Seatbelt use among university students from 26 low-, middle- and high-income countries

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ABSTRACT

The aim of this study was to estimate the prevalence of self-reported seatbelt use and sociodemographic, health risk behaviour and social-legal correlates among university students in 26 low-, middle- and high-income countries. Using anonymous questionnaires, data were collected from 16 770 undergraduate university students (mean age 20.9, SD=2.9) from 23 universities in 26 countries across Asia, Africa and the Americas. Results indicate that the percentage of university students reporting to be inconsistently using a seatbelt were 54.7% for all countries, 56.0% for men and 53.7% for women. In multivariate logistic regression, younger age, poorer family background, living in a low-income or lower-middle-income country, having no national seatbelt law or a law that does not apply to all occupants, poor attitudes towards seatbelt use, not always following the speed limit, having depressive symptoms, drug use, and low physical activity were associated with self-reported inconsistent seatbelt use. High self-reported inconsistent seatbelt use was found and several risk factors were identified which can be utilised in seatbelt use promotion programmes.

Keywords: seatbelt use, traffic-related behaviour, health risk behaviour, depression, legislation, university students, multi-country

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INTRODUCTION

The majority (91%) of the world's road traffic fatalities occur in low-income and middle-income countries, even though these countries have only about half of the world's vehicles (WHO, 2013). Although in low- and middle-income countries motor vehicle occupants do not comprise the majority of fatalities on the road, there is a huge increase in new car registrations in developing countries, which will lead to rises in the number of vehicle occupant deaths and injuries (WHO, 2015). One of the major risk factors for road traffic injuries and deaths among vehicle occupants is the failure to use a seatbelt (WHO, 2013).

Solutions to prevent road traffic injuries in low- and middle-income countries include speed limits and enforcement, blood alcohol concentration limits and random breath testing, seatbelts and child restraints, helmets for riders of bicycles and motorised two-wheelers, and visibility of road users (WHO, 2004). The use of a seatbelt can reduce the risk of a fatal injury for drivers and front seat passengers by 40-50 percent (WHO, 2013). The rate of wearing a seatbelt differs greatly between countries and is largely influenced by the existence and enforcement of mandatory seatbelt laws (WHO, 2013).

In low- and middle-income countries seatbelt usage rates seem generally much lower than in high-income countries (WHO, 2014). In a study among adults in four middle-income countries (Egypt, Mexico, Russia, Turkey), the average seatbelt-wearing rates was low (under 60% in most sites) (Vecino-Ortiz et al., 2014). Studies among university students in high-income countries found that in 13 European countries, 27% among male and 23% among female students reported inconsistent seatbelt use (Steptoe et al., 2002), 69% among Black male college students in the US failed to use seatbelts as a passenger and 48% as a driver (Ajibade, 2010) and almost 40% of university students in Spain inconsistently (not always or almost always) used seatbelts on urban roads (Cunill, Gras, Planes, Oliveras & Sullman, 2004). Among university and adolescent students in low- and middle-income countries, 19% of medical university students in Kazakhstan had not used seatbelts in the front seat (Nugmanova, Ussatayeva & McNutt, 2015), 82% inconsistently (not always) wore seatbelts among Iranian driving college students (Mohammadi, 2011), 81.3% of a sample of students of a local university in Thailand inconsistently (not always) used a front seatbelt (Nanakorn et al., 1999), 28.8% of male and 34.4% of female adult university students from a large national distant university in Thailand did not always wear the front seatbelt (Stephan et al., 2011), 42.2% to 55.7% drove without a seatbelt among Turkish university students (Oksuz & Malhan, 2005), and among adolescent students in India 52.4% reported 'not always' wearing a seatbelt (Sharma, Grover & Chaturvedi, 2007).

