Table 1 Differences between patients with and without pain in phantom limb in time from amputation and scores on hospital anxiety and depression scale. Values are means (95% confidence intervals)

	Phantom pain (n=29)	Non-phantom pain (n=64)	Correlation	
			Mann-Whitney U test	Kendall's tau*
Time from amputation (years)	6.79 (2.62 to 10.96)	11.06 (7.14 to 14.98)	873, P=0.65	
Anxiety score	4.66 (2.74 to 6.66)	3.59 (3.38 to 3.80)	912, P=0.90	0.16, P=0.03
Depression score	3.45 (1.82 to 5.08)	2.78 (2.09 to 3.47)	892, P=0.76	-0.04, P=0.53

* For time from amputation.

Phantom pain (mostly mild) was reported by 29 patients. Fifty three of the remaining 64 patients reported non-painful sensations in the phantom limb. Mean scores on the anxiety and depression scale were 3.9 for anxiety and 2.9 for depression. Whereas 10 patients scored in the clinical range for anxiety, mainly about falling, only one patient scored in this range for depression. No patient gave a history of previous or concurrent psychiatric treatment.

The patients were divided according to whether they experienced pain, and their anxiety and depression scores and time from amputation were compared with non-parametric statistics. The table shows that the time from amputation, and anxiety and depression scores did not differ between the two groups. Time from amputation was not strongly significantly associated with distress, so anxiety and depression do not seem to vary consistently over time.

Comment

The incidence of phantom pain in this study was 31%, in keeping with current reports.² Only a few patients

experienced emotional distress, anxiety being reported more often than depression. The prevalence of depression was low, suggesting that it is an uncommon reaction to amputation. In this elderly group of patients who had discomfort due to vascular illness, loss of the limb did not constitute a bereavement in the way that Parkes suggested.¹

These results, in agreement with those of Katz and Melzack,² show little support for the grief hypothesis, since it is difficult to sustain a concept of grief in the absence of depression on objective measures. In addition, we found no relation between the experience of pain and emotional distress, suggesting that phantom pain is not a function of emotional adjustment.

Dr M J Campbell and Dr Robert West commented on the statistics.

Contributors: RSH undertook the initial assessment of the patients and administered the McGill pain questionnaire. KF administered the hospital anxiety and depression scale, analysed the data, and wrote the paper. KF is the guarantor for the study.

Funding: None.

Conflict of interest: None.

- 1 Parkes CM. Factors determining the persistence of phantom pain in the amputee. *J Psychosom Res* 1973;17:97-108.
- 2 Katz J, Melzack R. Pain "memories" in phantom limbs: review and clinical observations. *Pain* 1990;43:319-36.
- 3 Sherman R, Camfield M, Arena J. The effect of presence or absence of pain on low back pain patients' answers to questions on the MMPT's HY, HS and D scales. *J Milit Psychol* 1995;7:28-38.
- 4 Melzack R. The short form McGill Pain questionnaire. *Pain* 1987;30:191-7.
- 5 Zigmond A, Snaith R. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;67:361-70.

(Accepted 3 October 1997)

Influence of travel patterns on mortality from injury among teenagers in England and Wales, 1985-95: trend analysis

Carolyn DiGuseppi, Leah Li, Ian Roberts

Child Health Monitoring Unit,
Department of Epidemiology,
Institute of Child Health, University
College London Medical School,
London WC1N 1EH
Carolyn DiGuseppi,
senior research fellow
Leah Li,
medical statistician
Ian Roberts,
director

Correspondence to:
Dr DiGuseppi

BMJ 1998;316:904-5

Injuries are the leading cause of death among teenagers.¹ The Health of the Nation strategy aims to reduce mortality from accidents in young people by 25% by 2005.² We previously analysed how changing travel patterns influenced death rates from unintentional injury among children under 14 years of age.³ Here we examine how they affect mortality from unintentional injury among teenagers.

