, my husband and other family members persuade me to wear it) No seat belt use (risk of injury to my foetus, forget to wear seat belt, improper seat belt installation)
Reagan et al. (2013)	Car driver/United States	Chi-squared tests and univariate ANOVA	Seat belt use (fewer trips per day and increased average trip speed)
Okamura et al. (2012)	Front seat car/Japan	Theory of planned behaviour	Self-efficacy, instrumental attitude (discomfort, convinced, penalty, effectiveness of belt, probability of detection) and descriptive norm

Table 5.1 Summary of related research (cont.).

Author(s)	Type of vehicle/Country	Analysis method	Factor of seat belt
Cunill et al. (2004)	Driver and passenger car/Spain	Discriminant analysis	Seat belt use (perceptions of risk, perception of safety, the effectiveness of the seat belt and social influence)
Kim et al. (2009)	Car driver and front seat (high school)/United States	Binary choice model	Low seat belt use (males, African American, accompanying occupants, weekends, inclement driving conditions, small school size, lower socioeconomic status and rural country school locations)

From the review of related literature, it can be seen that most studies concerning seat belt use involved private cars. The target group mostly consisted of private car drivers or their passengers. However, no research has focused on public intercity bus passengers, which can be a remarkable target group to study because of the increasing severity and rate of public intercity bus accidents at present. Thus, the present study analysed the seat belt use intention of intercity bus passengers. We divided the samples into two groups: teenage group and adult group because we would like to know that the intercity bus passenger's locus of control with regard to seat belt use intention for teenagers and adults are similar or different.

This aims to identify the factors that influence the seat belt use behavioural intention (BI) of public intercity bus passengers by applying the theory of locus of control (LC), which is a psychological model. This research adopts the factors used in related studies to develop relevant questions for the measurement model. The factors obtained from analysis can be used to propose to government organisations appropriate policies or practical methods based on passenger age and current road conditions to

increase the rate of seat belt use in public intercity buses. This study hypothesizes that the Locus of control (LC) was consistent with the empirical data model and the assessment of parameter invariance in the model forms for each group were different groups.

5.3 Locus of Control

From the theory of personal control beliefs, LC was invented by Rotter (Rotter, 1966) and is the belief that people can explain the reason for their behaviour by analysing their actions or external environment. The motives of different behaviours cause individuals to have diverse behavioural patterns. Rotter (1966) divided personal control beliefs in controlled factors into two types. The first type is internal LC, which is defined as the way people believe or perceive that events that happen to them are caused by or are a result of their own deeds or abilities. Therefore, success or failure depends on oneself and can be controlled by the individual. The second type is external LC, which is the belief or perception of people that events that happen to them are caused by or are a result of the environment or external influences. Therefore, events are attributed to destiny, supernatural powers or actions of other people.

This research extended the theory of LC by adding factors such as knowledge of seat belt enforcement (EN) and past experience and used structural equation modelling (SEM) to identify the factors that affect seat belt use BI. However, no research has been conducted on the seat belt use of intercity bus passengers. Thus, the current study analysed the seat belt use BI of intercity bus passengers by using LC.

5.4 Methodology

5.4.1 Participant

Data on seat belt use BI were acquired by conducting a survey of intercity bus passengers in four main provinces, namely, Chiang Mai, Songkhla, Nakhon Ratchasima and Bangkok. Among the 1200 samples drawn by random sampling, 911 (75.92%) people completed the questionnaires. These people were assessed on the basis of 18 observe variables. The sample size should not be less than 270 samples in each group because the research methodology indicates that the sample size should not be less than 15 times of the number of variables used (Golob, 2003). By using age-based criteria for sexual development, the current research divided the data for analysis into two groups: teenage group and adult group (Hines, 1982).

5.4.2 Research Variables and Questionnaire Design

The questionnaire for this research was divided into two parts: the first part involves the enquiry about the respondents' general information and their travel behaviour; the second part includes the question items, which were designed by using parameters from previous research on LC, including internality (IN), externality (EX), EN, past experience and BI (Table 5.2).

5.4.3 Accident costing methodology

The VSI was used for the accident costing, which is the integrated amount of a person's WTP to prevent the expected occurrence of one statistical injury (Chaturabong et al., 2011). The VSI can be calculated as the mean or median value of WTP divided by the risk change ($\Delta\rho$) (Persson, Norinder, Hjalte, & Gralen, 2001; Svensson, 2009a) as shown in equation 5.1.

Table 5.2 Questions used for the seat belt use BI model.

	Variables used in research	N = 911	
		Scoring	**Source**
	Behavioural intention		
BI1	I will wear seat belts whenever I take an intercity bus.	1 = Strongly disagree 5 = Strongly agree	(Lajunen and Räsänen, 2004; You et al., 2013)
BI2	I plan to wear a seat belt in the future because I think it is a lifesaving piece of equipment.		
	Internality		
IN1	If I do not wear a seat belt, It can lead to my death in an accident while travelling by bus.	1 = Strongly disagree 5 = Strongly agree	(Lajunen and Räsänen, 2004; Ratanavaraha et al., 2018; You et al., 2013)
IN2	If I do not wear a seat belt while travelling by bus, I may obtain serious injuries that can lead to disability, which requires extensive medical treatment, in case of an accident.		
IN3	If I do not wear a seat belt, my capacity to study or perform work will be affected in case of an accident while travelling by bus.		
IN4	If I do not wear a seat belt, the lives of my family, friends, relatives, etc. , will be affected in case I encounter an accident while travelling by bus.		
IN5	Wearing a seat belt is one's own duty.		
IN6	If I wear a seat belt while travelling by intercity bus, I feel safer.		
IN7	If I wear a seat belt, I can prevent serious injuries in case of an accident.		
IN8	I can reduce fatality risks from accidents by using a seat belt.		

Table 5.2 Questions used for the seat belt use BI model (cont.).