Factors associated with inconsistent seatbelt use, predominantly in university students and general adults, may include sociodemographic factors, health risk behaviours and social-

legal factors. *Sociodemographic* factors may include being male (university students in USA, Oleckno & Blacconiere, 1990; university students in Turkey, Oksuz & Malhan, 2005; general adult drivers in Thailand, Siviroj, Peltzer, Pengpid & Morarit, 2012) and specific population groups such as non-whites (university students in USA, Oleckno & Blacconiere, 1990). *Health risk behaviours* may include substance use such as tobacco use (university students in USA, Everett, Lowry, Cohen & Dellinger, 1999; university students in USA, Oleckno & Blacconiere, 1990), heavy drinking (university students in USA, Everett et al., 1999), and drug use (university students in USA, Everett et al., 1999; university students in USA, Oleckno & Blacconiere, 1990). Traffic-related health risk factors include alcohol-impaired driving (university students in 13 European countries, Steptoe et al., 2002), not obeying speed limits (university students in 13 European countries, Steptoe et al., 2002), and having had accidents in last three years (university students in Iran, Mohammadi, 2011). Other health risk behaviours include physical inactivity (university students in USA, Dinger, Brittain & Hutchinson, 2014), being obese (school-going adolescents in USA, Price, Dake, Balls-Berry & Wielinski, 2011), lack of health-promoting behaviour (university students in USA, Oleckno & Blacconiere, 1990). *Social-legal factors* include negative social influence (general drivers and passengers in Spain, Cunill et al., 2004), lack of legislation and law enforcement (university students in 13 European countries, Steptoe et al., 2002).

The aim of this study was to estimate the prevalence of self-reported seatbelt use and sociodemographic, health risk behaviour and social-legal correlates among university students in 26 low-, middle- and high-income countries.

METHODS

SAMPLE AND PROCEDURE

This cross-sectional study was carried out with a network of collaborators in participating countries (see acknowledgments). The anonymous, self-administered questionnaire used for data collection was developed in English, then translated and back-translated into the languages (Arabic, Bahasa, Chinese, French, Lao, Russian, Spanish, Thai, Turkish) of the participating countries. In each country where translated questionnaires were used, they were pilot tested for face validity and understanding among 25 students who were not from the sample population. The study was initiated through personal academic contacts of the principal investigators; thus universities were purposefully selected. These collaborators arranged for data to be collected in 2013 from an intended 400 male and 400 female undergraduate university students aged 16-30 years by trained research assistants in one or two universities in their respective countries. The universities involved were located in the capital cities or other major cities in the participating countries. Research assistants working in the participating universities asked classes of undergraduate students to complete the

questionnaire at the end of a teaching class. Classes were recruited according to timetable scheduling using stratified random sampling. We included no incentive for participation, and there were no penalties for refusing to complete the survey. The students who completed the survey varied in the number of years for which they had attended the university. A variety of majors were involved, including education, humanities and arts, social sciences, business and law, science, engineering, manufacturing and construction, agriculture, health and welfare, and services. Written informed consent was obtained from participating students, and the study was conducted in 2013. Ethics approvals were obtained from all participating institutions.

MEASURES

Seatbelt use was assessed with the question, "When driving or riding in the front seat of a car, do you wear a seatbelt?" Response options included 1=All of the time, 2=Some of the time, 3=Never and 4=I don't ride in cars (Wardle & Steptoe, 1991). Inconsistent seatbelt use was defined as 'not all of the time' wearing a seatbelt. *Attitudes towards the seatbelt use* was assessed with the question, "How important do you feel it is to wear a seatbelt?" Response options ranged from 1=Not important to 10=Very important (Wardle & Steptoe, 1991). A small test-retest study suggests that these survey questions showed acceptable short-term stability (Wardle & Steptoe, 1991). Furthermore, study countries were classified according to their national seatbelt law into A=National seatbelt law applies to all occupants and B=No seatbelt law or law does not apply to all occupants (WHO, 2013).

Sociodemographic questions included age, gender and socioeconomic background. The latter was assessed by rating their family background as wealthy (within the highest 25% in your country in terms of wealth), quite well off (within the 50% to 75% range in their country), not very well off (within the 25% to 50% range in your country), or quite poor (within the lowest 25% in their country in terms of wealth) (Wardle & Steptoe, 1991). Furthermore, study countries were classified according to income into four categories, low-income country, lower-middle-income country, upper-middle-income country, and high-income country (World Bank, 2013).

TRAFFIC-RELATED VARIABLES

Drinking and driving. Participants were asked, "Over the last year, how many times did you drive a car or ride a motorcycle when you felt that you had perhaps had too much to drink?" Response options were 'never', or a numerical indication of the number of times (Wardle & Steptoe, 1991). *Driving above the speed limit.* Participants who drive a car were asked, "If you do drive a car, do you travel within the speed limit?" Response options ranged from 1=All of the time to 4=Little of the time (Wardle & Steptoe, 1991). A small test-retest study suggested that these survey questions showed acceptable short-term stability (Wardle & Steptoe, 1991).

