



**COMPULSORY SEAT BELT WEARING
IN AUSTRALIA:
CHARACTERISTICS OF WEARERS
AND NON-WEARERS**

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Abstract

At least 90 per cent of passenger car occupants aged 8 years and over have a seat belt available in their seat position. Unfortunately many occupants do not wear the belts provided. The differences between wearers and non-wearers are described in terms of factors including age, sex, seating position, type of belt, time of day, day of week and weather condition. Additional data on socio-economic status and drinking habits may be required if the 'hard-core' group of non-users are to be effectively tackled.

Note:

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Introduction

The Australian Design Rules (ADRs)* for Motor Vehicle Safety ensure that seat belts are fitted to all new passenger cars and derivatives and trucks. The proportion of vehicles on the road with seat belts fitted is therefore continually rising. Recent surveys of seat belt fitting and wearing have shown that at least 90 per cent of passenger car occupants aged at least 8 years have a seat belt available in the seating position they were occupying when observed. Unfortunately not all those occupants with a seat belt available were restrained.

In view of the documented benefits of wearing seat belts (6th International Conference of the International Association for Accident and Traffic Medicine, 1977), the identification of differences between wearers and non-wearers is important, as this would enable formulation of appropriate measures aimed at increasing usage rates.

This report is based on data collected in extensive urban roadside surveys over the past six years by the Commonwealth Department of Transport.

Due to the physical difficulties of observing seat belt fitting and wearing in motor vehicles other than passenger cars and derivatives, and because almost all motor vehicle occupant casualties are occupants of passenger cars and derivatives, the collection of seat belt fitting and wearing information has concentrated on these types of vehicles.

*The Australian Design Rules are published by the Commonwealth Department of Transport.

Survey design

Surveys undertaken

Over the past six years the Office of Road Safety has undertaken a succession of surveys related to the restraint of occupants in motor vehicles. These are described in Table 1.

Table 1: Seat belt surveys, 1973-78

<i>Date</i>	<i>City</i>	<i>Type of survey</i>	<i>Reason for survey</i>	<i>Project report</i>
May 1973	Melbourne Adelaide Hobart	Before campaign	Assess campaigns aimed at improving the manner of wearing lap-sash seat belts by drivers and front left passengers aged at least 8 years	Johnston and Cameron (1979)
May 1974	Brisbane Perth Sydney Newcastle Wollongong	Before campaign		
December 1975	Melbourne Canberra	Before legislation	Assess introduction of child restraint legislation in Victoria	Boughton, Lancashire and Johnston (1977)
December 1976	Melbourne Canberra	After legislation	Assess introduction of child restraint legislation in Victoria	
March 1978	Melbourne Canberra Adelaide Perth	Before campaign	Assess publicity campaign aimed at increasing the use of restraints by children	Boughton and Johnston (1979)
July 1978	Melbourne Perth Adelaide	After campaign	Assess publicity campaign aimed at increasing the use of restraints by children	

Information collected in all but the first two surveys includes the fitting of restraints (both adult and child) to all seating positions and the wearing of restraints by all occupants. Details of the wearing of seat belts by occupants aged at least 8 years which are available from these surveys are also considered representative of normal wearing behaviour, as both the legislation and the publicity campaign were directed at restraint of children and not seat belt wearing by adults.

Although the six surveys (in 1973, 1974, 1975, 1976 and the two in 1978) were primarily undertaken for other purposes, they do provide some useful information for describing the characteristics of seat belt wearers and non-wearers.

Method of measurement

In all six surveys the population of vehicles sampled comprised passenger cars and derivatives, including those registered for commercial use, taxis and government vehicles.

In each city, vehicles were observed at five or six sites selected on the basis of the following criteria:

- signalised intersections on urban arterial roads with central medians;
- heavy traffic flow and no turning lanes to ensure maximum observations per unit time; in the later surveys in Melbourne the restriction of no turning lanes could not be met for all intersections;
- reasonable geographic spread over the city; and
- good street lighting and other features to ensure the safety of the observers.

In general, the same intersections were used in each city where more than one survey was undertaken.

Observers were stationed on the central median and the survey vehicles were defined as the lead vehicle in the lane closest to the central median at each red-light phase. In the 1975, 1976 and 1978 surveys, if two or more vehicles were stationary in this lane during the red-light phase, the observers were permitted to select whichever of the first three vehicles contained children, thus maximising the number of child occupants observed.

Observations were made between 0600 and 2400 hours on Thursday through Sunday, except in May 1974 when observations ceased at 2300 hours in the five survey cities. The allocation of sites to interviewer shifts was made according to a truncated Latin square design in order to give a reasonable balance of times and locations.

Data collected

In the 1973 and 1974 surveys, observations were made of the fitting and wearing of lap-sash seat belts by occupants of the two front outboard seating positions only.

For each vehicle observed in the 1975, 1976 and 1978 surveys the following data were obtained:

- occupancy by seating position;
- type of restraint fitted by seating position whether occupied or not;
- for each occupied seating position with restraint available, whether or not the restraint was in use;
- sex and estimated age (0–7, 8–13, 14–29, 30–49, ≥50) of all occupants — for children estimated to be less than 14 years of age the observer asked the driver the child's exact age; and
- if lap-sash belts were in use in either of the front outboard seating positions — tightness of sash, flatness of sash and buckle position (see Appendix A for operational definitions of these adjustment variables).

Because of the quantity of additional information to be recorded in the 1975, 1976 and 1978 surveys, two observers were required at each site; one observed front seating positions while the other observed rear seating positions and/or the tailgate (luggage area) of station wagons, utilities and panel vans.

The following data were recorded in all surveys:

- time of day;
- day of week;
- location of site;
- weather (not in 1973); and
- interviewer.

Copies of the data collection forms from the most recent surveys are at Appendix B.

Survey results

Vehicle occupancy

The number of occupants by seating position in vehicles observed in the July 1978 survey are given in Table 2. Approximately six out of ten passengers (other than drivers) were occupying front seating positions. This proportion has remained relatively constant for the 1975, 1976 and 1978 surveys (Table 3).

Table 2: Occupants observed by seating position in vehicle — Melbourne, Adelaide and Perth — July 1978

Seating position	Melbourne		Adelaide		Perth	
	No.	%	No.	%	No.	%
<i>Front: driver</i>	2 913		2 496		2 432	
centre	55	2.3	75	3.6	89	4.7
left	1 320	54.3	1 142	54.3	1 073	56.2
other	21	0.9	51	2.4	48	2.5
<i>All front</i>	1 396	57.5	1 268	60.3	1 210	63.4
<i>Rear: right</i>	283	11.6	277	13.2	242	12.7
centre	228	9.4	165	7.8	144	7.5
left	458	18.9	355	16.9	264	13.8
tailgate	22	0.9	16	0.8	38	2.0
other	42	1.7	22	1.0	12	0.6
<i>All rear</i>	1 033	42.5	835	39.7	700	36.6
<i>All passengers (excludes drivers)</i>	2 429	100.0	2 103	100.0	1 910	100.0

Table 3: Proportion of passengers (other than drivers) occupying front seats — 1975, 1976 and 1978 surveys

City	Year ^(a)	%
Melbourne	D 1975	55
Canberra	D 1975	55
Melbourne	D 1976	56
Canberra	D 1976	58
Melbourne	M 1976	58
Canberra	M 1978	61
Adelaide	M 1978	61
Perth	M 1978	59
Melbourne	J 1978	57
Adelaide	J 1978	60
Perth	J 1978	63

(a) M = March, J = July, D = December.

