The Contribution of Tourists and Visitors to Road Traffic Accidents: A Preliminary Analysis of Trends and Issues for Central Scotland

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This paper reviews the literature on road traffic accidents and their role in the mobility of tourists within discernible regions of activity. The paper builds upon knowledge developed in the tourism, transportation and safety science areas of research to illustrate the significance of these issues in relation to tourist well-being, and argues that multidisciplinary perspectives informed by different cognate areas of research combined with interactive research with public sector agencies such as the police, can make major contributions to the formulation of policy and actions to improve tourist and visitor safety. Using a police derived data source permits analysis and discussion of the key issues facing leisure-related (in which tourism is subsumed) and non-leisure-related traffic in one region of Scotland. Through a regional analysis of the available data sources it is possible to identify areas of action for agencies.

Keywords: road traffic accidents, transport, leisure, EuroRAP

Introduction

A substantial literature on road traffic issues now exists in the wider transportation and safety science literature, and tourism researchers have only belatedly begun to recognise both the importance and contribution that visitors make to road-related injuries. Within the existing literature in Table 1, which has been revised and updated by the authors for this paper, it is apparent that the tourism dimension of road safety issues is far from a mainstream issue for those researchers with health and safety expertise. Yet the relationship between tourism and transport is fundamental, since one facilitates the other (Lumsdon & Page, 2004). Furthermore, transport enables the visitor to engage in activities such as sightseeing and visiting attractions/other destinations which adds the dynamic dimension to tourism as an ever-changing activity.

Many of the studies cited in Table 1 are characterised by a case study, or at best a single country-based approach, but data remains one of the most problematic areas in terms of its availability, reliability and comparability. Thus, this paper contributes to our existing understanding of how tourism can be a contributor to and cause of Road Traffic Accidents (RTAs) by following a similar methodology to that used by Page *et al.* (2001) of selecting a definable geographical area and investigating the available data from official sources, which in this case has resulted from collaborative research with the Central Scotland Police Force to examine the dimensions, scale and nature of tourist-related RTAs. The paper argues that the use of official statistics needs to be supplemented through primary data gathered

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Table 1 The tourist motor vehicle accident literature: Key research findings

Year	*Author(s)*	*Sample*	*Findings*
1993	Hargarten and Bouc	796 cases of American tourists transported back to the US by emergency medical air transport services over a 3 year period	Injury accounted for 44% (n = 351) of the total cases, with motor vehicle crashes (n = 157) being the most common cause of injury. Almost half of all flights (41%) from Mexico were for multiple vehicle collisions (n = 82). Motor vehicle crashes were also the leading cause of transports from the Caribbean and South and Central America.
1985	Hargarten and Baker	185 Peace Corps volunteers who died during the period 1968 to 1983	Motor vehicle crashes (n = 67) were the single most common cause of death of Peace Corps Volunteers (PCVs). They accounted for more than one third of all deaths and more than half of all unintentional injury deaths. Motor vehicle death rates were slightly higher for men than for women, accounting for 67% of the motor vehicle deaths. Half of the motor vehicle fatalities occurred in the African region. Motorcycles accounted for 12% of all PCV fatalities and 33% of all motor vehicle deaths.
1990	Purkiss	926 patients attending a hospital emergency department in Bermuda with an injury following a motorcycle or moped accident	Tourists were involved in 48.3% of the accidents. The average monthly incidence for the tourist population over the 6 month study period was 1.57 accidents per thousand people. There were 16 moderate or severe injuries to tourists, requiring in-patient hospital care. The average age for tourist admissions was 37 years, and their mean hospital stay was 7.3 days.
1991	Guptill, Hargarten and Baker	396 deaths of American travellers to Mexico in 1975 and 1984	The leading cause of death to all US travellers to Mexico was injuries (51%), with 18% of deaths resulting from motor vehicle crashes.
1991	Hargarten, Baker and Guptill	2463 deaths of American travellers in 1975 and 1984	There were 601 deaths due to injuries in the study period. Motor vehicle crashes were the most common cause of injury deaths (26.8%), followed by drowning (16.1%).
1991	Paixao, Dewar, Cossar, Covell and Reid	952 deaths abroad of people leaving from Scotland between 1973 and 1988	Leading cause of death was cardiovascular disease (69%) followed by trauma (21%) and infection (4%); with traumatic deaths such as road traffic accidents being a major concern in young, particularly male, tourists.
1991	Sniezek and Smith	17,988 deaths among non-US residents in the United States between 1979 and 1984	Injuries (n = 4078) accounted for 23% of all deaths. The most frequent causes of injury deaths were motor vehicle traffic crashes (37%), drowning (15%), and homicides (11%). From the 1525 injuries related to motor vehicles, a risk indicator of 11.7 per one million tourist arrivals was calculated

Table 1 (*cont.*) The tourist motor vehicle accident literature: Key research findings