Traffic injury. Participants were asked, "During the past 12 months, how many times were you seriously injured?" Serious injury was defined as 'When it makes you miss at least one full day of usual activities, such as university, sports, or a job, or requires treatment by a doctor or nurse'. Furthermore, "During the past 12 months, what was the major cause of the most serious injury that happened to you?" Among the different response options, two related to traffic injury, i.e., "I was in a motor vehicle accident or hit by a motor vehicle." And "I was on a motorcycle." (CDC, 2014). A validation study of the health risk behaviour, including an injury component of the Global School Health Survey (GSHS) questionnaire, found good validity in a study in a developing country (Fiji) (Becker et al., 2010).

MENTAL HEALTH AND SUBSTANCE USE

Centre for Epidemiologic Studies Depression Scale (CES-D). We assessed depressive symptoms using the 10-item version of the CES-D (Andresen, Malmgren, Carter & Patrick, 1994). Scoring is classified from 0-9 as having a mild level of depressive symptoms, 10 to 14 as moderate depressive symptoms, and 15 representing severe depressive symptoms (Kilbourne et al., 2002). The Cronbach alpha reliability coefficient of this 10-item scale was 0.74 in this study.

Tobacco use was assessed with the question: "Do you currently use one or more of the following tobacco products (cigarettes, snuff, chewing tobacco, cigars, etc.)?" Response options were "yes" or "no" (WHO, 1998).

Binge drinking was assessed with one item, "How often do you have (for men) five or more and (for women) four or more drinks on one occasion?" Response options ranged from 1=Never to 5=Daily or almost daily (Babor, Higgins-Biddle, Saunders & Monteiro, 2001).

Drug use was assessed with the question, "How often have you taken drugs in the past 12 months; other than prescribed by the healthcare provider?" Response options included 1=0 times to 4=10 or more times.

The *South Oaks Gambling Screen* (SOGS), a standardised measure of pathological gambling and gambling behaviours in their lifetime (Lesieur & Blume, 1987), was used to assess nine different gambling behaviours, e.g., "Played cards for money." Response options ranged from 1=Not at all to 3=Once a week or more. Students who scored positive (in terms of more than once a week) on any of the nine gambling behaviours were classified as engaged in gambling. Cronbach alpha for this nine-item scale was 0.84 in this sample.

Physical activity was assessed using the self-administered International Physical Activity Questionnaire (IPAQ, 2006) short version, for the last seven days (IPAQ-S7S). We used the

instructions given in the IPAQ manual for reliability and validity, which is detailed elsewhere (Craig et al., 2003). We categorised physical activity (short form) according to the official IPAQ scoring protocol (IPAQ, 2014) as low, moderate and high. In a 12-country reliability and validity study, the IPAQ questionnaire produced repeatable data (Spearman's rho clustered around 0.8) and criterion validity had a median rho of about 0.30 (Craig et al., 2003).

Anthropometric measurements. Height (without footwear) was measured using a stadiometer and weight (without footwear and any heavy accessories) was assessed with a calibrated weighing scale. Body mass index (BMI) was calculated as weight in kilograms divided by height in metre squared. There was a low response rate of anthropometric measurements for Grenada and Cameroon and for the China Hongkong sub-sample, and in Bangladesh and Indonesia body weight and height were collected by self-report. BMI was used as an indicator of obesity (≥27.5 kg/m^2) in the East and South Asian participants (WHO Expert Consultation, 2004), and for the other countries, obesity was defined as BMI=30 kg/m^2 (WHO, 2014).

DATA ANALYSIS

The data were analysed using IBM SPSS (version 20.0). The proportion of seatbelt use behaviour, sociodemographic factors, traffic-related behaviour, mental health and substance use variables was calculated as a percentage. The Pearson chi-square test was used to calculate gender differences. Logistic regression analysis was done with STATA to calculate the crude odds ratio (OR) with 95% confidence interval (CI) to determine the associations between the potential determinants and inconsistent seatbelt use, overall and by the income level of the study countries. All variables which were statistically significant ($P < .05$) in bivariate analyses were included in the multivariable model. The country was entered as the primary sampling unit for survey analysis in STATA in order to achieve accurate CIs, given the clustered nature of the data.