Seat belt fitting

The percentage of vehicles which had restraints (seat belts and child restraints) fitted for each seating position is given in Table 4 for the July 1978 survey. Of drivers, 99 per cent in Melbourne and 93 per cent in Adelaide and Perth had a seat belt available.

Table 4: Percentage of each type of restraint fitted in each seating position (regardless of whether seat occupied) — Melbourne, Adelaide and Perth — July 1978

Seating position	City ^(a)	Seat belt type				Child		All restraints	None	Bassinet ^(c)	Total	
		Lap	Sash	Lap-sash ^(b)	Harness	Harness	Seat				%	No.
Driver	M	1.2	0.3	97.0	0.6	—	—	99.1	0.9	—	100.0	2 913
	A	0.4	1.4	90.6	0.3	—	—	92.7	7.3	—	100.0	2 496
	P	0.8	0.2	91.5	(d)	—	—	92.5	7.5	—	100.0	2 432
Front centre	M	50.9	—	—	—	—	0.2	51.1	48.9	—	100.0	1 103
	A	32.3	—	—	—	—	0.3	32.6	67.4	—	100.0	1 037
	P	56.2	—	—	—	—	0.5	56.7	43.3	—	100.0	793
Front left	M	1.3	0.3	96.6	0.4	(d)	0.1	98.8	1.2	(d)	100.0	2 913
	A	0.5	1.3	89.5	0.2	—	0.1	91.6	8.3	0.1	100.0	2 496
	P	0.7	0.2	90.9	(d)	(d)	—	91.9	8.1	—	100.0	2 432
Rear right	M	2.6	0.1	66.6	(d)	0.9	1.3	71.6	28.2	0.2	100.0	2 628
	A	1.7	2.8	58.7	—	0.4	1.5	65.1	34.6	0.3	100.0	2 344
	P	0.1	0.4	67.2	—	0.5	1.3	69.7	30.2	0.1	100.0	2 092
Rear centre	M	49.3	—	—	—	1.1	2.3	52.7	47.1	0.2	100.0	2 463
	A	45.2	—	—	—	0.4	1.3	46.9	53.0	0.1	100.0	2 237
	P	51.9	—	—	—	0.6	1.5	54.0	45.9	0.1	100.0	1 883
Rear left	M	2.6	0.1	65.6	(d)	1.1	2.6	72.0	27.8	0.2	100.0	2 628
	A	1.8	2.7	57.7	—	0.5	2.7	65.4	34.5	0.1	100.0	2 344
	P	0.1	0.5	66.9	—	0.6	1.7	69.8	30.1	0.1	100.0	2 092

(a) M = Melbourne, A = Adelaide, P = Perth.

(b) In Australia, the sash portion of the webbing is not detachable from the lap belt.

(c) Restrained and unrestrained.

(d) Less than 0.1 per cent.

While compulsory fitting of seat belts in new vehicles in compliance with ADRs applies throughout Australia, Victoria also requires retro-fitting for front outboard seating positions in older vehicles via two forms of legislation. On this basis more vehicles in Melbourne would be expected to have restraints fitted for the front outboard seating positions. Results of an evaluation of Victoria's retro-fitting legislation reported by Boughton and Cameron (1979) support this hypothesis. For rear seating positions fewer vehicles in Adelaide (65 per cent) compared with Melbourne (72 per cent) and Perth (70 per cent) had restraints available. This suggests that Adelaide may have an older population of vehicles.

The only fitting information available from the 1973 and 1974 surveys is the percentage of occupants (at least 8 years of age) in driver and front left passenger seating positions with lap-sash belts available. These percentages are given in Table 5, including the comparative percentages for the later surveys. Fitting rates of lap-sash belts in occupied front outboard seating positions of passenger cars and derivatives have risen between May 1973 and July 1978 from 82 per cent to 97 per cent in Melbourne and from about 80 per cent to 91 per cent in Adelaide and Perth.

The availability of restraints in front seating positions combined with their high occupancy (Tables 2 and 3) results in the majority of occupants at least 8 years of age having a restraint available in the seating position that they occupy.

Table 5: Percentage of occupants at least 8 years of age of front outboard seating positions with lap-sash belts available — all surveys

<i>City</i>	<i>Date</i>	<i>% with lap-sash belt</i>	<i>No. of vehicles observed</i>
Melbourne	May 1973	82	5 160
Adelaide	May 1973	80	6 977
Hobart	May 1973	74	5 150
Sydney	May 1974	92	4 053
Brisbane	May 1974	82	4 105
Perth	May 1974	79	5 878
Newcastle	May 1974	88	4 389
Wollongong	May 1974	88	3 748
Melbourne	December 1975	94	2 970
Canberra	December 1975	93	2 170
Melbourne	December 1976	95	2 551
Canberra	December 1976	96	2 832
Melbourne	March 1978	96	2 985
Canberra	March 1978	97	2 595
Adelaide	March 1978	91	2 775
Perth	March 1978	91	2 544
Melbourne	July 1978	97	2 913
Adelaide	July 1978	91	2 496
Perth	July 1978	91	2 432

Seat belt wearing

Introduction

In the 1973 and 1974 surveys only wearing rates of lap-sash belts by drivers and front left passengers at least 8 years of age were observed, whereas in the later surveys all occupants were included. Since compulsory wearing legislation only applies to occupants aged at least 8 years in all jurisdictions except the Australian Capital Territory (where it applies to occupants aged at least 14 years) and Western Australia

(where the minimum age was in effect reduced to 5 years in 1977), the results reported here are confined to occupants at least 8 years of age. Information on occupants aged less than 8 years has been reported by Boughton and Milne (1978).

Use by seating position and type of seat belt

Wearing rates for all seating positions and all types of seat belt are available from the 1975, 1976 and 1978 surveys. Details are given in Table 6 for the July 1978 survey. Compared with other types of seat belt, lap-sash belts are worn significantly more often in all cities ($p < 0.001$).

Table 6: Percentage wearing available seat belts for occupants at least 8 years of age by seating position and type of belt — Melbourne, Adelaide and Perth — July 1978

Seating position	City ^(a)	Lap	Sash	Lap-sash	Harness	All seat belts
Driver	M	56	56 ^(b)	85	82	85
	A	27	82	82	63 ^(b)	82
	P	60	100 ^(b)	87	100 ^(b)	87
Front centre	M	52	—	—	—	52
	A	35	—	—	—	35
	P	45	—	—	—	45
Front left	M	56	50 ^(b)	77	100 ^(b)	77
	A	25 ^(b)	45	76	100 ^(b)	75
	P	67 ^(b)	—	80	—	80
Rear right	M	40 ^(b)	—	28	—	29
	A	100 ^(b)	17 ^(b)	42	—	41
	P	100 ^(b)	—	40	—	41
Rear centre	M	9	—	—	—	9
	A	15	—	—	—	15
	P	18	—	—	—	18
Rear left	M	33 ^(b)	—	28	—	28
	A	100 ^(b)	100 ^(b)	37	—	38
	P	100 ^(b)	—	34	—	35
All positions	M	33	50	78	86	77
	A	26	65	77	67 ^(b)	76
	P	41	67 ^(b)	82	100 ^(b)	81

(a) M = Melbourne, A = Adelaide, P = Perth.

