

Original breve

Safety belt and mobile phone usage in vehicles in Barcelona (Spain)

Jose M Martínez-Sánchez^{a,b,c,*}, Ariadna Curto^{a,d,e}, Marcela Fu^{a,b,f}, Cristina Martínez^{a,b,g}, Xisca Sureda^{b,f}, Montse Ballbè^{a,b,f}, Esteve Fernández^{a,b,f}^a Tobacco Control Unit, Cancer Prevention and Control Programme, Institut Català d'Oncologia ICO, L'Hospitalet de Llobregat, Barcelona, Spain^b Cancer Control and Prevention Group, Institut d'Investigació Biomèdica de Bellvitge-IDIBELL, L'Hospitalet de Llobregat, Barcelona, Spain^c Biostatistics Unit, Department of Basic Science, Universitat Internacional de Catalunya, Sant Cugat del Vallès, Barcelona, Spain^d Centre for Research in Environmental Epidemiology (CREAL), Barcelona, Spain^e CIBER Epidemiología y Salud Pública (CIBERESP), Spain^f Department of Clinical Sciences, Universitat de Barcelona, Barcelona, Spain^g Medicine and Health Sciences School, Universitat Internacional de Catalunya, Barcelona, Spain

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ABSTRACT

Objectives: To describe the prevalence and correlates of safety belt and mobile phone usage in vehicles in the city of Barcelona (Spain).**Methods:** We performed a study using direct observation with a cross-sectional design. We selected 2,442 private cars, commercial vehicles, and taxis from all districts of Barcelona.**Results:** The prevalence of people not wearing safety belt was 10.5% among drivers, 4.6% among front seat passengers, and 32.2% among some of the rear passengers. It was higher among the passengers than among the drivers, regardless of the type of the vehicle. The prevalence of mobile phone usage while driving during a moment of the trip was 3.8%.**Conclusion:** Our study shows noticeably high prevalence of people not wearing safety belt in the rear seats. Moreover, four out of one hundred drivers still use the mobile phone while driving during a moment of the trip.

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Uso del cinturón de seguridad y del teléfono móvil en los vehículos de Barcelona (España)

RESUMEN

Objetivo: Describir la prevalencia y asociaciones del uso del cinturón de seguridad y teléfono móvil en vehículos en la ciudad de Barcelona.**Métodos:** Se realizó un estudio transversal mediante observación directa de los vehículos de la ciudad de Barcelona (n = 2.442 vehículos privados, comerciales y taxis).**Resultados:** La prevalencia del no uso del cinturón de seguridad fue del 10,5% entre los conductores, 4,6% entre los co-pilotos y 32,2% entre algunos de los pasajeros de los asientos traseros. La prevalencia fue superior en los pasajeros que en los conductores, independientemente del tipo de vehículo. La prevalencia del uso del móvil mientras se conducía en un momento del viaje en todos los vehículos fue de 3,8%.**Conclusión:** La prevalencia del no uso del cinturón de seguridad en los asientos traseros fue notablemente alta. Además, cuatro de cada 100 conductores todavía utilizan el móvil mientras conducen en un momento del viaje.

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Introduction

Road traffic injuries are a major public health problem; they are responsible of a great number of years of potential life lost being the ninth cause of mortality and morbidity around the world.¹

Several of the traffic injuries could be prevented by modifying certain drivers' behaviours. The use of safety belt is considered one of the most effective passive systems in preventing traffic injuries. It reduces up to 75% of the mortality in head-on collisions.² Non-use of safety belt is associated with more serious injuries in traffic

collisions.³ Moreover, mobile phone use while driving is also associated with an increased risk of traffic collisions.^{4,5}

The objective of this study was to estimate the prevalence and correlates of safety belt and mobile phone usage in vehicles in the city of Barcelona.

Methods

We conducted a cross-sectional study in the city of Barcelona in 2011 on the use of seatbelt of all occupants of the vehicles and use of mobile phone of drivers during a moment of the trip, through direct observation (n = 2,442 vehicles). The methodology of this study has been previously described.^{6,7} In brief, we selected 40 public roads (4 per district) and a traffic light was selected as point of observation,

* Corresponding author.

