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BMJ 2003;327:1455-1456
doi:10.1136/bmj.327.7429.1455

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Hazardous journeys

Car colour and risk of car crash injury: population based case control study

S Furness, J Connor, E Robinson, R Norton, S Ameratunga, R Jackson

Globally, road traffic crashes kill about 3000 people a day.¹ Identification of modifiable risk factors is an important step in reducing this burden. Previous research suggests that white or light coloured cars are less likely to be involved in a crash, than cars of other colours.² We investigated the effect of car colour on the risk of a serious injury from a crash, using a population based case control study designed to identify and quantify modifiable risk factors.

Participants, methods, and results

The Auckland car crash injury study was conducted in the Auckland region of New Zealand between April 1998 and June 1999.^{3,4} The study population comprised all drivers of cars on public (urban and rural) roads in the region. Cases (n = 571) were all car drivers involved in crashes in which one or more of the occupants of the car were admitted to hospital or died (response rate 93%). Controls (n = 588) were car drivers identified by cluster sampling of drivers from randomly selected sites on the road network, at randomly selected times, representative of all time spent driving in the study region during the study (response rate 79%). Data on car colour were available for all of the controls and all but four of the cases.

White was the most prevalent colour in both cases and controls. White, black, grey, red, and silver colour groups were relatively homogeneous with respect to shades included in each group. There was no consistent pattern in distribution of car colour by age of vehicle.

In the multivariable analysis, we assessed the effect of the following potential confounders: age of driver,

sex, educational level, ethnicity, alcohol consumption (in previous six hours), use of recreational drugs, seat-belt use, average time spent driving each week, vehicle speed, vehicle age, engine size, registration, warrant of fitness and vehicle insurance, driving licence status, road type, weather, and ambient light conditions (day, night, twilight). Confounders were included in the final model if they resulted in a change in the odds ratio of more than 5% and had no more than 5% missing data.⁵

We found a significant reduction in the risk of serious injury in silver cars compared with white cars in both the univariate analysis (odds ratio = 0.5 (95% confidence interval 0.3 to 0.8)) and the multivariable analysis (adjusted odds ratio = 0.4 (0.2 to 0.9); table). There was a significant increased risk of a serious injury in brown vehicles after confounders had been adjusted for (odds ratio = 2.1 (1.1 to 4.2)) and the risks for black and green cars were also raised (adjusted odds ratio = 2.0 (1.0 to 4.2) and 1.8 (1.0 to 3.6) respectively). However, green and brown colour groups were heterogeneous in terms of shades of colours included. The risk of a serious injury in yellow, grey, red, and blue cars was not significantly different from that in white cars.

Comment

Silver cars were about 50% less likely to be involved in a crash resulting in serious injury than white cars. The design and methods are a reasonable approach to study the association between modifiable risk factors and injury from car crashes. The association between silver car colour and reduced risk of serious injury

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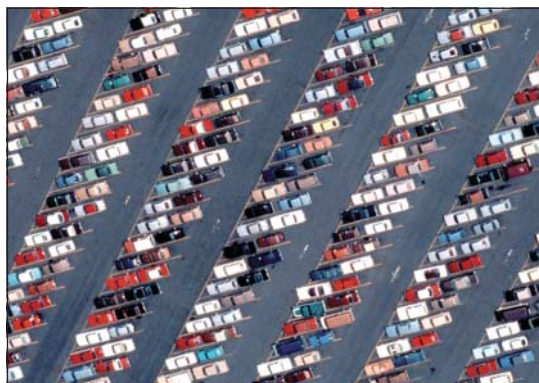
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BMJ 2003;327:1455-6



Association of car colour with car crash injury in Auckland

Car colour	No (%) of cases (n=567)	No (%) of controls* (n=588)	Univariate odds ratio	Multivariable odds ratio†
White	145 (25.6)	146 (25.9)	1	1
Yellow	31 (5.5)	15 (2.8)	2.0 (1.0 to 4.0)	0.8 (0.3 to 2.3)
Grey	52 (9.2)	61 (10.0)	0.9 (0.6 to 1.5)	0.6 (0.3 to 1.3)
Black	36 (6.4)	34 (5.5)	1.2 (0.7 to 2.0)	2.0 (1.0 to 4.2)
Blue	91 (16.1)	96 (17.4)	0.9 (0.6 to 1.4)	0.9 (0.5 to 1.6)
Red	85 (15.0)	82 (13.3)	1.1 (0.7 to 1.8)	0.7 (0.4 to 1.4)
Green	42 (7.4)	44 (7.0)	1.1 (0.6 to 1.8)	1.8 (1.0 to 3.6)
Brown	55 (9.7)	49 (6.8)	1.4 (0.8 to 2.5)	2.1 (1.1 to 4.2)
Silver	30 (5.3)	61 (11.3)	0.5 (0.3 to 0.8)	0.4 (0.2 to 0.9)
P value	—	—	0.04	0.003

*Proportions of controls are adjusted for the cluster sampling design.