	Variables used in research	N = 911	
		Scoring	**Source**
	Externality		
EX1	Accidents were caused by colliding with other vehicle types.	1 = Strongly disagree	(Lajunen and Räsänen, 2004; You et al., 2013)
EX2	Accidents were caused by travelling by intercity bus running on wet/slippery street.	5 = Strongly agree	
EX3	Accidents were caused by travelling by intercity bus running on mountainous routes.		
EX4	The accident severity was caused by a nonstandard seat belt installation.		
EX5	Accidents caused by intercity bus did not involve passenger behaviour.		
	Knowledge of seat belt enforcement		
EN1	Do you know about the 'enforcement of passenger seat belt laws'?	1 = Yes 0 = No	(Chaudhary et al., 2004)
EN2	Do you know about 'the punishment for people who are caught not wearing seat belts'?		
	Past experience		
PA	Did you wear a seat belt during your past travel by intercity bus?	1 = Yes 0 = No	(Şimşekoğlu and Lajunen, 2008)

5.4.3 Analyzing the WTP determinants

5.4.3.1 Data Reliability and Validity

To measure research quality, the questionnaire was used as a measuring instrument and was assessed by two features:1) Content validity based on expert judgement by using the index of item objective congruency (IOC) (The value should be greater than 0.50.) (Tavakol and Dennick, 2011). 2) Equipment reliability by

using the confidence level of Cronbach's alpha (The value should be 0.6–0.7.) (Tavakol and Dennick, 2011).

5.4.3.2 Structural Equation Modelling

SEM is an analysis model that integrates different models by using several equations at the same time to measure the construct validity between many latent variables. The degree of importance of each question item to the latent variables is estimated by using the values of the correlation coefficient between the observed variables and latent variables and the measurement variance (Kline, 2011). SEM is also used to confirm the relevance of hypothetical models that identify the details of the relationship between variables to explain the relationship of all variable sets.

5.4.3.3 Model Fit Indices

To measure data consistency with the hypothetical model of theory of LC, the measurement criteria for the index of consistency were as follows; 1) χ^2/degree of freedom (DOF) value should be less than three (Kline, 2011). 2) The value of root mean square error of approximation (RMSEA) should be less than or equal to 0.07 (Steiger, 2007). 3) Comparative fit index (CFI) value should be greater than or equal to 0.90 (Hu and Bentler, 1999). 4) The value of Tucker-Lewis Index (TLI) or nonnormed fit index should be greater than or equal to 0.80 (Hooper et al., 2007). 5) The value of the standardised root mean square residual (SRMR) should be less than or equal to 0.08 (Hu and Bentler, 1999).

5.5 Findings

5.5.1 Descriptive Statistics

The 911 intercity passengers were divided into the teenage group and adult group. The results of respondents in the teenage group, the respondents consisted of 110 males (32.9%) and 224 females (67.1%). In terms of education, there are 2 samples in elementary school (0.6%), 1 sample in secondary education or M.3 (0.3 %), 273 samples in high school or M.6/vocational school (81.7%) and 58 samples with diplomas/higher vocational degrees (17.4%). As regards occupation, 327 samples are students (97.9%), 4 samples are general workers (1.2%), and 3 samples have other occupations (0.9%). In the adult group, the samples consisted of 287 males (49.7 %) and 290 females (50.3 %). In terms of education, 90 samples completed elementary school (15.6%), 73 samples are in M3 (12.7 %), 153 samples are in M6/vocational school (26.5%), 47 samples (8.1%) have diplomas/higher vocational degrees, 154 samples have bachelor's degrees (26.7%), 59 samples have master's degrees (10.2%), and 1 sample have a doctorate degree (0.2%). For occupations, there were 74 government officials/state enterprise (12.8%), 115 private employees (19.9%), 70 business owners (12.1%), 23 farmers (4%), 131 pupils/students (22.7%), 154 general workers (26.7%) and 10 samples in other professions (1.7%).

From the results of the overall picture of each factor of both passenger groups (Table 5.3), it can be concluded that passengers intended to use seat belts in the future while travelling by intercity bus (mean = 3.85 (teenagers), 4.19 (adults)). The other results are as follows: the belief that each event was caused by their own deeds: mean = 4.10 (teenagers), 4.16(adults); the belief that the outcomes of each event were

caused by the environment or external influences that cannot be controlled: mean = 4.01 (teenagers), 4.10 (adults); the acknowledgement of law enforcement and punishment: mean = 0.63 (teenagers), 0.75(adults); and seat belt use while travelling in the past: mean = 0.317 (teenagers), 0.515 (adults). For the skewness and kurtosis values used to measure the data distribution, the skewness value should be less than 3, and the kurtosis value should be lower than 10 for the accepted values (Kline, 2011). This research had skewness and kurtosis values in the criteria range for both groups. It could be concluded that the data used for the analysis of both groups have a normal distribution and were suitable for analysis.

Table 5.3 Mean, standard deviation, skewness and kurtosis values of variables.

Variables used	Teenagers (N = 334)				Adults (N = 577)			
	$\bar{x}$	SD	SK	Ku	$\bar{x}$	SD	SK	Ku
Behavioural intention (Cronbach's α = 0.726)								
	3.85				**4.19**			
BI1	3.620	0.918	−0.392	0.268	4.120	0.865	−0.847	0.674
BI2	4.081	0.799	−0.466	−0.301	4.277	0.712	−0.778	0.793
Internality (Cronbach's α = 0.827)								
	4.10				**4.16**			
IN1	4.015	0.773	−0.497	0.360	4.191	0.787	−0.865	0.948
IN2	4.072	0.779	−0.470	−0.119	4.189	0.767	−0.521	−0.436
IN3	4.057	0.842	−0.382	−0.849	4.179	0.798	−0.743	0.262
IN4	4.063	0.845	−0.481	−0.474	4.017	0.821	−0.448	−0.272
IN5	4.099	0.812	−0.318	−1.058	4.173	0.851	−0.865	0.465
IN6	4.168	0.749	−0.284	−1.170	4.198	0.810	−0.848	0.656
IN7	4.114	0.688	−0.151	−0.884	4.125	0.756	−0.550	0.034
IN8	4.180	0.750	−0.307	−1.168	4.182	0.748	−0.585	0.121
Externality (Cronbach's α = 0.751)								
	4.01				**4.10**			
EX1	3.955	0.821	−0.310	−0.628	4.083	0.837	−0.816	0.803
EX2	4.150	0.795	−0.527	−0.533	4.146	0.806	−0.410	0.942
EX3	4.123	0.838	−0.512	−0.557	4.182	0.799	−0.810	0.777

Table 5.3 Mean, standard deviation, skewness and kurtosis values of variables (cont.).