(b) Less than ten occupants.

Of the number of belts observed in front outboard seating positions less than 3 per cent (see Table 4) were not lap-sash belts, and their inclusion in the figures for 1975, 1976 and 1978 results in only a slight (at most 1 per cent) decrease in the wearing rates. This is illustrated in Table 7. In all following tables for occupants of front outboard seating position, data from the 1975, 1976 and 1978 surveys refer only to lap-sash belts so as to maintain comparability with the earlier surveys.

Table 8 gives a comparison of wearing rates for front outboard seat occupants for all survey cities. The wearing rates for drivers are significantly higher than those for front left passengers in each city and year ($p < 0.001$ all cases). For those cities in which a number of surveys have been undertaken (Adelaide, Canberra, Melbourne and Perth), only in Adelaide has there been a significant increase in the wearing rates of both drivers and front left passengers between the first and last surveys conducted in each city ($p < 0.001$). It has been suggested that increased enforcement in Adelaide

has been a major factor in increasing wearing rates (Milne 1979). In other cities the wearing rates exhibit at most a 5 per cent change (Perth, front left passengers) but in general fluctuate only 1 or 2 per cent.

Table 7: Wearing rates for front outboard occupants at least 8 years of age — all surveys^(a)

<i>Survey year and city</i>	<i>Per cent wearing available seat belt</i>	
	<i>Lap-sash</i>	<i>All seat belts</i>
1973 — May		
Melbourne	80 (4 918)	—
Adelaide	62 (5 574)	—
Hobart	67 (4 246)	—
1974 — May		
Sydney	82 (3 712)	—
Brisbane	82 (3 349)	—
Perth	83 (4 639)	—
Newcastle	82 (3 875)	—
Wollongong	79 (3 311)	—
1975 — December		
Melbourne	83 (4 128)	82 (4 276)
Canberra	80 (2 997)	80 (3 031)
1976 — December		
Melbourne	83 (3 575)	83 (3 705)
Canberra	81 (4 050)	81 (4 119)
1978 — March		
Melbourne	83 (4 163)	82 (4 280)
Canberra	81 (3 533)	81 (3 563)
Adelaide	82 (3 624)	82 (3 656)
Perth	85 (3 356)	84 (3 418)
1978 — July		
Melbourne	83 (4 080)	82 (4 167)
Adelaide	80 (3 267)	80 (3 337)
Perth	85 (3 179)	85 (3 211)

(a) Figures in brackets are numbers of occupants for which usage is known; e.g. 80 per cent of 4 918 occupants with seat belt available were observed wearing seat belt.

Use by occupant age, sex and seating position

Wearing rates for drivers and front left passengers by age and sex are given in Table 9. Overall there is a small but statistically significant difference ($p < 0.05$) in the wearing rate for front outboard seat occupants by sex: 79 per cent of male and 80 per cent of female occupants of front outboard seating positions were observed using the available lap-sash belt. However, females have significantly higher wearing rates than males for both drivers and front left passengers separately ($p < 0.001$ both cases). The lower wearing rate for front left passengers noted in the preceding section is seen to occur for both males and females and in all age groups, with male front left passengers at least 30 years of age having the lowest wearing rate.

Males aged less than 30 years, whether drivers or front left passengers, have significantly higher wearing rates than those of males aged 30 years or more ($p < 0.001$ for drivers, $p < 0.05$ for front left passengers). For females, no significant differences were detected although the tendency is the same, that is for those aged 30 years or more

Table 8: Wearing rates of available lap-sash belts for front outboard occupants at least 8 years of age by seating position — all surveys

Survey year and city	Drivers				Front left passengers			
	Worn	Not worn	Total	% worn	Worn	Not worn	Total	% worn
1973 — May								
Melbourne	2 766	567	3 333	83	1 168	341	1 509	77
Adelaide	2 425	1 327	3 752	65	1 010	741	1 751	58
Hobart	2 065	927	2 992	69	750	465	1 215	62
1974 — May								
Sydney	2 223	405	2 628	85	837	248	1 085	77
Brisbane	1 896	355	2 251	84	855	244	1 099	78
Perth	2 819	463	3 282	86	1 020	338	1 358	75
Newcastle	2 128	392	2 520	84	1 067	289	1 356	79
Wollongong	1 872	431	2 303	81	748	261	1 009	74
1975 — December								
Melbourne	2 364	426	2 790	85	1 054	281	1 335	79
Canberra	1 670	353	2 023	83	725	249	974	74
1976 — December								
Melbourne	2 069	355	2 424	85	908	243	1 151	79
Canberra	2 273	433	2 706	84	998	364	1 344	74
1978 — March								
Melbourne	2 424	451	2 875	84	1 020	258	1 278	80
Canberra	2 095	420	2 515	83	778	240	1 018	76
Adelaide	2 108	414	2 522	84	852	250	1 102	77
Perth	2 020	290	2 310	87	822	224	1 046	79
1978 — July								
Melbourne	2 401	423	2 824	85	973	283	1 256	77
Adelaide	1 865	396	2 261	82	760	246	1 006	76
Perth	1 943	280	2 223	87	766	190	956	80

Table 9: Wearing rates of available lap-sash belts for front outboard occupants at least 8 years of age by occupant age, sex and seating position — all surveys combined

Age (years) and sex	Drivers			Front left passengers			Front outboard occupants		
	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn
Male									
8-29	12 741	2 668	83	2 877	1 106	72	15 618	3 774	81
30-49	14 442	3 367	81	1 424	628	69	15 866	3 995	80
≥50	4 722	1 102	81	631	283	69	5 353	1 385	79
All ages ^(a)	31 979	7 467	81	4 957	2 116	70	36 936	9 583	79
Female									
8-29	4 309	779	85	5 433	1 643	77	9 742	2 422	80
30-49	4 048	754	84	4 763	1 326	78	8 811	2 080	81
≥50	1 030	196	84	1 946	601	76	2 976	797	79
All ages ^(a)	9 404	1 733	84	12 186	3 586	77	21 590	5 319	80
All ^(b)	41 426	9 366	82	17 163	5 749	75	58 589	15 115	79

(a) Age not known included.