E-mail address: jmmartinez@iconcologia.net (Dr. J.M. Martínez-Sánchez).

Table 1
Prevalence, crude and adjusted Odds Ratios for non-use of safety belt by drivers in private cars by sex in the city of Barcelona, Spain (2011).

	n	Prevalence		Logistic regression models			Logistic regression models		
		% (95%CI)	p*	ORc	(95%CI)	p	ORa	(95%CI)	p
ALL									
Sex									
Man	1224	2.3 (1.5-3.1)	0.215	1.69	(0.73-3.88)	0.220	1.59	(0.69-3.70)	0.279
Woman	511	1.4 (0.4-2.4)		1	-		1	-	
Age (years)									
18-34	456	0.9 (0.0-1.8)	0.007	1	-	-	1	-	
35-64	1154	2.2 (1.4-3.0)		2.50	(0.87-7.23)	0.090	2.55	(0.88-7.39)	0.084
≥65	125	4.8 (1.1-8.5)		5.70	(1.58-20.52)	0.008	5.40	(1.49-19.54)	0.010
Time									
8-11 h	1019	2.0 (1.1-2.9)	0.847	1	-	-	1	-	
17-19 h	716	2.1 (1.0-3.2)		1.07	(0.54-2.10)	0.847	1.12	(0.57-2.21)	0.740
MEN									
Age			0.037						
18-34	328	1.2 (0.0-2.4)		1	-	-	1	-	
35-64	786	2.3 (1.3-3.3)		1.90	(0.64-5.65)	0.250	1.91	(0.64-5.70)	0.244
≥65	110	5.5 (1.2-9.8)		4.67	(1.29-16.88)	0.019	4.74	(1.31-17.16)	0.018
Time									
8-11 h	724	2.2 (1.1-3.3)	0.827	1	-	-	1	-	
17-19 h	500	2.4 (1.1-3.7)		1.09	(0.51-2.32)	0.827	1.15	(0.54-2.50)	0.721
WOMEN									
Age (years)			0.252						
18-34	128	0.0 (0.0-4.1)		-	-	-	-	-	-
35-64	368	1.9 (0.5-3.3)		-	-	-	-	-	-
≥65	15	0.0 (0.0-20.4)		-	-	-	-	-	-
Time			1.000						
8-11 h	295	1.4 (0.1-2.7)		1	-	-	1	-	
17-19 h	216	1.4 (0.5-4.1)		1.02	(0.23-4.63)	0.975	1.02	(0.23-4.63)	0.975

ORc: crude odds ratio

ORa: adjusted odds ratio derived from a logistic regression model adjusted for all the variables in the table.

CI: confidence interval

* Chi-square test and Fisher's exact test

from where a trained observer conducted the direct observation of the vehicles. The observations were made when the traffic light was red for vehicles. We systematically selected the first two vehicles in the adjacent lane to the observer. We excluded adjacent lanes when they were exclusive for buses and bicycles. The study included all private cars, commercial vehicles, and taxis.

The driver's variables were: use of the safety belt (yes/no), use of the mobile phone or its manipulation with the hands to talk or to send a text message during a moment of the trip (yes/no), approximate age (18-34/35-64/≥65 years old) and sex (man/woman). We only included the use of handheld mobile phone, excluding the use of headset and hands-free mobile phones. Passengers' variables (front seat and rear passenger) were only: total number of passengers (excluding the driver) and number of passengers using the safety belt. We also collected contextual variables (time and number of lanes of the public road).

We calculated the prevalence rates and used chi-square test to compare those rates among drivers. We also fitted logistic regression models to obtain the adjusted odds ratios.

Results

The prevalence of people not wearing safety belt in all vehicles was 10.5% among drivers, 4.6% among front seat passengers, and 32.2% among some of the rear passengers. The prevalence of non-use of safety belt was higher among some of the rear passengers, regardless the type of the vehicle (table I of the Appendix).

There was a statistically significant difference in the prevalence of drivers who were not wearing safety belt according to age in all vehicles ($p=0.001$), particularly in private cars ($p=0.007$). In the bivariate analysis, only the variables age (≥65 years old) was

significantly related to non-use of safety belt in private vehicles (Table 1).