Variables used	Teenagers (N = 334)				Adults (N = 577)			
	x̄	**SD**	**SK**	**Ku**	**x̄**	**SD**	**SK**	**Ku**
EX4	3.967	0.780	−0.324	−0.228	4.081	0.822	−0.717	0.381
EX5	3.868	0.853	−0.446	0.062	3.988	0.805	−0.580	0.417
Knowledge of seat belt enforcement (Cronbach's α = 0.679)								
	0.63				**0.75**			
EN1	0.754	0.431	−1.188	−0.592	0.882	0.323	−1.495	1.498
EN2	0.506	0.501	−0.024	−1.490	0.622	0.485	−0.505	−1.450
Past experience (Cronbach's α = NS)								
PA	0.317	0.466	0.788	−1.387	0.515	0.500	−0.059	−1.471

5.5.2 Structural Equation Modelling

5.5.2.1 Intention of seat belt usage among teenagers

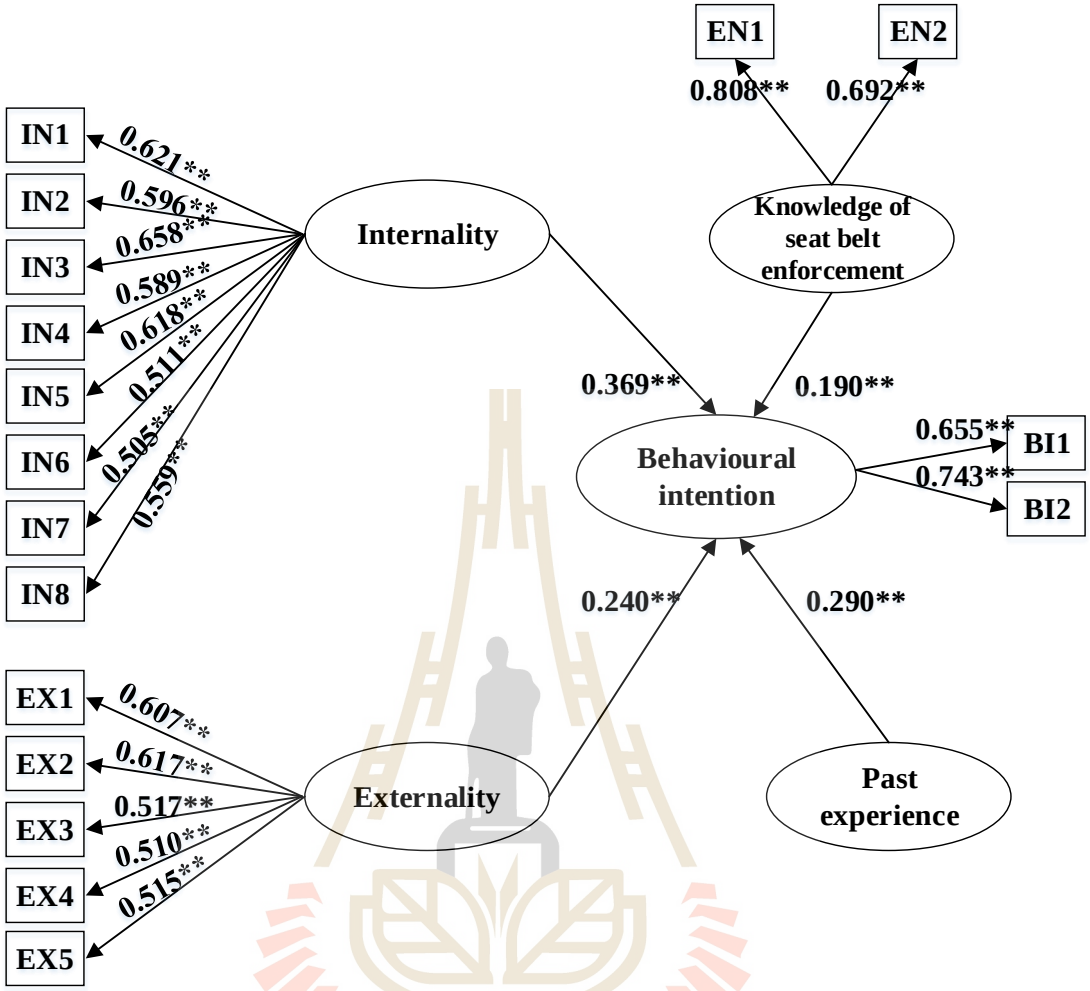
For the SEM analysis results as regards the seat belt use BI of intercity bus passengers in the teenage group (Table 5.4 and Figure 5.1), it was found that the goodness of fit index was as follows; χ^2 = 169.648, DOF = 120, χ^2/DOF = 1.414, P<0.001, RMSEA = 0.035, CFI = 0.968, TLI = 0.959 and SRMR = 0.049. When compared with the goodness of fit index, it was found that the measurement met the criteria. Therefore, in the teenage group, the SEM for the seat belt use BI of intercity bus passengers was relevant to empirical data.

Table 5.4 Results of SEM for seat belt use intention.

Variables used	Teenagers (N = 334)			Adults (N = 577)		
	Stand. estimates	S.E.	t-value	Stand. estimates	S.E.	t-value
Behavioural intention BY						
BI1	0.655	0.050	12.844	0.698	0.040	14.819
BI2	0.743	0.042	15.592	0.712	0.040	17.945
Internality BY						
IN1	0.621	0.041	15.297	0.603	0.029	20.532
IN2	0.596	0.042	14.252	0.691	0.028	24.739
IN3	0.658	0.038	17.207	0.692	0.027	25.675
IN4	0.589	0.044	13.505	0.603	0.033	18.389
IN5	0.618	0.041	15.221	0.635	0.031	20.339
IN6	0.511	0.048	10.671	0.543	0.038	11.605
IN7	0.505	0.048	10.285	0.572	0.032	17.735
IN8	0.559	0.044	12.654	0.570	0.037	12.614
Externality BY						
EX1	0.607	0.049	12.357	0.667	0.026	25.469
EX2	0.617	0.048	12.723	0.753	0.023	33.481
EX3	0.517	0.057	9.088	0.784	0.021	37.628
EX4	0.510	0.060	5.620	0.673	0.027	25.009
EX5	0.515	0.054	8.997	0.632	0.029	21.857
Knowledge of seat belt enforcement BY						
EN1	0.808	0.047	17.301	0.827	0.040	23.370
EN2	0.692	0.047	14.870	0.667	0.020	23.324
Behavioural intention ON						
IN	0.369	0.034	10.757	0.388	0.030	12.891
EX	0.240	0.026	9.209	0.273	0.021	13.077
EN	0.190	0.021	8.926	0.244	0.020	12.067
PA	0.290	0.060	4.869	0.236	0.049	4.817