RESULTS

DESCRIPTIVE RESULTS

The final sample included 16 770 university students (41.0% men and 59.0% women), with a mean age of 20.9 years (SD=2.9). Study response rates in 22 countries were over 90% and in Barbados, Grenada, Madagascar and Egypt the response rates were 41.4%, 53.0%, 78.8% and 82.2%, respectively. The percentage of university students reporting to be inconsistently using a seatbelt were 54.7% for all countries, 56.0% for men and 53.7% for women, ranging from 12.1% in Mauritius to 86.3% in Tunisia. In several countries (Cameroon, Ivory Coast, South Africa, Tunisia, Turkey), male students more frequently inconsistently used seatbelts than female students, while in some other countries (China,

Laos, Madagascar) women more frequently inconsistently used seatbelts than men. Regarding the importance of seatbelt use, overall, students endorsed with a high mean (7.9, range 1-10) the importance of seatbelt use, ranging from 6.2 in Egypt and Nigeria to 9.5 in Indonesia (see Table 1).

Table 1. Seatbelt use and attitudes by study country and gender

		Inconsistent seatbelt use			Statistic	Importance of seatbelt use	National seatbelt law
		All	Male	Female			
	N	%	%	N	P-value	M (SD)	
All	16770	54.7	56.0	53.7	0.003	7.9 (2.8)	
Caribbean and South America							
Barbados[4]	575	22.3	23.8	20.3	0.362	8.6 (2.0)	A[5]
Grenada[3]	429	31.0	35.1	28.9	0.150	8.5 (2.3)	A
Jamaica[3]	754	63.7	63.8	59.4	0.997	8.4 (2.2)	A
Colombia[3]	779	72.9	74.0	72.1	0.546	8.0 (2.5)	A
Venezuela[3]	544	33.6	30.8	35.5	0.266	8.9 (1.9)	A
Sub-Saharan Africa							
Cameroon[2]	531	37.9	43.3	33.3	0.018	8.5 (2.5)	B[6]
Ivory Coast[2]	764	50.4	54.9	45.8	0.011	8.9 (3.0)	B
Madagascar[1]	706	84.4	80.4	88.5	0.003	6.5 (3.4)	B
Mauritius[3]	459	12.1	14.9	9.4	0.086	9.0 (3.9)	B
Namibia[3]	486	40.9	42.1	39.5	0.619	8.8 (2.2)	A
Nigeria[2]	709	59.9	61.0	58.7	0.536	6.2 (3.8)	B
South Africa[3]	719	53.3	60.4	47.2	<0.001	8.0 (2.7)	A
North Africa, Near East and Central Asia							
Egypt[2]	615	78.5	84.6	73.0	<0.001	6.2 (3.4)	B
Tunisia[3]	802	86.3	89.9	84.2	0.027	7.3 (3.7)	B
Turkey[3]	739	42.8	55.9	30.1	<0.001	7.8 (2.8)	A
Kyrgyzstan[1]	680	40.1	43.1	37.7	0.150	8.3 (2.7)	A
Russia[3]	841	15.7	40.1	33.7	0.266	8.2 (2.7)	A
South Asia and China							
Bangladesh[1]	665	64.5	66.0	61.7	0.256	7.2 (3.1)	B
India[2]	499	63.1	64.4	60.7	0.412	7.4 (3.3)	A
Pakistan[2]	738	84.8	83.2	86.0	0.303	7.5 (2.5)	B
China[3]	531	37.9	45.3	54.1	0.022	7.6 (2.2)	A
Southeast Asia							
Indonesia[2]	345	26.1	29.3	23.9	0.263	9.5 (1.6)	B
Laos[2]	454	81.7	75.1	86.1	0.003	7.0 (3.5)	B

		Inconsistent seatbelt use			Statistic	Importance of seatbelt use	National seatbelt law
		All	Male	Female			
	N	%	%	N	P-value	M (SD)	
Philippines[2]	661	80.3	83.6	79.2	0.208	7.2 (2.5)	A
Singapore[4]	841	15.7	14.4	17.1	0.266	8.1 (2.0)	A
Thailand[3]	759	37.3	59.6	63.9	0.272	8.0 (2.3)	B

[1]Low-income country; [2]Lower-middle-income country; [3]Upper-middle-income country; [4]High-income country (Source: World Bank, 2013). [5]A=National seatbelt law applies to all occupants; [6]B=No seatbelt law or law does not apply to all occupants (Source: WHO, 2013)

ASSOCIATIONS WITH INCONSISTENT SEATBELT USE

In multivariate logistic regression, it was found that younger age, having a not well-off or poor economic family background, living in a low-income or lower-middle-income country, having no national seatbelt law or a law that does not apply to all occupants, poor attitudes towards seatbelt use, not always following the speed limit when driving a car, having depressive symptoms, drug use in the past 12 months, and low physical activity were associated with self-reported inconsistent seatbelt use (see Table 2).