The prevalence of use of mobile phones while driving during a moment of the trip was 3.8%. It was higher in private cars (4.1%), in women (5.5%), and when the drivers were alone (5.2%). There was also an inverse trend of the prevalence with age (p for trend < 0.001) (Table 2). Bivariate logistic regression models showed the mobile phone use while driving was higher when the driver was a woman, had an age range of 18-34 years old, when drivers were alone, and the vehicle type was a private or commercial one (Table 2).

The prevalence of non-use safety belt and use of mobile phone during a moment of trip according to type of vehicles are shown in table II and III of the Appendix in the online version of this article.

Discussion

The prevalence of passengers not wearing the safety belt in the rear seat of vehicles was noticeably higher than the prevalence observed in drivers and front seat passengers in the urban area of Barcelona.

The prevalence of drivers not wearing the safety belt observed in our study is lower than those reported in Italy⁸ and England⁹ studies, using also direct observation (24.3% and 15.3%, respectively) and even lower if compared to data obtained by questionnaires in 2002 in Spain.¹⁰ At that time, before of the introduction of the penalty point system,¹¹ the prevalence of non-use of safety belt in the urban area was 40% among drivers, 45% among front seat passengers, and 80% among some of the rear passengers.¹⁰ As in Spain the use of safety belt is not compulsory among taxi drivers in urban streets and roads,¹¹ the figure of the non-usage that we observed could be understandable. But is not the case of the taxi passengers, for whom its use is always compulsory. However, we found

Table 2

Prevalence, crude and adjusted Odds Ratios for mobile phone use while driving during a moment of the trip by sex in the city of Barcelona, Spain (2011).

	n	Prevalence		Logistic regression models			Logistic regression models		
		%(95%CI)	p*	ORc	(95%CI)	p	ORa	(95%CI)	p
ALL	2442	3.8 (3.0-4.6)		-	-	-	-	-	-
Sex			0.015						
Man	1899	3.3 (2.5-4.1)		1	-		1	-	
Woman	543	5.5 (3.6-7.4)		1.73	(1.11-2.71)	0.016	1.54	(0.95-2.47)	0.074
Age (years)			<0.001						
18-34	606	6.4 (4.5-8.3)		9.35	(1.27-68.69)	0.028	7.27	(0.98-53.78)	0.052
35-64	1699	3.1 (2.3-3.9)		4.29	(0.59-31.3)	0.150	3.85	(0.52-28.33)	0.186
≥65	137	0.7 (0.1-4.0)		1	-		1	-	
Passengers			<0.001						
Yes	913	1.3 (0.6-2.0)		1	-		1	-	
No	1529	5.2 (4.1-6.3)		4.14	(2.25-7.65)	<0.001	3.58	(1.78-7.22)	<0.001
Passengers < 14 years old			0.015						
Yes	271	1.1 (0.4-3.2)		1	-		1	-	
No	2171	4.1 (3.3-4.9)		3.82	(1.20-12.51)	0.023	1.36	(0.359-5.14)	0.652
Vehicle type			0.059						
Private	1736	4.1 (3.2-5.0)		4.73	(1.15-19.43)	0.031	3.77	(0.90-15.80)	0.069
Commercial	482	3.9 (2.2-5.6)		4.55	(1.05-19.73)	0.043	3.58	(0.82-15.85)	0.090
Taxi	224	0.9 (0.3-12.7)		1	-		1	-	
Time			0.236						
8-11 h	1446	3.4 (2.5-4.3)		1	-		1	-	
17-19 h	996	4.3 (3.0-5.6)		1.29	(0.85-1.95)	0.237	1.36	(0.89-2.08)	0.152
MEN			<0.001						
Age (years)			<0.001						
18-34	470	6.2 (4.0-8.4)		7.96	(1.07-59.01)	0.042	6.75	(0.90-50.43)	0.063
35-64	1307	2.4 (1.6-3.2)		3.04	(0.41-22.42)	0.276	3.05	(0.41-22.74)	0.276
≥65	122	0.8 (0.1-4.5)		1	-		1	-	
Passengers			<0.001						
Yes	720	1.3 (0.5-2.1)		1	-		1	-	
No	1179	4.5 (3.3-5.7)		3.72	(1.82-7.58)	<0.001	3.47	(1.69-7.12)	0.001
Passengers < 14 years old			0.014						
Yes	165	0.0 (0.0-2.3)		-	-	-	-	-	-
No	1734	3.6 (2.7-4.5)		-	-	-	-	-	-
Vehicle type			0.114						
Private	1225	3.5 (2.5-4.5)		3.93	(0.94-16.34)	0.060	3.46	(0.82-14.59)	0.091
Commercial	456	3.7 (2.0-5.4)		4.18	(0.96-18.27)	0.057	3.24	(0.73-14.34)	0.121
Taxi	218	0.9 (0.3-3.3)		1	-		1	-	
Time			0.441						
8-11 h	1131	3.0 (2.0-4.0)		1	-		1	-	
17-19 h	768	3.6 (2.3-4.9)		1.22	(0.73-2.03)	0.442	1.29	(0.77-2.16)	0.339
WOMEN			0.390						
Age (years)			0.390						
18-34	136	7.4 (3.0-11.8)		1.54	(0.70-3.67)	0.284	1.45	(0.66-3.22)	0.358
35-64	392	5.1 (2.9-7.3)		1	-		1	-	
≥65	15	0.0 (0.0-20.4)		-	-	-	-	-	-
Passengers			0.003						
Yes	193	1.6 (0.5-4.5)		1	-		1	-	
No	350	7.7 (4.9-10.5)		5.29	(1.58-17.69)	0.007	5.29	(1.58-17.34)	0.007
Passengers < 14 years old			0.176						
Yes	106	2.8 (1.0-8.0)		1	-		-	-	-
No	437	6.2 (3.9-8.5)		2.26	(0.67-7.60)	0.187	-	-	-
Vehicle type			0.746						
Private	551	5.5 (3.6-7.4)		1	-		1	-	
Commercial	26	7.7 (2.1-24.1)		1.15	(0.26-5.06)	0.853	1.08	(0.24-4.83)	0.922
Taxi	6	0.0 (0.0-39.0)		-	-	-	-	-	-
Time			0.360						
8-11 h	315	4.8 (2.4-7.2)		1	-		1	-	
17-19 h	228	6.6 (3.4-9.8)		1.41	(0.67-2.94)	0.362	1.52	(0.72-3.20)	0.271