Note: Teenagers: χ^2 = 169.648, DOF = 120, χ^2/DOF = 1.414, P < 0.001, RMSEA = 0.035 (<0.07), CFI = 0.968 (>0.9), TLI = 0.959 (>0.8), SRMR = 0.049 (<0.08).

Adults: χ^2 = 273.336, DOF = 121, χ^2/DOF = 2.258, P < 0.001, RMSEA = 0.047 (<0.07), CFI = 0.952 (>0.9), TLI = 0.939 (>0.8), SRMR = 0.042 (< 0.08).



χ^2 = 169.648, DOF = 120, χ^2/DOF = 1.414, P < 0.001, RMSEA = 0.035 (<0.07), CFI = 0.968 (>0.9), TLI = 0.959 (>0.8) and SRMR = 0.049 (<0.08)

*P < 0.05, **P < 0.01 (Mplus 7.12 standardised estimates)

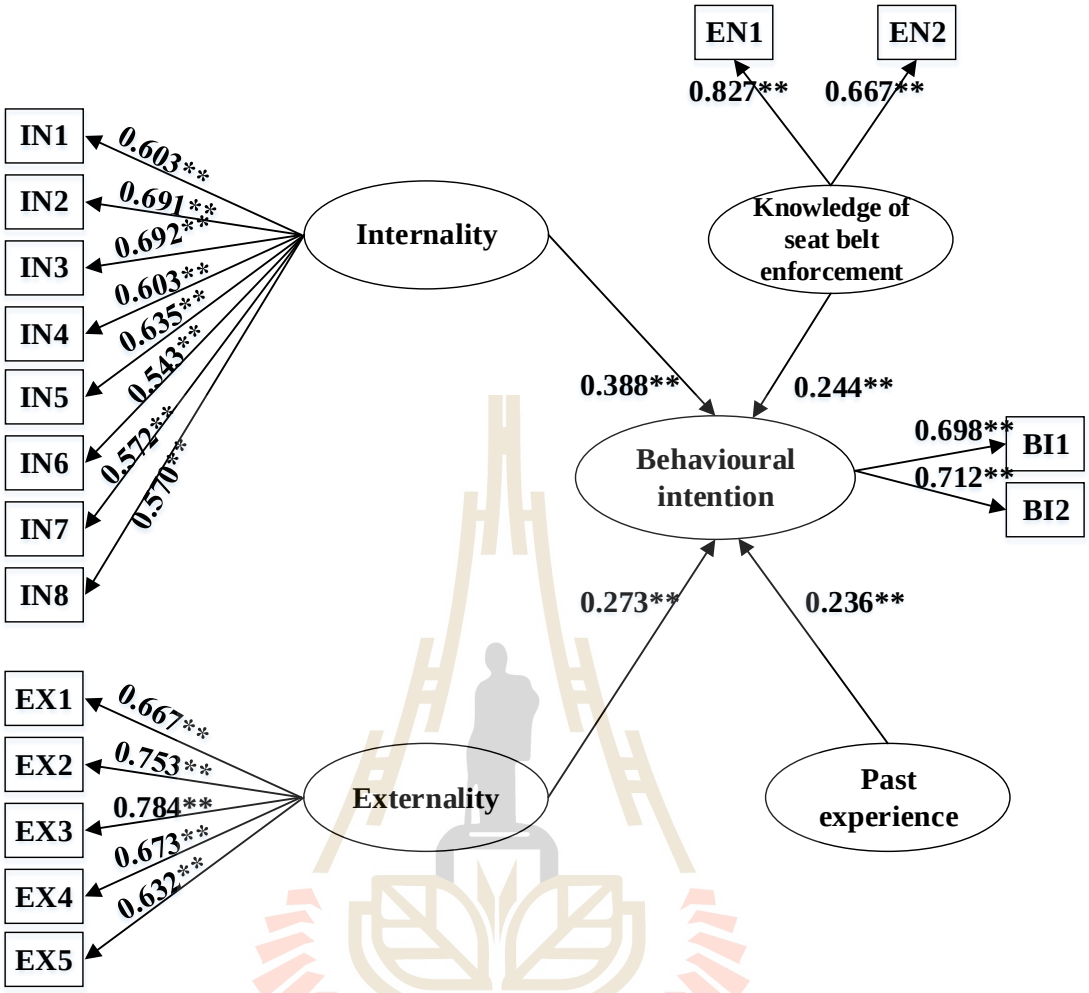
Figure 5.1 SEM of BI to use a seat belt among teenagers

The factor that had a significant positive influence and the highest coefficient of standardised factor loading value towards seat belt use BI was IN, which is the belief that various incidents occurring to oneself resulted from one's own deeds ($\beta = 0.369$), followed by past experience, which is the experience of using safety belts in the past ($\beta = 0.290$); EX, which is the belief that events occurring to

oneself was caused by the environment or external influences that cannot be controlled (β= 0.240)**;** and EN (β= 0.190).

5.5.2.2 Intention of seat belt usage among adults

For the SEM analysis results as regards the seat belt use BI of intercity bus passenger in the adult group (Table 5.4 and Figure 5.2), it was found that the goodness of fit index was as follows; χ^2 = 273.336, DOF = 121, χ^2/DOF = 2.258, P < 0.001, RMSEA = 0.047, CFI = 0.952, TLI = 0.939 and SRMR = 0.042. When compared with the goodness of fit index, it was found that the measurement met the criteria. Therefore, the SEM for seat belt use BI of intercity bus passengers in the adult group was consistent with empirical data.