†Adjusted for driver's age, ethnicity, alcohol consumption in past 6 hours, seat belt use, vehicle speed, average driving time each week, driving licence status, vehicle insurance status, and weather.

persisted after we had adjusted for major confounding factors, but the possibility of residual confounding remains. The extent to which these results are generalisable to other settings is open to question. Increasing the proportion of silver cars could be an effective passive strategy to reduce the burden of injury from car crashes.

We thank the study participants and I Civil, R Dunn, and J Bailey for help with the design of the study.

Contributors: SF was responsible for this analysis and writing the paper; JC, ER, RN, SA, and RJ contributed to the design and conduct of the study and the writing of the paper; ER and JC contributed to this analysis. JC is the guarantor.

Funding: The Health Research Council of New Zealand funded the Auckland car crash injury study and the Road Safety Research Trust funded this analysis.

Competing interests: None declared.

- 1 Peden M, McGee K, Sharma G. *The injury chart book: a graphical overview of the global burden of injuries*. Geneva: World Health Organization, 2002.
- 2 Lardelli-Claret P, De Dios Luna-Del-Castillo J, Juan Jimenez-Moleon J, Femia-Marzo P, Moreno-Abril O, et al. Does vehicle color influence the risk of being passively involved in a collision? *Epidemiology* 2002;13:721-4.
- 3 Connor J, Norton R, Ameratunga S, Robinson E, Civil I, Dunn R, et al. Driver sleepiness and the risk of serious injury to car occupants: a population based case-control study. *BMJ* 2002;324:1125-8.
- 4 Connor J, Norton R, Ameratunga S, Robinson E, Wigmore B, Jackson R. Prevalence of driver sleepiness in a random population-based sample of car driving. *Sleep* 2001;24:688-94.
- 5 Greenland S. Modeling and variable selection in epidemiologic analysis. *Am J Public Health* 1989;79:340-9.

Depiction of elderly and disabled people on road traffic signs: international comparison

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BMJ 2003;327:1456-7

The traffic sign for elderly or disabled people crossing the road was introduced in the United Kingdom in 1981 after a children's competition.¹ It portrays a silhouette of a man with a flexed posture using a cane and leading a kyphotic woman (fig 1). The same sign is also used for frail, disabled, or blind people, even though many of these people are not old. The sign implies that osteopaenic vertebral collapse and the need for mobility aids are to be expected with physical disability as well as with advancing age.

Elderly people should not be stigmatised as being impaired or inevitably disabled. We had observed that some countries did not depict these groups in this way and wondered how road signs worldwide illustrate elderly people, as well as people with physical disabilities.

Participants, methods, and results

We obtained addresses from the British Diplomatic List 2001,² and we wrote to each of the 178 British diplomats and consuls at all British missions abroad. We requested a picture, photograph, or other image of any road sign that warned about elderly people, as well as deaf people, blind people, or any other people in the neighbourhood with a physical disability. If we received no reply after eight weeks, we wrote again. We followed up countries that failed to respond by contacting their embassies in the United Kingdom with up to two further letters. We also searched the world wide web for pictures of road traffic signs specific to each country.

We received 119 replies from British missions abroad and seven replies from British embassies, and we found five countries with signs by using an internet search. This gave a total response rate of 131/178 (74%). However, 13 countries replied to our questions but were unable to offer adequate information for the study, and alternative lines of inquiry failed to generate definitive answers. We believe the negative responses are accurate—many countries (for example, Argentina, Brunei, and Macedonia) informed us

Countries that have road traffic signs warning motorists about elderly, disabled, blind, or deaf people

Country with sign	Disabled people	Elderly people	Blind people	Deaf people
Armenia	X		X	X
Australia		X		
Bangladesh	X		X	
Belarus	X			
Belize	X			
Canada		X		
Cyprus	X		X	X
Denmark	X		X	
Estonia	X	X	X	
Finland	X			
France	X			
Ghana	X		X	
Iceland	X			
Italy	X			
Latvia			X	
Lebanon	X			
Lithuania	X		X	X
Malaysia	X		X	
Namibia	X	X		
Norway	X	X		
Panama	X			
Russian Federation	X		X	X
San Marino	X			
Seychelles	X	X	X	
Singapore		X	X	
Slovakia	X			X
Slovenia			X	
Sweden	X		X	X
Switzerland	X			
Thailand	X			
Tunisia	X			
Turkmenistan	X		X	X
United Kingdom	X	X	X	
United States	X			
Vatican City	X			

All countries except the United Kingdom have separate signs to represent each group of people. The UK road sign may be used alone to represent elderly, disabled, or blind people or with the caption "blind people" or "disabled people." The "elderly people" caption is being discontinued