ORc: crude odds ratio.

ORa: adjusted odds ratio derived from a logistic regression model adjusted for all variables in the table.

CI: confidence interval.

* Chi-square test and Fisher's exact test.

that taxi passengers, either front seat passengers or rear passengers, used less the safety belt than private and commercial vehicles' occupants (table I of the Appendix).

The prevalence of mobile phone usage while driving during a moment of the trip in our study was similar than those observed in other European^{8,9} and Spanish¹² cities, as derived from studies with a similar direct observation design (prevalence between 2.5% and 4.5%). In Michigan (USA), Eby et al.¹³ found that the mobile phone

use while driving increased from 2.7% in 2001 to 5.8% in 2005. However, we found a similar prevalence in a study conducted in Lleida (a median-size Spanish city) in 2002 (3.3%), before the introduction of the Spanish penalty points regulation.¹¹ The lower prevalence in our study could be partially explained because the General Traffic Directorate conducted eight campaigns to prevent distractions while driving between 2008 and 2011.¹⁴ These campaigns included media coverage (TV, radio, newspapers, etc.) of the risks associated

to the use of the mobile phone while driving and the surveillance of the non-use of the mobile phone while driving.

The main limitation of this study derives from the inherent observer bias, specifically with the age variable, as people can look younger or older than they actually are. However, the pilot study⁷ carried out by two independent observers showed an almost perfect agreement in the observation. The prevalence rates of mobile phone use while driving could also underestimate by the inability of the direct observation during a stop at the traffic light to monitor the entire trip of the driver, who could have used the mobile phone at any time or even do more than one call during the trip. One study conducted in Spain with self-reported information showed that 15.1% of drivers between 18 and 64 years old used the mobile phone while driving regularly or fairly often in the last 30 days.¹⁵ A strength of an observational study like this compared with studies based on self-report is the objectivity in the information, free of information bias, that could occur with self-report. Our data could also underestimate the actual prevalence because we did not make direct observations during nights and weekends when many of unsafe driving behaviours occur such as alcohol use while driving.