χ^2 = 273.336, DOF = 121, χ^2/DOF = 2.258, P < 0.001, RMSEA = 0.047 (<0.07), CFI = 0.952 (>0.9), TLI = 0.939 (>0.8) and SRMR = 0.042 (<0.08)

*P < 0.05, **P < 0.01 (Mplus 7.12 standardised estimates)

Figure 5.2 SEM of seat belt use BI among adults

The factor that had a significant positive influence and highest coefficient of standardised factor loading value towards seat belt use was IN **(**β = 0**.**388**)**, followed by EX **(**β = 0**.**273**)**, EN **(**β = 0**.**244**)** and past experience **(**β = 0**.**236**).**

5.5.3 Multigroup Analysis

The invariance test results of the model are shown in Table 5.5. The invariance of the model forms was assessed using a hypothesis stating that the values of factor loadings, intercepts and structural path were not different when using the simultaneous model and the strict model. The total value of the different chi-squared values was 63.464, and the difference between the DOFs was 24 ($P<0.0001$), thus indicating that the hypothesis cannot be accepted. Therefore, the model of intention of seat belt use for an intercity bus passenger indicated different values of factor loadings, intercepts and structural path between teenagers and adults. Therefore, a model of intention of seat belt use for intercity bus passengers must be developed separately for teenagers and adults.

Table 5.5 Model fit indices for the invariance test between groups.

Description	χ^2	**DOF**	χ^2/**DOF**	**CFI**	**TLI**	**RMSEA (90%CI)**	**SRMR**	$\Delta\chi^2$	**ΔDOF**	**p**
Individual group:										
Model 1: Teenagers	169.648	120	1.414	0.968	0.959	0.035 (0.022–0.047)	0.049			
Model 2: Adults	273.336	121	2.258	0.952	0.939	0.047 (0.039–0.054)	0.042			
Measurement of invariance:										
Simultaneous model	496.508	231	2.15	0.944	0.925	0.050 (0.044–0.056)	0.045			
Factor Loadings, Intercepts, structural paths held equal across group	559.972	255	2.19	0.935	0.922	0.051 (0.045–0.057)	0.077	63.464	24	<0.000

Note: χ^2 = Chi-squared statistic; DOF = Degree of freedom; p = Level of significance; CFI = Comparative fit index; TLI = Tucker-Lewis index; RMSEA = Root mean square error of approximation; SRMR = standardised root mean square residual.

5.6 Conclusions and Discussion

The overall analysis of these two groups showed that both the teenage group and adult group believe that events occurring to them were caused by their own deeds (IN). For example, if a passenger encounters an accident while travelling and he/she dies or becomes disabled, requires lengthy medical treatment or suffers injuries that decrease the capacity to study or work, the passenger will affect not only his/her own life but also the lives of his/her family, friends and relatives because he/she did not wear a seat belt while travelling. Passengers can feel safe and reduce fatality risks by simply wear seat belts while travelling. Regarding the belief that the outcomes of

events are caused by the environment or external influence that cannot be controlled, e. g. accidents were caused by colliding with other vehicle types, travelling on wet/ slippery roads, travelling on mountain passes, use of nonstandard seat belts or accidents caused by intercity buses, these are not involved with the behaviour of passengers at all. This belief influenced more the seat belt use intention of the adult group than that of the teenage group. However, the past experience of using seat belts significantly influenced seat belt use in the teenage group rather than the adult group. Furthermore, the adult group was more aware of laws than the teenage group. Therefore, perceived law enforcement may not be effective in encouraging seat belt use in the teenage group. Furthermore, given that adherence to the law differ in each country, the importance of following the law should be properly communicated (Ning, 2015).

From the multigroup analysis results of the two groups, it was found that the two models were different. Therefore, proposals to government with regard to encouraging seat belt use while travelling should be separately considered according to the age of the passengers. The analysis results show that the overall picture of the factors of both groups can be explained as follows:

IN is the factor that influences the seat belt use behaviour of both groups, but it had a greater coefficient value in the adult group than in the teenage group. This is consistent with the results of previous research that existing beliefs or attitudes towards seat belt use for increasing safety or reducing medical treatment costs increased the rate of seat belt use of private car passengers (Okamura et al., 2012). Other examples include the following: perceived accident severity resulted in the increased precaution

of private car drivers (Akbaş et al., 2010), and pilots believe that they can avoid accidents if they follow aviation instructions (You et al., 2013).

EX is the factor influencing the seat belt use BI of both passenger groups, but it had more influence on the adult group than on the teenage group. EX influences passengers to increasingly wear seat belts while travelling because passengers believe that seat belt use can reduce accident severity in case of uncontrolled events. In other words, if passengers perceive that an accident may occur, seat belt use while travelling will increase. This is relevant to the previous review of literature that if private car's drivers or passengers perceive accident risks, it will result in more seat belt uses (Kim et al., 2009; Rowe et al., 2016; Şimşekoğlu and Lajunen, 2008).

EN is the factor influencing seat belt use BI of both passenger groups, but it had more influence on the adult group than on the teenage group. Knowledge of seat belt use law and its punishment will positively affect seat belt use BI while travelling. This result is consistent with the previous review of related literature stating that the availability of law enforcement personnel will increase the rate of seat belt use (Ash et al., 2014; Beck and Shults, 2009).

Past experience is the factor that influences the seat belt use of both passenger groups, but it had more influence on the teenager group than adults. If the passengers have an existing habit of wearing seat belts, it will result in increased seat belt use while travelling. This result is consistent with previous research indicating that car drivers or passengers that forget to use seat belts or lack the discipline to regularly use seat belts have low seat belt use intention (Demirer et al., 2012; Kim et al., 2009). According to the overall analysis, the results can be used to create proposals to government for promoting seat belt use among intercity bus passengers:

(1) Cultivate positive attitudes towards teenagers' seat belt use, such as creating a campaign or advertising media promoting the benefits of seat belt use, which simultaneously illustrates good image for themselves and society. Furthermore, both internal public and private organisations should support this policy by determining the level of policy enforcement within organisations. According to previous research, the policy of seat belt use enforcement within organisations resulted in increased seat belt use (Studnek and Ferketich, 2007).