(b) Age not known, sex not known included

Table 10: Wearing of available lap-sash belts by front outboard occupants aged at least 8 years by day of week and city — 1973, 1974, 1975 and 1978 surveys^(a)

Day of week	Melbourne 1973			Adelaide 1973			Hobart 1973			Sydney 1974			Brisbane 1974			Perth 1974					
	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn			
Thursday	657	171	79	760	394	66	636	364	64	775	117	87	719	133	84	1 167	237	83			
Friday	1 113	241	82	784	468	63	740	368	67	746	152	83	654	143	82	943	137	87			
Saturday	1 022	264	79	832	591	58	767	382	67	687	133	84	729	155	82	844	191	82			
Sunday	1 150	251	82	1 073	641	63	679	290	70	844	163	84	647	132	83	881	216	80			
All days ^(b)	3 950	968	80	3 449	2 094	62	2 828	1 418	67	3 060	653	82	2 751	599	82	3 839	800	83			
Day of week	Newcastle 1974			Wollongong 1974			Melbourne 1975			Canberra 1975			Melbourne 1976			Canberra 1976					
	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn			
Thursday	712	122	85	726	162	82	819	145	85	674	182	79	689	134	84	793	197	80			
Friday	551	136	80	480	132	78	845	178	83	705	138	84	824	163	83	868	181	83			
Saturday	523	123	81	648	151	81	810	180	82	372	86	81	642	153	81	777	164	83			
Sunday	1 405	273	84	764	175	81	944	204	82	644	196	77	822	148	85	833	237	78			
All days ^(b)	3 195	681	82	2 620	692	79	3 418	707	83	2 395	602	80	2 977	598	83	3 271	779	81			
Day of week	Melbourne 1978 M ^(a)			Canberra 1978 M ^(a)			Adelaide 1978 M ^(a)			Perth 1978 M ^(a)			Melbourne 1978 J ^(a)			Adelaide 1978 J ^(a)			Perth 1978 J ^(a)		
	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn	Worn	Not worn	% worn
Thursday	786	142	85	744	155	83	746	150	83	608	94	87	779	166	82	635	149	81	608	76	89
Friday	844	159	84	772	175	82	684	157	81	703	104	87	884	179	83	672	153	81	673	88	88
Saturday	932	226	80	730	156	82	718	163	82	771	158	83	845	172	83	652	160	80	704	143	83
Sunday	892	182	83	627	174	78	812	194	81	760	158	83	866	189	82	666	180	79	724	163	82
All days ^(b)	3 454	709	83	2 873	660	81	2 960	664	82	2 842	514	85	3 374	706	83	2 625	642	80	2 709	470	85

(a) M = March, J = July.

(b) 'Day of week not known' included.

to wear seat belts less. Failure to reach statistical significance may have been due to the relatively small amount of data regarding females.

Use by day of week

In all surveys, observation of seat belt wearing was undertaken on the four days Thursday to Sunday. Details are presented in Table 10 for all occupants of front outboard seating positions.

Thursday had the highest wearing rate in twelve of the nineteen survey/city combinations, while thirteen of the weekday (Thursday plus Friday) wearing rates were greater than the weekend (Saturday plus Sunday) wearing rates. For all cities and surveys combined, a significantly higher wearing rate was observed for the weekdays (81 per cent) compared with the weekend (79 per cent) (Table 11, $p < 0.001$).

Table 11: Wearing of available lap-sash belts by front outboard occupants aged at least 8 years by day of week for all cities — 1973, 1974, 1975 and 1978 surveys

<i>Day of week</i>	<i>Worn</i>	<i>Not worn</i>	<i>Total</i>	<i>% worn</i>
Thursday	14 033	3 290	17 323	81
Friday	14 485	3 452	17 937	81
Saturday	14 005	3 751	17 756	79
Sunday	16 033	4 166	20 199	79
Total ^(a)	58 556	14 659	73 215	80

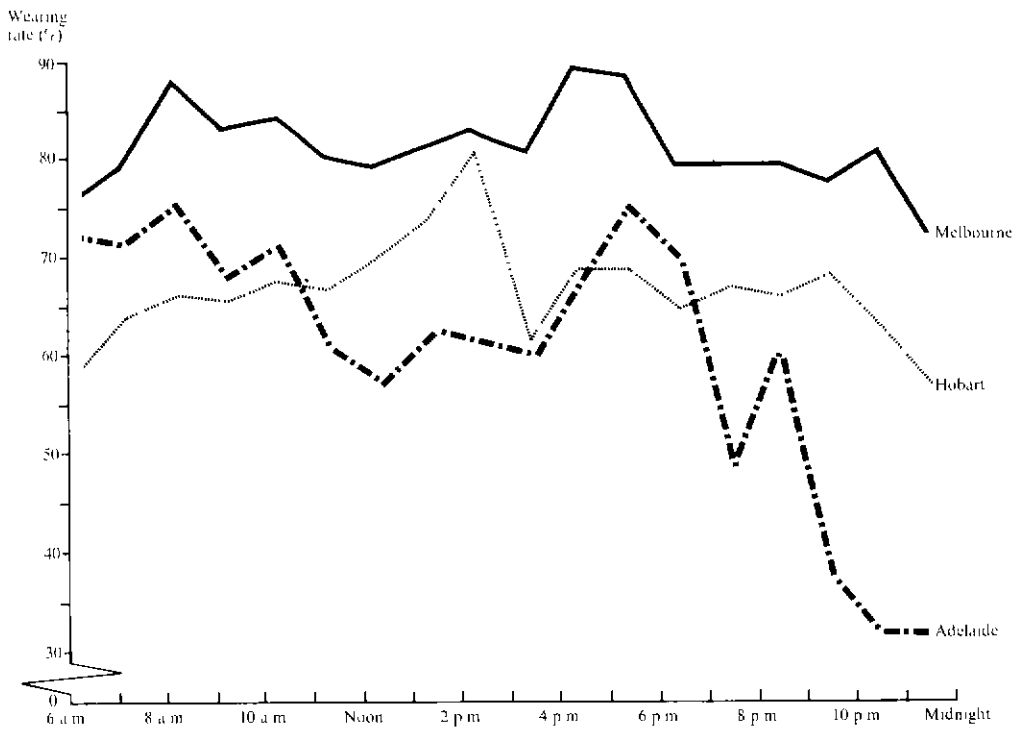
(a) Day of week not known excluded.

Use by time of day

Wearing rates of lap-sash belts by time of day in hourly intervals are depicted in Figures 1 to 4 for each survey/city combination. As all three cities observed in May 1973 show significant reductions in the wearing rate after 6 p.m. (Melbourne $p < 0.001$, Adelaide $p < 0.001$, Hobart $0.001 < p < 0.05$) the data were grouped into day (6 a.m.—6.59 p.m.) and night (7 p.m.—12 p.m.; 7 p.m.—11 p.m. in May 1974 surveys) — Table 12. In fourteen of the nineteen survey/city combinations the night wearing rate was less than the day wearing rate, although in only nine cases was the night rate significantly less ($p < 0.05$).

For all cities and surveys combined the night wearing rate (78 per cent) was significantly less than the day wearing rate (81 per cent) ($p < 0.001$).

Figure 1: Wearing rate of lap-sash seat belts, where belt fitted — May 1973



Use by weather condition

Weather condition was analysed for the 1975, 1976 and 1978 surveys. Details for occupants of front outboard seating position are given in Table 13. No correlation between weather condition and wearing of seat belts is obvious.