In conclusion, public health policies should improve interventions focusing on increasing the use of safety belt to reduce the road traffic injuries, particularly among rear passengers. Furthermore, we recommend the launch of campaigns addressed to surveillance the compliance of the non-use of mobile phone, particularly among women and young people, and to increase the awareness of risk and risk-taking behaviours while driving.

What is already known about this subject?

Road traffic injuries are a major public health problem; they are responsible of a great number of years of potential life lost. Several of those injuries could be prevented by modifying certain drivers' behaviours, such as promoting the use of safety belts and non-use of mobile phone while driving.

What does this paper add?

The prevalence of passengers who were not wearing the safety belt in the rear seat of vehicles was noticeably high. Surveillance of compliance risk-taking behaviour while driving should be increased.

Contributors

All authors contributed in the design of the study. AC collected the data, prepared the database and analysed the data. JMMS and EF revised with her the results. All the authors contributed to the interpretation of the results. JMMS drafted the manuscript. All authors approved the final version.

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Conflict of interest

None.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.gaceta.2014.01.002>.

References

1. World Health Organization. Global status report on road safety: time for action. Geneva; 2009.
2. Crandall CS, Olson LM, Sklar DP. Mortality reduction with air bag and seat belt use in head-on passenger car collisions. *Am J Epidemiol.* 2001;153:219–24.
3. Hodson-Walker NJ. The value of safety belts: a review. *Can Med Assoc J.* 1970;102:391–3.
4. McCartt AT, Hellinga LA, Bratiman KA. Cell phones and driving: review of research. *Traffic Inj Prev.* 2006;7:89–106.
5. McEvoy SP, Stevenson MR, McCartt AT, et al. Role of mobile phones in motor vehicle crashes resulting in hospital attendance: a case-crossover study. *BMJ.* 2005;331:428.
6. Curto A, Martínez-Sánchez JM, Fernández E. Tobacco consumption and secondhand smoke exposure in vehicles: a cross-sectional study. *BMJ Open.* 2011;1:e000418.
7. Martínez-Sánchez JM, Curto A, Fernández E. Agreement between two observers in the measurement of smoking and use of safety belt and cell phones in vehicles. *Gac Sanit.* 2012;26:91–3.
8. Lorini C, Pellegrino E, Mannocci F, et al. Use of seat belts and mobile phone while driving in Florence: trend from 2005 to 2009. *Epidemiol Prev.* 2012;36:34–40.
9. Walker L, Williams J, Jamrozik K. Unsafe driving behaviour and four wheel drive vehicles: observational study. *BMJ.* 2006;333:71.
10. Dirección General de Tráfico. Comienza una nueva campaña de la DGT ¡apretarse el cinturón! TRÁFICO. 2002;Septiembre-octubre:6.
11. Boletín Oficial del Estado (BOE). Ley 17/2005, de 19 de julio, por la que se regula el permiso y la licencia de conducción por puntos y se modifica el texto articulado de la ley sobre tráfico, circulación de vehículos a motor y seguridad vial. Boletín Oficial del Estado (BOE), 182 de 20/07/2005. Madrid: Gobierno de España, 2005.
12. Astrain I, Bernaus J, Claverol J, et al. Prevalence of mobile phone use while driving vehicles. *Gac Sanit.* 2003;17:66–9.
13. Eby DW, Vivoda JM, St Louis RM. Driver hand-held cellular phone use: a four-year analysis. *J Safety Res.* 2006;37:261–5.
14. Dirección General de Tráfico. Campañas de divulgación. Available at: http://www.dgt.es/was6/portal/contenidos/visor_multimedia/#app=7f51&c92c-selectedIndex=0 [Accessed 9 Dec 2013].
15. Mobile device use while driving—United States and seven European countries, 2011. *MMWR Morb Mortal Wkly Rep.* 2013; 62:177–82.