(2) Easy- to- understand advertising media should be created to attract teenagers' attention with regard to seat belt use, e.g., comics that express accident severity, and public exhibitions should be held to reflect the consequence of not wearing seat belts while travelling (e.g. severe injury, disability and death). Owing to the perception of consequences, the awareness will increase seat belt use.

(3) Public relations should be organised. The content in law enforcement and punishments for violating 'laws enforcing passengers to use seat belts' should be included in textbooks. Furthermore, serious measures should be enforced such as establishing checkpoints to investigate violating drivers or passengers, use of CCTVs or conducting police checks in intercity buses.

The abovementioned examples of policy recommendations will help raise awareness of wearing seat belts for both the teenage and adult groups. The examples can also help reduce accident severity and the death rate of passengers.

5.7 Acknowledgement

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5.8 References

Aceves-González, C., Cook, S., and May, A. (2015). Bus use in a developing world city: Implications for the health and well-being of older passengers. **Journal of Transport & Health**. 2(2): 308-316.

Agusdinata, D. B., van der Pas, J. W. G. M., Walker, W. E., and Marchau, V. A. W. J. (2009). Multi-criteria analysis for evaluating the impacts of intelligent speed adaptation. **Journal of Advanced Transportation**. 43(4): 413-454.

Akbaş, O., Güven, R., Cebeci, G., Bertlek, S. B., Aldemir, G., and Bal, E. (2010). A study on the effects of seat belt posters on drivers. **Procedia - Social and Behavioral Sciences**. 2(2): 1002-1007.

Ash, I. K., Edwards, A. L., and Porter, B. E. (2014). An investigation of state population characteristics that moderate the relationship of state seat belt law and use in the United States. **Accident Analysis & Prevention**. 71: 129-136.

Barua, U., and Tay, R. (2010). Severity of urban transit bus crashes in Bangladesh. **Journal of Advanced Transportation**. 44(1): 34-41.

Beck, L. F., and Shults, R. A. (2009). Seat Belt Use in States and Territories with Primary and Secondary Laws - United States, 2006. **Journal of Safety Research**. 40(6): 469-472.

Bilgic, S., Barut, H. B., Karacasu, M., Er, A., and Yaliniz, P. (2011). The changes in usage of seat belts in Antalya, Turkey. **Procedia - Social and Behavioral Sciences**. 20: 588-593.

Chaudhary, N. K., Solomon, M. G., and Cosgrove, L. A. (2004). The relationship between perceived risk of being ticketed and self-reported seat belt use. **Journal of Safety Research**. 35(4): 383-390.

Cunill, M., Gras, M. E., Planes, M., Oliveras, C., and Sullman, M. J. M. (2004). An investigation of factors reducing seat belt use amongst Spanish drivers and passengers on urban roads. **Accident Analysis & Prevention**. 36(3): 439-445.

Demirer, A., Durat, M., and Haşimoğlu, C. (2012). Investigation of seat belt use among the drivers of different education levels. **Safety Science**. 50(4): 1005-1008.

Department of Land Transport. (2017). **Thailand Transport Statistics**. Available from: http://apps.dlt.go.th/statistics_web/statistics.html Date Accessed: April 4, 2017.

Eugenia Gras, M., Cunill, M., Sullman, M. J. M., Planes, M., and Font-Mayolas, S. (2007). Predictors of seat belt use amongst Spanish drivers. **Transportation Research Part F: Traffic Psychology and Behaviour**, 10(3): 263-269.

Golob, T. F. (2003). Structural equation modeling for travel behavior research. **Transportation Research Part B: Methodological**. 37(1): 1-25.

Hines, M. (1982). Prenatal gonadal hormones and sex differences in human behavior. **Psychological Bulletin**. 92(1): 56-80.

Hooper, D., Coughlan, J., and R. Mullen, M. (2007). Structural Equation Modeling: Guidelines for Determining Model Fit. **Electronic Journal of Business Research Methods.** 6(1): 53-60.

Høye, A. (2016). How would increasing seat belt use affect the number of killed or seriously injured light vehicle occupants? **Accident Analysis & Prevention**. 88: 175-186.

Hu, L. t., and Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. SEM: **Structural Equation Modeling: A Multidisciplinary Journal**. 6(1): 1-55.

Karbakhsh, M., Ershadi, Z., Khaji, A., and Rahimi-Sharbaf, F. (2010). Seat belt use during pregnancy in Iran: attitudes and practices. **Chinese Journal of Traumatology (English Edition).** 13(5): 275-278.

Kim, S., Depue, L., Spence, L., and Reine, J. (2009). Analysis of teenage seat belt use: From the 2007 Missouri high school seat belt survey. **Journal of Safety Research**. 40(4): 311-316.

Kline, R. B. (2011). **Principles and Practice of Structural Equation Modeling**: Guilford Press.

Lajunen, T., and Räsänen, M. (2004). Can social psychological models be used to promote bicycle helmet use among teenagers? A comparison of the Health Belief Model, Theory of Planned Behavior and the Locus of Control. **Journal of Safety Research**. 35(1): 115-123.

Michalaki, P., Quddus, M., Pitfield, D., and Huetson, A. (2016). A time-series analysis of motorway collisions in England considering road infrastructure, socio-demographics, traffic and weather characteristics. **Journal of Transport & Health**. 3(1): 9-20.

Nickel, B. E. (1988). Facing the challenge of the future by strategic planning for public transport in Germany. **Journal of Advanced Transportation**. 22(2): 134-153.

Ning, L. (2015). Motor vehicle crash fatalities in states with primary versus secondary seat belt laws: A time-series analysis: Lee LK, Monuteaux MC, Burghardt LC, et al. Ann Intern Med. 2015;163:184-190. **The Journal of Emergency Medicine** . 49(6): 1024-1025.

Okamura, K., Fujita, G., Kihira, M., Kosuge, R., and Mitsui, T. (2012). Predicting motivational determinants of seatbelt non-use in the front seat: A field study. **Transportation Research Part F: Traffic Psychology and Behaviour**, 15(5): 502-513.

Olsen, C. S., Cook, L. J., Keenan, H. T., and Olson, L. M. (2010). Driver seat belt use indicates decreased risk for child passengers in a motor vehicle crash. **Accident Analysis & Prevention**. 42(2): 771-777.