Table 2. Associations between inconsistent seatbelt use and sociodemographic, health risk behaviour and social-legal variables in *university students from 26 low- and middle-income and high-income countries, 2013*

Variables	Inconsistent seatbelt use		
		UOR (95% CI)	AOR (95% CI)
Sociodemographics	%		
Age in years			
16 -19	34.1	1 (Reference)	1 (Reference)
20 - 21	35.5	0.82 (0.76-0.88)***	0.74 (0.66-0.84)***
22 or more	30.4	0.67 (0.62-0.72)***	0.68 (0.60-0.77)***
Gender			
Female	58.5	1 (Reference)	1 (Reference)
Male	41.5	1.10 (1.03-1.17)**	1.03 (0.91-1.12)
Wealth			
Not well off/Poor	46.4	1 (Reference)	1 (Reference)
Wealthy/ Quite well off	53.6	0.65 (0.61-0.69)***	0.54 (0.49-0. 60)***
Country income			
Upper middle income/High income	49.8	1 (Reference)	1 (Reference)
Low income/Lower middle income	50.2	2.31 (2.17-2.47)***	2.83 (2.54-3.15)***
Health risk behaviour			
Traffic-related behaviour			
Drinking and driving	17.0	0.94 (0.85-1.03)	–

Variables	Inconsistent seatbelt use		
		UOR (95% CI)	AOR (95% CI)
Sociodemographics	%		
Not always following speed limit	67.2	1.87 (1.73-2.03)***	1.55 (1.49-1.72)***
Involved in motor vehicle accident	1.6	1.12 (0.87-1.44)	–
Involved in motor cycle accident	1.8	1.50 (1.16-1.94)**	1.14 (0.89-1.60)
Mental health and substance use			
Depression symptoms (severe)	12.8	1.20 (1.10-1.32)***	1.28 (1.11-1.49)***
Current tobacco use	12.8	1.12 (1.02-1.22)*	1.02 (0.82-1.21)
Binge drinking in past month	11.8	1.02 (0.93-1.11)	–
Drug use in past 12 months	17.2	1.46 (1.35-1.58)***	1.32 (1.17-1.48)***
Gambling (>once a week)	8.2	1.13 (1.01-1.26)*	1.15 (0.96-1.37)
Physical activity			
Low	47.5	1 (Reference)	1 (Reference)
Moderate	21.6	0.85 (0.78-0.92)***	0.77 (0.67-0.88)***
High	30.9	0.72 (0.67-0.77)***	0.72 (0.65-0.81)***
BMI obesity	5.3	0.89 (0.77-1.03)	–
Social-legal factors			
Importance of seatbelt use			
1-6	24.8	1 (Reference)	1 (Reference)
7-9	24.5	0.28 (0.25-0.31)***	0.28 (0.23-0.32)***
10	50.7	0.16 (0.14-0.17)***	0.13 (0.12-0.15)***
National seatbelt law			
No seatbelt law or law does not apply to all occupants	45.1	1 (Reference)	1 (Reference)
National seatbelt law applies to all occupants	54.9	0.43 (0.40-0.46)***	0.71 (0.61-0.83)***

***P<.001; **P<.01; *P<.05; UOR=Unadjusted Odds Ratio; AOR=Adjusted Odds Ratio; CI=Confidence Interval

ASSOCIATIONS WITH INCONSISTENT SEATBELT USE BY INCOME LEVEL OF STUDY COUNTRY

In multivariate logistic regression in both students from low-income or lower-middle-income and in the upper-middle-income or high-income countries, younger age, having a not well-off or poor economic family background, having no national seatbelt law or a law that does not apply to all occupants, poor attitudes towards seatbelt use, and not always following the speed limit when driving a car were associated with self-reported inconsistent seatbelt use. In addition, among students from low- and lower-middle-income level countries, lack of physical activity and depression were positively, and tobacco use and drink driving were negatively associated with inconsistent seatbelt use, while among students from upper-middle-income or high-income countries, binge drinking and illicit drug use were additionally associated with inconsistent seatbelt use (see Table 3).