Subjects, methods, and results

From the Office for National Statistics we obtained anonymised death certificates recording deaths from injury between 1985 and 1995 among people aged 15-19 years in England and Wales. Records included age, sex, external cause of injury (E code), and year of death. We defined deaths of road users by E codes (table) and calculated mortality using census data and the average distance travelled as denominators. Data

on the average annual distances travelled were obtained from the national travel surveys, whose methods have been published.⁴ We analysed unpublished data from the 1985-6, 1989-91, and 1992-4 surveys for residents of England or Wales aged 15-19 (Department of Transport, 1996). We estimated the average distance travelled by car, motorcycle, bicycle, and foot each year, from travel survey midpoints using linear regression.⁵ We estimated trends using Poisson distribution.⁵

Between 1985 and 1995, 10 530 teenagers aged 15-19 died from injury in England and Wales; 7954 deaths were from unintentional injury, of which 6073 (76%) involved road users (table). Mortality from unintentional injury declined by 32% (95% confidence interval -37% to -27%) over this period. There were large declines in death rates for motorcyclists (-78%; -81% to -74%), pedestrians (-49%; -59% to

Death rates and numbers of deaths from road use among teenagers aged 15-19 in England and Wales by sex, with cumulative changes in death rates, 1985-95

Year	Motorcyclist*		Pedestrian†		Pedal cyclist‡		Car occupant§	
	Male	Female	Male	Female	Male	Female	Male	Female
Death rate per 100 000 population (No of deaths)								
1985	12.1 (246)	1.4 (27)	3.2 (65)	1.8 (35)	1.7 (35)	0.4 (7)	10.1 (206)	3.7 (71)
1986	11.8 (236)	1.1 (21)	4.1 (83)	2.0 (39)	1.2 (25)	0.3 (6)	12.2 (244)	5.4 (103)
1987	11.0 (216)	0.9 (17)	3.3 (64)	1.8 (33)	1.7 (33)	0.3 (6)	13.1 (256)	4.3 (81)
1988	8.9 (169)	0.9 (16)	2.9 (56)	1.3 (24)	1.4 (26)	0.0 (0)	12.0 (229)	4.6 (84)
1989	8.5 (155)	1.0 (17)	3.6 (65)	1.9 (33)	1.8 (33)	0.2 (3)	15.7 (287)	6.3 (109)
1990	8.5 (150)	0.9 (15)	1.9 (34)	1.5 (25)	1.7 (30)	0.2 (4)	16.2 (285)	5.8 (97)
1991	6.3 (105)	0.7 (11)	2.7 (45)	1.7 (27)	1.4 (23)	0.3 (5)	13.0 (217)	4.7 (74)
1992	4.4 (71)	0.7 (10)	2.0 (32)	1.3 (19)	1.6 (25)	0.1 (1)	13.3 (213)	4.6 (70)
1993	3.0 (47)	0.2 (3)	2.2 (34)	1.3 (19)	0.6 (10)	0.3 (4)	10.4 (160)	3.9 (57)
1994	3.1 (48)	0.3 (4)	1.7 (26)	1.5 (22)	1.0 (16)	0.1 (2)	11.2 (172)	4.6 (66)
1995	2.5 (39)	0.0 (0)	2.1 (32)	0.6 (9)	1.1 (17)	0.1 (2)	11.4 (174)	4.2 (61)
1985-95	7.6 (1482)	0.8 (141)	2.8 (536)	1.6 (285)	1.4 (273)	0.2 (40)	12.6 (2443)	4.8 (873)
Percentage change in death rate (95% CI)								
1985-95	-78 (-81 to -73)	-81 (-90 to -67)	-51 (-63 to -35)	-44 (-62 to -17)	-35 (-56 to -5)	-53 (-83 to 32)	-1 (-13 to 12)	-4 (-23 to 19)
Percentage change in No of deaths/km (95% CI)								
1985-95	-31 (-42 to -17)	N/A	-39 (-54 to -20)	-22 (-47 to 14)	-16 (-43 to 23)	10 (-62 to 209)	-30 (-38 to -20)	-25 (-40 to -7)

*E810-819 ending in .2 or .3. †E810-819 ending in .7. ‡E810-819 ending in .6, and E826. §E810-819 except ending in .2, .3, .6, or .7.