Figure 2: Wearing rate of lap-sash seat belts, where belt fitted — May 1974

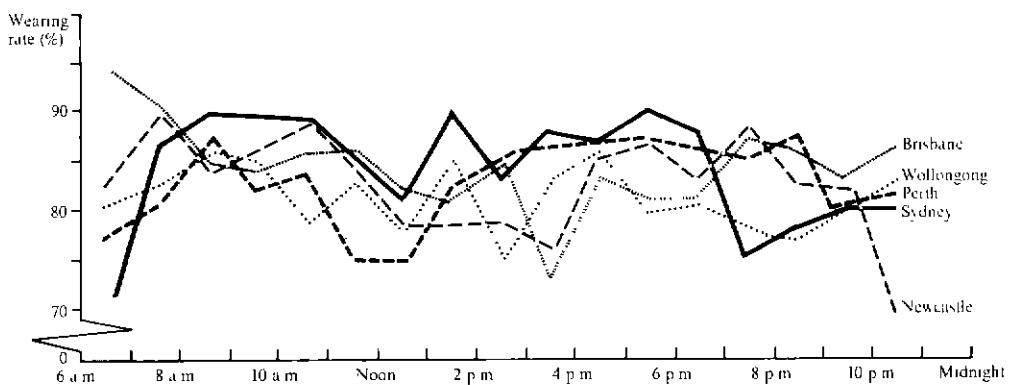
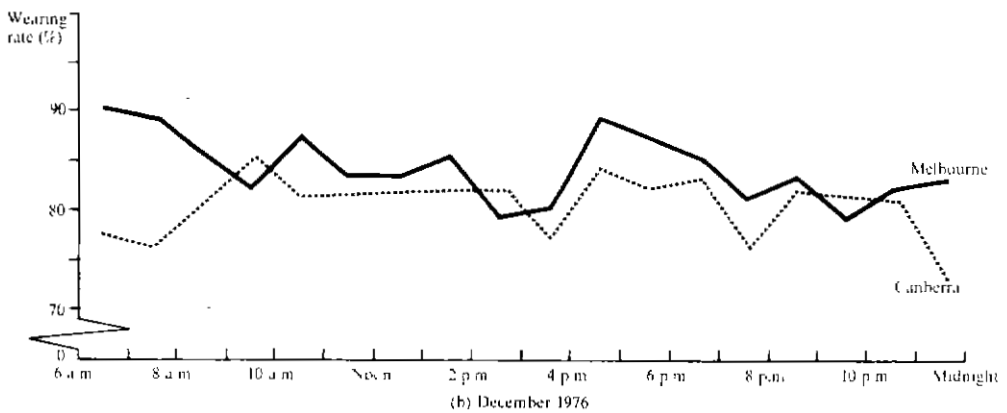
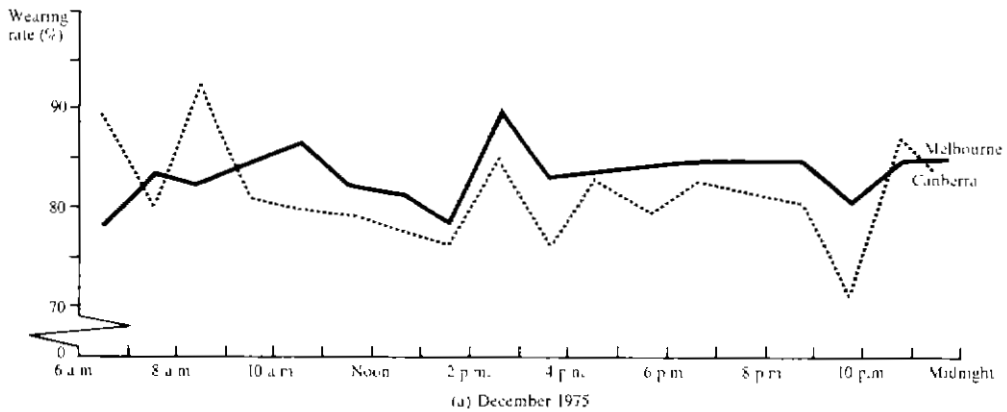


Figure 3: Wearing rate of lap-sash seat belts, where belt fitted — December 1975 and December 1976



Use by drivers alone or accompanied by front left passengers

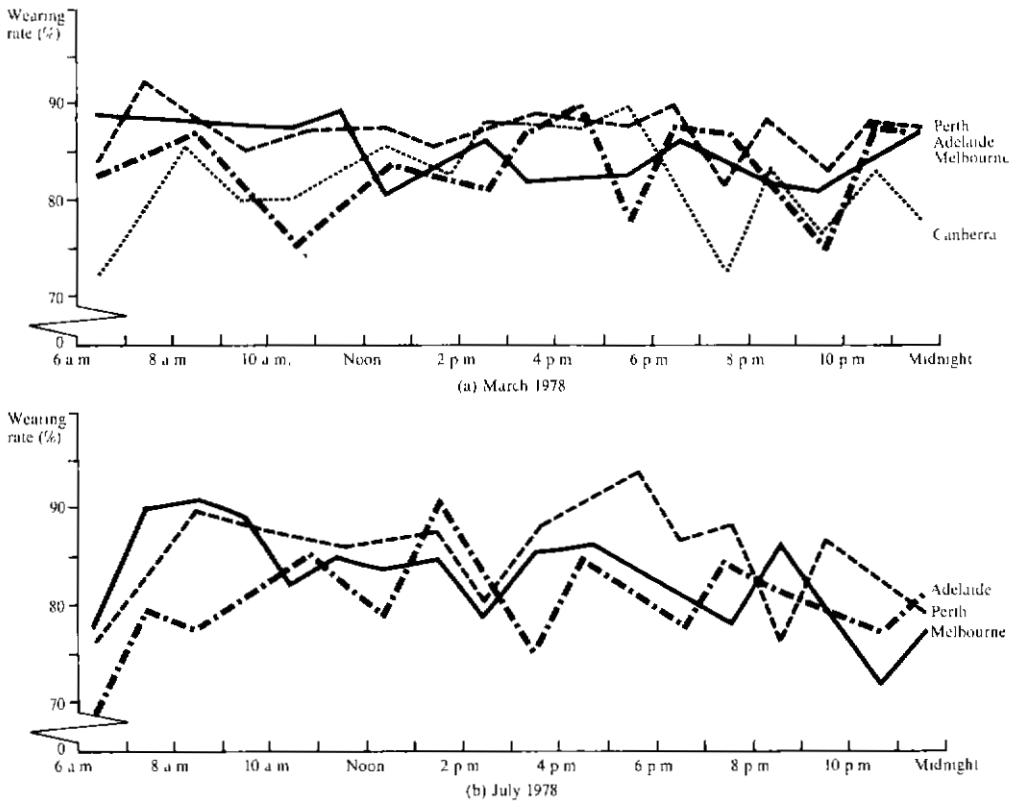
The hypothesis that wearing rates of drivers differ depending on whether or not they are travelling with a front left passenger can be tested with the data available from the surveys. Table 14 gives use of lap-sash belts by drivers with and without front left passengers aged at least 8 years in each of the survey/city combinations.

In fourteen of the nineteen combinations the proportion of drivers wearing seat belts when accompanied by a front left passenger is greater than the comparable proportion for drivers alone. However, in only four cases was the rate significantly greater ($p < 0.05$). This suggests that while the wearing rates may not have any significant statistical difference for one city alone, the overall tendency is for drivers with front left passengers aged at least 8 years to wear their lap-sash belt more often.

On pooling the data from all cities and years, as in Table 15, a chi-square test indicates that, overall, significantly more drivers do wear their lap-sash belt when accompanied by a front left passenger aged at least 8 years ($p < 0.001$).

Further breakdown by age and sex of driver, as in Table 16, shows that the significantly different wearing rates are associated with male drivers, in particular the two other age groups (30–49, ≥ 50).