Table 3: Associations between inconsistent seatbelt use and sociodemographic, health risk behaviour and social-legal variables among *university students by income level of study country, 2013*

Variables	Inconsistent seatbelt use	
	Low income/ Lower middle income	**Upper middle income/High income**
	AOR (95% CI)	**AOR (95% CI)**
Sociodemographics		
Age in years 16 -19 20 - 21 22 or more	 1 (Reference) 0.77 (0.64-0.91)** 0.65 (0.54-0.78)***	 1 (Reference) 0.69 (0.53-0.89)*** 0.79 (0.61-1.02)
Gender Female Male	–	–
Wealth Not well off/Poor Wealthy/ Quite well off	 1 (Reference) 0.65 (0.55-0.77)***	 1 (Reference) 0.39 (0.32-0.49)***
Health risk behaviour		
Traffic-related behaviour		
Drinking and driving	1.16 (0.95-1.42)	0.45 (0.36-0.56)***
Not always following speed limit	1.76 (1.52-2.04)***	1.70 (1.37-2.11)***
Involved in motor vehicle accident	–	
Involved in motor cycle accident	–	1.82 (0.73-4.53)
Mental health and substance use		
Depression symptoms (severe)	1.27 (1.05-1.55)*	1.29 (0.96-1.74)
Current tobacco use	0.67 (0.59-0.80)***	0.97 (0.74-1.25)
Binge drinking in past month	–	1.78 (1.41-2.16)***
Drug use in past 12 months	–	1.40 (1.12-1.76)**
Gambling (>once a week)	–	1.19 (0.89-1.60)
Physical activity Low Moderate High	 1 (Reference) 0.80 (0.64-0.98)* 0.61 (0.52-0.72)***	 1 (Reference) 0.84 (0.66-1.07) 0.81 (0.64-1.03)
BMI obesity	–	0.88 (0.55-1.39)
Social-legal factors		
Importance of seatbelt use 1-6 7-9 10	 1 (Reference) 0.35 (0.28-0.44)*** 0.21 (0.17-0.26)***	 1 (Reference) 0.24 (0.18-0.31)*** 0.11 (0.08-1.42)***
National seatbelt law No seatbelt law or law does not apply to all occupants National seatbelt law applies to all occupants	 1 (Reference) 0.62 (0.52-0.74)***	 1 (Reference) 0.20 (0.14-0.28)***

***P<.001; **P<.01; *P<.05; AOR=Adjusted Odds Ratio; CI=Confidence Interval

DISCUSSION

In this large study of university students from 26 low-, middle- and high-income countries, it was found in agreement with previous studies (Mohammadi, 2011; Nanakorn et al., 1999; Oksuz & Malhan, 2005; Sharma et al., 2007) that more than half of the students inconsistently used a seatbelt by self-report when driving or sitting in the front seat of a car. This result is clearly higher than in a previous survey of self-reported inconsistent seatbelt use among university students in 13 European countries (25%) (Steptoe et al., 2002). Our study finding is a cause for concern and calls for seatbelt health promotion intervention with this university student population, in particular in low-income and lower-middle-income countries.

The study found that male students were more likely than female students to inconsistently use a seatbelt in most study countries. This finding concurs with previous study findings (Oleckno & Blacconiere, 1990; Oksuz & Malhan, 2005; Siviroj et al., 2012). In addition, younger students were more likely than older students to inconsistently use a seatbelt. This could mean that seatbelt promotion programmes should particularly target young male students in most study countries. In two study countries (Laos and Madagascar) inconsistent seatbelt use was significantly higher in female than male students, meaning that in Laos and Madagascar female university students should be particularly targeted in seatbelt promotion.