Ratanavaraha, V., Khampirat, B., Jomnonkwao, S., and Mon, E. e. (2018). Myanmar motorbike riders' willingness to pay for fatality risk reduction. **Technol. Suranaree Journal of Science & Technology**. 25(2): 131-142.

Reagan, I. J., McClafferty, J. A., Berlin, S. P., and Hankey, J. M. (2013). Using naturalistic driving data to identify variables associated with infrequent, occasional, and consistent seat belt use. **Accident Analysis & Prevention**. 50: 600-607.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. **Psychological monographs: General and applied**. 80(1): 1-28.

Routley, V., Ozanne-Smith, J., Qin, Y., and Wu, M. (2009). Taxi driver seat belt wearing in Nanjing, China. **Journal of Safety Research**. 40(6): 449-454.

Rowe, R., Andrews, E., Harris, P. R., Armitage, C. J., McKenna, F. P., and Norman, P. (2016). Identifying beliefs underlying pre-drivers' intentions to take risks: An application of the Theory of Planned Behaviour. **Accident Analysis & Prevention**. 89: 49-56.

Şimşekoğlu, Ö., and Lajunen, T. (2008). Why Turks do not use seat belts? An interview study. **Accident Analysis & Prevention**. 40(2): 470-478.

Şimşekoğlu, Ö., and Lajunen, T. (2009). Relationship of seat belt use to health and driver behaviors. **Transportation Research Part F: Traffic Psychology and** Behaviour, 12(3): 235-241.

Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. Pers. **Personality and Individual Differences**. 42(5): 893-898.

Studnek, J. R., and Ferketich, A. (2007). Organizational policy and other factors associated with emergency medical technician seat belt use. **Journal of Safety Research**. 38(1): 1-8.

Tavakol, M., and Dennick, R. (2011). Making sense of Cronbach's alpha. **International Journal of Medical Education**. 2: 53-55.

Vaughn, M. G., Salas-Wright, C. P., and Piquero, A. R. (2012). Buckle up: non-seat belt use and antisocial behavior in the United States. **Annals of Epidemiology**. 22(12): 825-831.

You, X., Ji, M., and Han, H. (2013). The effects of risk perception and flight experience on airline pilots' locus of control with regard to safety operation behaviors. **Accident Analysis & Prevention**. 57: 131-139.

CHAPTER VI

CONCLUSION

The present study has considered factors affecting seat-belt-use behavioural intention of both teenage and adult intercity-bus passengers, using the theory of planned behaviour (TPB), health belief model (HBM) and locus of control (LC) and SEM to examine the conformation of the model. Our aim was to use the identified factors to propose recommendations for planning policy and to present the government with guidelines for modifying passengers' seat-belt-use behavioural intention. The results of the study shows that as follow:

6.1 Predictors of seat-belt-use behavioural intention among teenagers and adults by TPB

In the analysis of seeking factors affecting seat-belt-use behavioural intention of teenage and adult intercity-bus passengers by applying TPB, factors included instrumental attitude, emotion attitude, subjective norm and perceived behavioural control (the basic factors of TPB). The theory was extended by including factors such as the perception of seat belt enforcement, injury risk and past experience. Each factor of both groups influenced seat-belt-use behavioural intention. In the teenage group, injury risk had a significantly positive influence on seat-belt-use behavioural intention, followed in order by instrumental attitude, past experience, perception of seat belt enforcement, behavioural control and subjective norm. The emotion attitude had a significantly negative influence. In the adult group, injury risk also had a significantly

positive influence on seat-belt-use behavioural intention, followed in order by instrumental attitude, perception of seat belt enforcement, past experience, behavioural control and subjective norm. The emotional attitude had the same significantly negative influence as the teenage group.

From all the results of the analysis, recommendations were proposed to the government promoting intercity-bus passengers to use the seat belt more. We can tell which factor should be first supported or corrected by looking at the greatest amount of respective standardised coefficient values and the guidelines for planning suitable policies for the target group. The present study proposes production of advertising media to demonstrate accident severity and the consequences of not wearing a seat belt. Educational institutes or the government and private organisations should organise campaigns that raise awareness and educate students or personnel in organisations about the importance of seat belt use. Campaigns or advertising media are used to present the benefits of seat belt use. The government should support these efforts, impart knowledge to people in the country, and have public relations about law enforcement and a penalty for contravening 'perception of seat belt enforcement'. It is important to now have stricter inspection measures than before.

The results of the present study will be beneficial because the government or relevant sectors can apply the recommendations in campaigns promoting the cultivation of passengers' conscious behaviour and the awareness of seat belt use safety. They will also help reduce the severity of injuries and decrease passengers' death rates.

6.2 Predictors of seat-belt-use behavioural intention among teenagers and adults by HBM.

Predictors of behavioural intention seatbelt usage among teenagers and adults. The most affecting factors of the seat belt use behavioural intention of intercity bus passengers in the teenager group were perceived severity, followed by perceived benefits, past experience, perceived susceptibility, cue to action, perceived enforcement, health motivation and self-efficacy. These eight factors had significantly positive influence on the seat belt use behavioural intention of passengers. Perceived barriers had the most significantly negative influence on the seat belt use behavioural intention. The most-affecting factors of the seat belt use behavioural intention of intercity bus passengers in the adult group was perceived benefits, followed by perceived severity, perceived susceptibility, past experience, perceived enforcement, cue to action, health motivation and self-efficacy. These factors had significantly positive influence on the seat belt use behavioural intention. Perceived barriers was the factor having the most significantly negative influence on the seat belt use behavioural intention. According to the analysis, the overall picture of the two groups showed that the adult group recognized the benefits of using seat belt more than the teenager group, although the teenager group recognized the severity of not wearing seat belts. In addition, the adult group gave importance to the perception or the law enforcement more than the teenager group. This reflected that for teenagers, the perception or the law enforcement may not be effective enough to make them be aware of this issue. In other words, seat belt use will reflect each country's adherence of law faithfulness (Curtis, K.M., Rodi, S. W., and Sepulveda M. G., 2007). The results of the multi-group analysis showed that the models of the two groups were different. Thus, to

recommend the policy plan to the government, age range-specific development must be considered, and effective campaigns must be implemented encouraging passengers to recognize safety by using seat belts while travelling in intercity buses.