Figure 4: Wearing rate of lap-sash seat belts, where belt fitted — March and July 1978



Manner of seat belt wearing

Compulsory wearing legislation as introduced throughout Australia requires not only the wearing of an available seat belt but also its correct adjustment. Unless a seat belt is worn correctly, that is belt not twisted, belt tight and buckle located beside the hip, benefits may be reduced considerably (Holt and Vazey 1977).

Since 1 January 1975, new passenger cars and derivatives have been required to be fitted with inertia reel belts having fixed buckle positions for the front outboard seating positions. Wearers of these belts do not have to adjust the belt manually for tightness and correct buckle location. However, in the July 1978 survey, the percentage of restrained occupants (aged at least 8 years) of front outboard seating positions that were using a static lap-sash belt was 56 per cent in Melbourne, 60 per cent in Adelaide and 52 per cent in Perth. Thus, at least one in two belt wearers needed to correctly adjust their seat belt themselves.

Information on manner of wearing of static belts located in front outboard seating positions has been recorded in all six surveys. Comparative results are presented in Table 17 for:

- percentage with sash loose;
- percentage with sash twisted;
- percentage with buckle on abdomen;
- percentage incorrectly adjusted (i.e. sash loose, sash twisted and buckle on abdomen);
- and

Table 12: Wearing of available lap-sash belts by front outboard occupants aged at least 8 years by time of day — all surveys

Survey city	6 a.m.—6.59 p.m.			%	7 p.m.—12 p.m. ^(a)			%
	Worn	Not worn	Total		worn	Worn	Not worn	
1973 — May								
Melbourne	2 733	545	3 278	83	1 185	350	1 535	77
Adelaide	2 746	1 355	4 101	67	675	702	1 377	49
Hobart	2 167	1 019	3 186	68	640	353	993	64
1974 — May								
Sydney	2 295	366	2 661	86	747	187	934	80
Brisbane	1 924	405	2 329	83	825	158	983	84
Perth	2 646	548	3 194	83	1 187	228	1 415	84
Newcastle	2 450	491	2 941	83	723	153	876	83
Wollongong	1 924	432	2 356	82	690	184	874	79
1975 — December								
Melbourne	2 569	538	3 107	83	849	169	1 018	83
Canberra	1 674	410	2 084	80	721	192	913	79
1976 — December								
Melbourne	2 168	415	2 583	84	809	183	992	82
Canberra	2 464	568	3 032	81	807	211	1 018	79
1978 — March								
Melbourne	2 578	499	3 077	84	876	210	1 086	81
Canberra	2 196	454	2 650	83	677	206	883	77
Adelaide	2 227	484	2 711	82	733	179	912	80
Perth	2 154	350	2 504	86	688	164	852	81
1978 — July								
Melbourne	2 575	507	3 082	84	799	199	998	80
Adelaide	1 937	488	2 425	80	688	154	842	82
Perth	2 158	347	2 505	86	551	123	674	82
All cities and years	43 585	10 221	53 806	81	14 870	4 305	19 175	78

(a) 7 p.m.—11 p.m., May 1974.

percentage correctly adjusted (i.e. sash tight, sash not twisted and buckle located off hip).

These measures are somewhat subjective and any changes over time or between cities may be due to observer differences, since different teams of observers were used in each survey. Operational definitions of sash loose, sash tight and buckle on abdomen are given in Appendix A.

The proportions of occupants with sash loose or sash twisted appear not to have changed during the six surveys; however, the proportion with buckle on abdomen is significantly less in the 1975, 1976 and 1978 surveys compared with the 1973 and 1974 surveys. (For Melbourne 1973–75, 1973–76 and 1973–78 comparisons $p < 0.001$; for Adelaide 1973–78, July, comparison $0.005 < p < 0.05$; for Perth 1974–78, March, comparison $p < 0.001$). ADR 4A which came into force in January 1974, was the first Australian Design Rule to specify a buckle location which would result in the buckle being located at or below the hip. This may account for the reduction in buckles located on the abdomen.

Apart from Wollongong in 1974, at most two out of ten front outboard seating

Table 13: Percentage wearing of available lap-sash belts by front outboard occupants aged at least 8 years and weather condition — 1975, 1976 and 1978 surveys^(a)

Survey year and city	Weather		
	Fine	Overcast ^(b)	Raining
1975 — December			
Melbourne	83 (3 238)	81 (707)	80 (177)
Canberra	77 (1 305)	82 (1 492)	81 (200)
1976 — December			
Melbourne	83 (1 789)	84 (1 715)	82 (71) ^(c)
Canberra	81 (3 791)	83 (257)	
1978 — March			
Melbourne	81 (937)	84 (3 074)	82 (158)
Canberra	82 (2 148)	80 (1 223)	76 (186) ^(c)
Adelaide	82 (3 637)		
Perth	83 (1 975)	85 (1 090)	89 (200)
1978 — July			
Melbourne	82 (2 816)	85 (1 151)	79 (113)
Adelaide	76 (1 065)	82 (2 079)	82 (183)
Perth	82 (1 119)	88 (1 106)	87 (954)

(a) Figures in brackets are the total sample size of which the percentages indicated were wearing available seat belt (all types).

(b) Defined as at least 80 per cent cloud cover.

(c) Less than five observations.

position occupants restrained by a static lap-sash belt were wearing the seat belt correctly adjusted. Thus, in July 1978 at least 40 per cent ($0.8 \times 56 = 45$ per cent in Melbourne, $0.8 \times 60 = 48$ per cent in Adelaide, $0.8 \times 52 = 42$ per cent in Perth) of restrained occupants of front outboard seating positions had incorrectly adjusted seat belts.

Fortunately, few (at most 5 per cent) have their seat belt incorrectly adjusted for all three adjustment criteria.

Johnston and Cameron (1979) have investigated the effectiveness of television publicity campaigns to improve manner of wearing. Their analyses showed that the proportion with static belts incorrectly adjusted could be reduced via such publicity. However, the results from all six surveys suggest that the effects of the publicity did not continue over an extended time period. In view of the proportion of restrained occupants with incorrectly adjusted seat belts, further publicity campaigns may still be desirable even though benefits may be short term only.

Summary

Seat belt wearing may well be the most important road safety countermeasure, but unless trends in wearing are continually monitored to determine the need for additional engineering, enforcement and/or education, the full potential benefit of seat belt wearing may never be realised.

Monitoring of seat belt wearing trends has not been done on a large scale in most Australian States and Territories; consequently little is known about the characteristics of wearers versus non-wearers and 'correct' wearers versus 'incorrect' wearers. However, the Department of Transport (DoT) has undertaken extensive roadside surveys seat belt fitting and wearing to assist in evaluating the effectiveness of educational campaigns and legislation for the protection of child car occupants.