N/A=annual distance travelled insufficient to calculate reliable trend estimates for deaths per km travelled.

-36%), and pedal cyclists (-38%; -57% to -11%), but not car occupants (-2%; -12% to 9%).

Young men accounted for 6279 (79%) deaths from unintentional injury, and young women for 21% (1675). The sex ratio varied by road user (table). Declines in mortality of motorcyclists, pedestrians, and car occupants were similar for men and women. The decline in death rates of cyclists was larger among women, although the point estimates are not very precise.

The average annual distance travelled by motorcycle declined by 78%, from 246 km to 54 km, the average annual distance walked fell by 24%, from 624 km to 472 km, and the average annual distance cycled fell by 31%, from 216 km to 149 km. The average annual distance travelled by car increased by 35%, from 4510 km to 6069 km. Declines in motorcycling (-99%), walking (-28%), and cycling (-60%) were larger and the increase in car travel smaller (28%), in young women than they were in young men (-73%, -20%, -24%, and 40%, respectively).

In 1995 mortality was lowest for people travelling by car (1.3 deaths/100 million km travelled). Overall, 2.9 pedestrians, 4.3 cyclists, and 23.9 motorcyclists died per 100 million km travelled. Cumulative declines in deaths per 100 000 population (see above) were larger than declines in deaths per km travelled for motorcyclists (-20%; -33% to -5%), pedestrians (-33%; -46% to -16%), and cyclists (-10%; -37% to 29%). Deaths per km travelled by car declined substantially (-27%; -35% to -19%), unlike deaths of car occupants per 100 000 population. Deaths per km declined more for young men than for young women in each road user group (table).

Comment

The 32% decline in mortality from unintentional injury among people aged 15-19 since 1985 is largely due to falling mortality among motorcyclists, pedestrians, and cyclists. These declines correspond to large decreases in motorcycling, walking and cycling.

Mortality among car occupants has not declined, despite a 27% decrease in deaths per km travelled by car, because of the large increases in the distance travelled by car. Transport patterns are an important determinant of adolescent health. Strategies to influence transport patterns could substantially reduce mortality from road crashes.

We gratefully acknowledge the Office for National Statistics and the Department of Transport for providing data for this study. Contributors: CD participated in study formulation, design and analysis, interpreted the results, and wrote the paper. LL performed the statistical analysis, and edited the paper. IR obtained the data, participated in study formulation and design, and interpretation of results, and edited the paper. Guarantors: CD and IR.

Funding: The Camden and Islington Health Authority funds Dr DiGiuseppi. The Child Health Monitoring Unit is supported by the Sir Sigmund Warburg Voluntary Settlement.

Conflict of interest: None.

- 1 Woodroffe C, Glickman M, Barker M, Power C. *Children, teenagers and health: the key data*. Buckingham: Open University Press, 1993.
- 2 Department of Health. *The health of the nation: strategy for health in England*. London: HMSO, 1992.
- 3 DiGiuseppi C, Roberts I, Li L. Influence of changing travel patterns on child death rates from injury: trend analysis. *BMJ* 1997;314:710-3.
- 4 Department of Transport. *Transport statistics report: National Travel Survey 1992/94*. London: HMSO, 1995.
- 5 Frome EL. The analysis of rates using Poisson regression models. *Biometrics* 1983;39:665-74.

(Accepted 3 October 1997)

Endpiece

What's a network?

Network: Any thing reticulated or decussated, at equal distances, with interstices between the intersections.

Samuel Johnson, *Dictionary of the English Language* (1755)