According to the analysis, the overall picture can be considered to propose the following recommendations to the government sector for promoting passengers' seat belt use while travelling by intercity buses:

(1) The internal exhibition in educational institutes and government or private organizations should be held to show the severity of accident occurrence. Advertising media should be made to reflect the severity of not wearing seat belts while travelling, such as serious injuries or disabilities. Furthermore, parents or adult relatives of children must be provided awareness, since they are accepted as the adult group that can encourage teenagers to pay attention to seat belt use while travelling.

(2) Educational institutes and government or private organizations should implement campaigns, or advertising media should show the benefits of seat belt use and create images showing that seat belt use indicates the new generation's sense of responsibility towards themselves and the society.

(3) The public relations in educational institutes should be directed by including the content related to "the law enforcement for passenger seat belt use" in the lessons. In addition, the government or private organizations should determine policies that enforce seat belt use within organizations. Furthermore, there should be more stringent measures of law enforcement such as the determination of check points for investigating seat belt use of intercity bus passengers. In case of law violation, both service providers and users should be penalized.

From the aforementioned recommendations, the cultivation of good attitude towards seal belt usage in both teenagers and adults will make them be aware of safety, pay more attention to their own health, and overcome various barriers against seat belt use in the future. Importantly, it will decrease the severity of injuries and fatality rate in accidents in the future.

6.3 Predictors of seat-belt-use behavioural intention among teenagers and adults by LC

The overall analysis of these two groups showed that both the teenage group and adult group believe that events occurring to them were caused by their own deeds. For example, if a passenger encounters an accident while travelling and he/ she dies or becomes disabled, requires lengthy medical treatment or suffers injuries that decrease the capacity to study or work, the passenger will affect not only his/ her own life but also the lives of his/her family, friends and relatives because he/she did not wear a seat belt while travelling .Passengers can feel safe and reduce fatality risks by simply wear seat belts while travelling .Regarding the belief that the outcomes of events are caused by the environment or external influence that cannot be controlled, e.g .accidents were caused by colliding with other vehicle types, travelling on wet/ slippery roads, travelling on mountain passes, use of nonstandard seat belts or accidents caused by intercity buses, these are not involved with the behaviour of passengers at all . This belief influenced more the seat belt use intention of the adult group than that of the teenage group . However, the past experience of using seat belts significantly influenced seat belt use in the teenage group rather than the adult group .Furthermore, the adult group was more aware of laws than the teenage group . Therefore, perceived

law enforcement may not be effective in encouraging seat belt use in the teenage group . Furthermore, given that adherence to the law differ in each country, the importance of following the law should be properly communicated (Ning, 2015).

From the multigroup analysis results of the two groups, it was found that the two models were different . Therefore, proposals to government with regard to encouraging seat belt use while travelling should be separately considered according to the age of the passengers.

According to the overall analysis, the results can be used to create proposals to government for promoting seat belt use among intercity bus passengers:

(1) Cultivate positive attitudes towards teenagers' seat belt use, such as creating a campaign or advertising media promoting the benefits of seat belt use, which simultaneously illustrates good image for themselves and society. Furthermore, both internal public and private organisations should support this policy by determining the level of policy enforcement within organisations. According to previous research, the policy of seat belt use enforcement within organisations resulted in increased seat belt use (Studnek and Ferketich, 2007).

(2) Easy-to-understand advertising media should be created to attract teenagers' attention with regard to seat belt use, e.g., comics that express accident severity, and public exhibitions should be held to reflect the consequence of not wearing seat belts while travelling (e.g. severe injury, disability and death). Owing to the perception of consequences, the awareness will increase seat belt use.

(3) Public relations should be organised. The content in law enforcement and punishments for violating 'laws enforcing passengers to use seat belts' should be included in textbooks. Furthermore, serious measures should be enforced such as

establishing checkpoints to investigate violating drivers or passengers, use of CCTVs or conducting police checks in intercity buses.

The abovementioned examples of policy recommendations will help raise awareness of wearing seat belts for both the teenage and adult groups. The examples can also help reduce accident severity and the death rate of passengers.

According to the analysis, the overall picture of the researchs showed that the adult group gave importance to the law enforcement more than the teenager group. This reflected that for teenagers, the perception of the law enforcement may not be effective enough to make them be aware of this issue. In other words, seat belt use will reflect each country's adherence of law faithfulness.

6.4 References

Curtis, K.M., Rodi, S. W., and Sepulveda M. G. (2007). The lack of an adult seat belt law in New Hampshire: Live free and die?. **Accident Analysis & Prevention**. 39(2): 380 - 383.

Ning, L. (2015). Motor vehicle crash fatalities in states with primary versus secondary seat belt laws: A time-series analysis: Lee LK, Monuteaux MC, Burghardt LC, et al. Ann Intern Med. 2015;163:184-190. **The Journal of Emergency Medicine**. 49(6), 1024-1025. doi: http://dx.doi.org/10.1016/j.jemermed.2015.10.032.

Studnek, J. R., and Ferketich, A. (2007). Organizational policy and other factors associated with emergency medical technician seat belt use. **Journal of Safety Research**. 38(1): 1-8. doi: http://dx.doi.org/10.1016/j.jsr.2006.09.001.

APPENDIX I

LIST OF PUBLICATIONS

List of Publications

Nambulee, W., Jomnonkwao, S., Siridhara, S., Ratanavaraha, V., Karoonsoontawong, A., and Beeharry, R. (2018). The intercity bus passenger's locus of control with regard to seat belt use intention. **Suranaree Journal of Science and Technology**. 25. 235-246.

BIOGRAPHY

Miss. Watanya Nambulee was born on August 11, 1988 in Mueang Nongkhai District, Nongkhai Province. In 2007, she began studying for her Bachelors degree at School of Transportation Engineering, Institute of Engineering at Suranaree University of Technology, Nakhon Ratchasima Province. After graduating, she continued to study for a Masters degree and the Degree of Doctor of Philosophy at the School of Transportation Engineering, Institute of Engineering, Suranaree University of Technology.