Table 14: Wearing of available lap-sash belts by drivers alone or accompanied by front left passengers aged at least 8 years by city — all surveys

City and year	Driver alone ^(a)				Driver with passenger aged at least eight years			
	Worn	Not worn	Total	% worn	Worn	Not worn	Total	% worn
1973 — May								
Melbourne	1 498	349	1 847	81	1 280	258	1 538	83
Adelaide	1 297	720	2 017	64	1 144	641	1 785	64
Hobart	1 184	594	1 778	67	892	346	1 238	72
1974 — May								
Sydney	1 296	247	1 543	84	927	158	1 085	85
Brisbane	952	189	1 141	83	944	166	1 110	85
Perth	1 646	254	1 900	87	1 173	209	1 382	85
Newcastle	952	208	1 160	82	1 176	184	1 360	86
Wollongong	1 036	255	1 291	80	836	176	1 012	83
1975 — December								
Melbourne	1 185	236	1 421	83	1 136	187	1 323	86
Canberra	809	185	994	81	823	158	981	84
1976 — December								
Melbourne	1 073	202	1 275	84	996	153	1 149	87
Canberra	1 144	215	1 359	84	1 129	218	1 347	84
1978 — March								
Melbourne	1 331	256	1 557	84	1 093	195	1 288	85
Canberra	1 235	261	1 496	83	860	159	1 019	84
Adelaide	1 182	237	1 419	83	926	177	1 103	84
Perth	1 101	156	1 257	88	919	134	1 053	87
1978 — July								
Melbourne	1 330	239	1 569	85	1 071	184	1 255	85
Adelaide	1 015	238	1 253	81	850	158	1 008	84
Perth	1 105	162	1 267	87	838	118	956	88

(a) Driver alone means there was no front left passenger aged at least 8 years

Although limited in coverage and comparability they are the only series of seat belt wearing surveys which cover all major Australian cities and provide some information on the characteristics of wearers and non-wearers. The Road Safety and Traffic Authority, the Road Traffic Board and the Traffic Accident Research Unit in Victoria, South Australia and New South Wales respectively have also produced valuable series of data.

The DoT surveys were all undertaken in major cities on arterial roads and the only vehicles for which observations were recorded were passenger cars and derivatives. The fitting and wearing information obtained from the surveys is therefore only applicable to the use of seat belts in passenger cars and derivatives in urban areas.

In passenger cars and derivatives observed in July 1978, seat belts were fitted to more than 90 per cent of front outboard seating positions and almost all the belts fitted were of the lap-sash type. Other seating positions had lower fitting rates (approximately 50–60 per cent for centre seating positions and 70 per cent for rear outboard seating positions), but these fitting rates are steadily rising due to the Australian Design Rules for Motor Vehicle Safety. Of passengers (excluding drivers) at least 8 years of age, 88 per cent for Melbourne, 83 per cent for Adelaide and 84 per cent for Perth were occupying seating positions fitted with a seat belt.

In view of the high fitting rate in front outboard seating positions there is only limited scope for retro-fitting; however, Boughton and Cameron (1979) have shown that the introduction of retro-fitting legislation in the Australian Capital Territory would be cost effective and beneficial in terms of a reduction in casualties.

Overall approximately three out of four car occupants aged at least 8 years with a seat belt in the occupied seating position were wearing the available seat belt. Wearing rates were highest in front outboard seating positions (75–85 per cent) but much lower elsewhere, being less than 50 per cent for all rear seating positions. The low wearing rate for rear seat occupants is cause for concern especially in view of the known hazard for (restrained) front seat occupants from unrestrained rear seat occupants. (Huelke, Sherman and O'Day 1976).

Lap-sash belts have the highest wearing rate except for full harnesses. Full harnesses would be expected to have a high wearing rate since they are fitted voluntarily. Evidence from New South Wales (Fleming 1976) suggested that wearing rates may be higher for belts fitted with inertia reels. Analysis of the DoT survey results by Carter (1979) has confirmed this finding.

Since wearing of an available seat belt is compulsory, all those occupants with a seat belt in the occupied seating position ideally should be restrained i.e. a 100 per cent wearing rate. As the wearing rate is not 100 per cent in reality, identification of differences between wearers and non-wearers could be of value in developing measures to improve wearing rates.

Table 15: Wearing of available lap-sash belt by drivers alone or accompanied by front left passengers aged at least 8 years — all surveys combined

<i>Wearing of available lap-sash belt</i>	<i>Driver with passenger aged at least 8 years</i>		
	<i>Driver alone</i>	<i>Driver with passenger aged at least 8 years</i>	<i>All drivers</i>
Worn	22 371	19 013	41 384
Not worn	5 203	3 979	9 182
Total	27 574	22 992	50 566
Percentage wear	81	83	82

Table 16: Wearing of available lap-sash belt by drivers alone or accompanied by front left passenger aged at least 8 years by age and sex of driver — all surveys combined

<i>Driver age (years)</i>	<i>Male</i>			<i>% worn</i>	<i>Female</i>			<i>% worn</i>
	<i>Worn</i>	<i>Not worn</i>	<i>Total</i>		<i>Worn</i>	<i>Not worn</i>	<i>Total</i>	
<i>Driver alone</i>								
≤29	5 549	1 200	6 749	82	2 245	423	2 667	84
30–49	6 395	1 678	8 073	79	2 054	405	2 459	84
≥50	2 095	579	2 674	78	500	116	616	81
All ages ^(a)	14 536	3 542	18 078	80	4 819	956	5 775	83
<i>Driver with front left passenger aged at least 8 years</i>								
≤29	5 314	1 110	6 424	83	1 274	222	1 496	85
30–49	6 017	1 317	7 334	82	1 368	254	1 622	84
≥50	1 863	398	2 261	82	348	66	414	84
All ages ^(a)	13 237	2 921	16 158	82	2 995	543	3 538	85

(a) Age not known included.

Table 17: Manner of wearing static lap-sash belts for front outboard seating position occupants — all surveys

<i>Survey city and year</i>	<i>Loose (%)</i>	<i>Twisted (%)</i>	<i>Buckle on abdomen (%)</i>	<i>Incorrectly^(a) adjusted (%)</i>	<i>Correctly^(a1) adjusted (%)</i>
1973 — May					
Melbourne	44	25	25	6	11
Adelaide	39	25	19	5	19
Hobart	32	24	23	4	15
1974 — May					
Sydney	40	18	19	4	19
Brisbane	47	21	24	5	14
Perth	41	28	22	5	12
Newcastle	32	20	18	4	15
Wollongong	38	22	20	3	15
1975 — December					
Melbourne	24	16	12	2	17
Canberra	31	38	17	5	14
1976 — December					
Melbourne	39	18	13	3	14
Canberra	44	26	12	4	13
1978 — March					
Melbourne	43	20	11	2	17
Canberra	56	24	8	3	9
Adelaide	37	24	12	2	13
Perth	65	28	7	2	6
1978 — July					
Melbourne	39	21	9	2	20
Adelaide	44	26	16	5	13
Perth	49	21	6	2	15

(a) Correctly adjusted means sash tight, sash not twisted and buckle off body
 Incorrectly adjusted means sash loose, sash twisted and buckle on abdomen

Based on occupants of front outboard seating positions, wearing rates decreased with increasing age of occupant and males had lower wearing rates than females when either drivers or front left passengers. Males aged at least 50 years who were front left passengers had the lowest wearing rate, while female drivers aged less than 30 years had the highest. Drivers without front left passengers also had significantly lower wearing rates than those with a front left passenger.

Of the four survey days, Thursday through Sunday, weekdays had the higher wearing rate and weekend days the lower. Wearing rates were also significantly lower at night (after 7 p.m.) compared with day (6 a.m.—6.59 p.m.). Unfortunately, data on the interaction between day of week and time of day are not available.

No correlation between weather condition and wearing of seat belt is obvious.