The study further found that poorer family background, living in a poor country, and living in a country with no national seatbelt law or a law that does not apply to all occupants were significantly associated with poorer seatbelt use. Previous studies have emphasised the importance of seatbelt legislation and law enforcement (Steptoe et al., 2002; WHO, 2013) in improving seatbelt use rates. Living in a poorer country seems to be associated with poorer seatbelt legislation in the study low-income countries (Bangladesh, Madagascar) and lower-middle-income countries (Cameroon, Ivory Coast, Nigeria, Egypt, Pakistan, Indonesia, Laos) compared to study high-income (Barbados, Singapore) and upper-middle-income countries (Grenada, Jamaica, Columbia, Venezuela, Namibia, South Africa, China). Analysing students from low- or lower-middle-income and upper-middle-income or higher-income countries separately, this study found that among students from upper-middle-income or high-income countries, binge drinking and illicit drug use were additionally associated with inconsistent seatbelt use. In previous studies among university students across multiple countries (Peltzer & Pengpid, 2016; in print), the prevalence of binge drinking and illicit drug use was significantly higher among students in upper-middle- and high-income countries than in low- and lower-middle-income countries. The association between heavy drinking, illicit drug use and inconsistent seatbelt use has previously been

reported in several studies among university students in a high-income country (USA) (Everett et al., 1999; Oleckno & Blacconiere, 1990).

The study also found that university students who rated seatbelt use as more important carried it out more often. This finding is in agreement with previous studies (Steptoe et al., 2002), and should be utilised in the promotion of seatbelt use programmes. The study further found that several (other) health risk behaviours (not always following the speed limit when driving a car, illicit drug use, physically inactive) and having depressive symptoms were more common in students inconsistently using a seatbelt compared to students consistently wearing a seatbelt. These findings are in agreement with some previous studies (Dinger et al., 2014; Everett et al., 1999; Oleckno & Blacconiere, 1990; Steptoe et al., 2002), and seem to confirm the clustering of other health risk behaviours with lack of seatbelt use. This is even more relevant, since additional health risk behaviours (tobacco use, gambling, and having been in a motorcycle accident) were associated with inconsistent seatbelt use in bivariate analyses, as also found in previous studies (Everett et al., 1999; Oleckno & Blacconiere, 1990; Mohammadi, 2011). Seatbelt promotion programmes should incorporate other clustering health risk behaviours such as not always following speed limits, substance use, physical inactivity and depression symptoms, as well as male students in their interventions. Consequently, injury prevention programmes should selectively target these high-risk motor vehicle drivers and passengers to improve seatbelt compliance and limit associated injury (Ball, Kirkpatrick & Brenneman, 2005).

Unlike in previous studies (Price et al., 2011; Steptoe et al., 2002), this study did not find an association or negative association between alcohol-impaired driving, being obese and inconsistent seatbelt use. It is unclear why these findings were found, and further studies are encouraged to investigate the body weight status, drinking and driving and seatbelt use.

Road traffic injury prevention and control programmes are most effective when they combine several components, including appropriate engineering of seatbelts, policy, enforcement, use of incentives, and health promotion education (Akhmadeeva, Andreeva, Sussman, Khusnutdinova & Simons-Morton, 2008; Mace et al., 2001). Akhmadeeva et al. (2008, p.288) note that “there is a great and urgent need for cross-regional and cross-national translation of effective traffic safety initiatives, including the promotion of seatbelt use.”

Considering that the habitual act of seatbelt use or non-use is a result of habits performed largely unintentionally, innovative campaigns or programmes to break the ‘automatic’ habit could include timing the seatbelt message to be delivered at the time when students are prone to revaluate their habits (e.g., beginning of the academic year, change of residence,

etc.), aiming at stopping the bad habit of inconsistent seatbelt use from forming before it starts, and using positive modelling and social influence (Hoekstra & Wegman, 2011; Maio et al., 2007).

STUDY LIMITATIONS

This study had several limitations. The study was cross-sectional, so causal conclusions cannot be drawn. The investigation was carried out with students from one or two universities in each country, and inclusion of other centres could have resulted in different results. University students are not representative of young adults in general, and the seatbelt use behaviour, traffic-related and health risk behaviour may be different in other sectors of the population. The data collection, in particular seatbelt use, by self-report could have resulted in desired participants' responses. Future studies should employ observations of actual seatbelt use.

CONCLUSION

In this large study among university students from 26 low-, middle- and high-income countries, results suggest a high self-reported inconsistent seatbelt use. Several risk factors were identified, which can be utilised in reaching these young people for change strategies in seatbelt use programmes.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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