Although significantly higher wearing rates were observed for occupants of front outboard seating positions, less than two out of ten of these occupants wearing a static lap-sash belt had it adjusted correctly.

Conclusions

The annual cost to the Australian community of road accidents has been estimated to be in the order of \$1000 million. There is little doubt that a measure which has been most effective in reducing this cost is the compulsory wearing of seat belts. Nevertheless, there are a number of reasons why all the potential benefits of seat belt wearing are not being realised.

The seat belt system needs to be continually monitored and upgraded but, even with the most comfortable and sophisticated systems available, many occupants will still not wear them. Although the data presented above indicate that significant relationships exist between usage and factors such as age, sex and seating position, the differences in many cases are small.

It may be that once high usage rates have been achieved, coarse variables such as age and sex may not help to describe non-wearers. Other factors such as socio-economic status and drinking habits may be more important in defining the characteristics of this 'hard-core'. There may well be scope for detailed interview and investigation of observed non-wearers to provide a better basis for future education and enforcement efforts.

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Operational definitions of correct seat belt wearing used in roadside surveys

● **Tightness**

- the occupant was asked to lean forward as far as he could
- ‘tight’ — where occupant had virtually no forward movement of body (during training this was related to the passage of a clenched fist between sash and chest, during observation a physical measure could not, of course, be employed)
- ‘in-between’ — where movement was slight to moderate (equivalent to the passage of a laterally extended hand between sash and chest)
- ‘loose’ — when movement was greater than either of the above

● **Buckle position**

- ‘off-body’ — where buckle was by occupant’s side and rearward of the hip joint
- ‘in-between’ — where buckle was in the forward region of the hip area
- ‘too near middle’ — where buckle was on abdomen

● **Twist**

- ‘twist’ — where sash webbing was twisted whilst in contact with body (twist in lap webbing was not considered because it was too difficult to observe reliably)
- ‘no twist’

Appendix B

Data collection forms from the 1978 surveys

SEAT BELT SURVEY		FRONT SEATS				OBSERVATION NUMBER IN PERIOD	
IDENT. No (1-5) (Office)		VEHICLE REGISTRATION (FIRST 3 LETTERS)					
Position in Car	Occupied Unoccupied Does not exist	1 2 3	CENTRE 1 2 3	L/H 1 2 3	Other Position 1 2 3	Position in Car	Occupied Unoccupied Does not exist
Type of restraint fitted	None* Could not observe Lap only Sash only Lap/Sash — Static Inertia Adult Harness Child Harness — approved not approved Child Seat — approved not approved Bassinet — restrained unrestrained	00 01 02 03 04 05 06 07 08 09 10 11 12	00 01 02 03 04 05 06 07 08 09 10 11 12	00 01 02 03 04 05 06 07 08 09 10 11 12	00 01 02 03 04 05 06 07 08 09 10 11 12	Type of restraint fitted	None Could not observe Lap only Sash only Lap/Sash — Static Inertia Adult Harness Child Harness — approved not approved Child Seat — approved not approved Bassinet — restrained unrestrained
Occupant Restraint Observed	In use Not in use	1 2	1 2	1 2	1 2	Occupant Restraint Observed	In use Not in use
IF LAP/SASH FITTED AND IN USE	Tight In-between Loose Inertia	1 2 3 4		1 2 3 4		IF LAP/SASH FITTED AND IN USE	Tight In-between Loose Inertia
Flatness of sash	Flat Twisted	1 2		1 2		Flatness of sash	Flat Twisted
Buckle position	Off hip In-between Near middle Inertia	1 2 3 4		1 2 3 4		Buckle position	Off hip In-between Near middle Inertia
Sex	Male Female	1 2	1 2	1 2	1 2	Sex	Male Female
Age Group	ASK { 0 - 7 8 - 13 ESTIMATE { 14 - 29 30 - 49 50 +	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	Age Group	ASK { 0 - 7 8 - 13 ESTIMATE { 14 - 29 30 - 49 50 +
IF AGE "0 - 7"	Age - actual		mths yrs	mths yrs	mths yrs	IF AGE "0 - 7"	Age - actual
Attitude of child "0 - 7"	Seated Standing Nursed Lying on seat In bassinet Other		1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	Attitude of child "0 - 7"	Seated Standing Nursed Lying on seat In bassinet Other
Child "0-7"	Restraint — Tight Not tight Restraint behind back Could not observe Other		1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	Child "0-7"	Tight — Restraint Not tight — Restraint Restraint behind back Could not observe Other
	TIME (2 digit code)	DAY	SITE	WEATHER	INTERVIEWER (2 digit code)		

SEAT BELT SURVEY

REAR SEATS

IDENT.No (1-5) (Office)		VEHICLE REGISTRATION (FIRST 3 LETTERS)					OBSERVATION NUMBER IN PERIOD	
		R/H	CENTRE	L/H	TAILGATE	Other Position		
Position in car	Occupied	1	1	1	1	1	Occupied	Position in car
	Unoccupied	2	2	2	2	2	Unoccupied	
	Does not exist	3	3	3	3	3	Does not exist	
Type of restraint fitted	None	00	00	00	00	00	None	Type of restraint fitted
	Could not observe	01	01	01	01	01	Could not observe	
	Lap only	02	02	02			Lap only	
	Sash only	03		03			Sash only	
Lap/Sash	Static	04		04			Static	Lap/Sash
	Inertia	05		05			Inertia	
	Adult Harness	06	06	06			Adult Harness	
Child Harness	approved	07	07	07	07	07	approved	Child Harness
	not approved	08	08	08	08	08	not approved	
Child Seat	approved	09	09	09	09	09	approved	Child Seat
	not approved	10	10	10	10	10	not approved	
Bassinet	restrained	11	11	11	11	11	restrained	Bassinet
	unrestrained	12	12	12	12	12	unrestrained	
Occupant restraint observed	In use	1	1	1	1	1	In use	Occupant restraint observed
	Not in use	2	2	2	2	2	Not in use	
Sex	Male	1	1	1	1	1	Male	Sex
	Female	2	2	2	2	2	Female	
Age Group	ASK	1	1	1	1	1	ASK	Age Group
		2	2	2	2	2		
		3	3	3	3	3		
	ESTIMATE	4	4	4	4	4	ESTIMATE	
		5	5	5	5	5		
IF AGE "0 - 7"		mths	mths	mths	mths	mths		IF AGE "0 - 7"
	Age - actual							Age - actual
		yrs	yrs	yrs	yrs	yrs		
Attitude of child "0 - 7"	Seated	1	1	1	1	1	Seated	Attitude of child "0 - 7"
	Standing	2	2	2	2	2	Standing	
	Nursed	3	3	3	3	3	Nursed	
	Lying on seat	4	4	4	4	4	Lying on seat	
	In bassinet	5	5	5	5	5	In bassinet	
	Other	6	6	6	6	6	Other	
Child "0 - 7"	Restraint across chest	1	1	1	1	1	Restraint across chest	Child "0 - 7"
	Tight	2	2	2	2	2	Tight	
	Not tight	3	3	3	3	3	Not tight	
	Restraint behind back	4	4	4	4	4	Restraint behind back	
	Could not observe	5	5	5	5	5	Could not observe	
	Other	6	6	6	6	6	Other	

INTERVIEWER (2 DIGIT CODE)