Year	*Author(s)*	*Sample*	*Findings*
1994	Salib and Brimacombe	255 patients presenting to the Ayers Rock Medical Centre over 18 months (defined as life threatening or requiring more than 1.5 hours of emergency medical treatment)	There were 33 incidents associated with car accidents, of which two-thirds involved tourists (no distinction was made between domestic and international tourists).
1995	Prociv	421 recorded deaths of Australian travellers overseas	A total of 31 travellers (7% of the sample) died in motor vehicle or road accidents. Most of the fatalities (n = 26) involved short-term travellers, defined as those going overseas for less than 12 months. A further nine non-specified deaths were possibly related to road crashes. Of the 40 traffic and non-specified accident victims, 25 were men and 15 women; 34 (85%), including 12 women, were below the age of 50.
1996	Carey and Aitken	538 cases of road trauma involving motorbikes in Bermuda between July and September 1993	The tourist rate of motorbike-related injury was 94.1/1,000 person-years at risk, whereas that of the local population was 16.6/1,000. The injury rate among residents was highest for young males, whereas among tourists it was highest among older persons. Tourists also had an increased risk of fracture. The study concluded that tourists visiting Bermuda are at high risk of injury from motorbike use, with rates of injury much higher than the local population.
1996	Page and Meyer	Data on road-based accidents collated by the Land Transport Safety Authority in New Zealand	Some 52 foreign drivers were involved in fatalities on New Zealand roads for the period 1988–93, with nearly 20% due to drivers not keeping to the left, a major problem for some overseas visitors. There were 1386 non-fatal accidents involving foreign drivers for the period 1988–91. The foreign driver was considered by the New Zealand Police to have been a causative factor in 232 non-fatal injury crashes in the period 1988–91, with not keeping to the left a significant factor. Foreign drivers were also identified as a major problem in terms of rental car crashes.

Table 1 (*cont.*) The tourist motor vehicle accident literature: Key research findings

Year	*Author(s)*	*Sample*	*Findings*
1997	Petridou *et al.*	730 road traffic injury victims who contacted any of the three hospital of the Heraklion District on the island of Crete during the 6-month study period	On the basis of Greek hospital discharge statistics in Heraklion District, one foreign visitor was discharged owing to injuries of any type for every 18 Greeks. The corresponding ratio for road traffic accidents is close to 1:3, underlying the importance of road traffic accidents as the major health hazard during pleasure travelling. Left-sided driving country nationals were at an increased risk for a traffic accident when they drove a rented rather than an owned vehicle ($p = 0.02$), possibly on account of maladaption during the adjustment period in the country of visit. Moreover, road traffic victims from left-side driving countries compared with foreigners from right-side driving countries were involved 2.5 times more frequently in accidents in which overpassing or other driving manoeuvres require reflexes conditioned on reverse directionality ($p = 0.02$). Alcohol abuse was reported as a primary cause of accident in a significantly higher proportion of foreign nationals, reflecting the fact that the latter group was on vacation. The study concluded that road traffic accidents are a major hazard during pleasure travelling and victims of such accidents among travellers have a distinct epidemiological profile compared with accidents of a similar nature among locals.
1998	Wilks and Watson	Road crash data involving international drivers in Queensland 1992–97; cost of road crashes involving international visitors	Between 1992 and 1997, 39 fatal crashes occurred; 397 cases needed hospitalisation; 503 cases needed medical treatment; 261 minor injuries occurred and 1282 property damage cases resulted. A total of 2482 cases occurred. The total cost of international driver crashes in 1997 in Queensland was AU$18,912,000, with a AU$4,272,000 cost for fatal crashes; AU$9,620,000 for hospitalisation; AU$1,980,000 for medical treatment; AU$1,020,000 for minor injury and AU$2,020,000 for property damage by accidents.
1999	Coley	Analysis of overseas drivers fatal, serious and minor injury crashes in New Zealand 1993–98	Use of Land Transport Safety Authority data, extending the earlier work of Page and Meyer (1996) in New Zealand.
1999	Davis	Analysis of legal risks using published secondary data in Australia	The increase of tourists does not necessarily lead to an increase in road accidents and claims for compensation.

Table 1 (*cont.*) The tourist motor vehicle accident literature: Key research findings

Year	*Author(s)*	*Sample*	*Findings*
1999	Department of Transport and Works, Northern Territory	Analysis of road crash data 1993–98	Between 1993 and 1998, 445 international visitors were reported as being injured on Northern Territory roads, representing 5.7% of all casualties. There were 33 international visitor deaths, representing 9.5% of all fatalities.
1999	Department of Urban Services Australian Capital Territory (Canberra)	Analysis of road crash data 1993–97	Only 0.02% of international visitors were involved in a serious crash.
1999	Ellis	Overview of international visitor involvement in fatal crashes in Australia 1990–94	Predicted the annual rate of 45 international tourist deaths on Australian roads could rise to 70 in 2000 due to the Sydney Olympic Games
1999	Matcham	Analysis of 1997–98 insurance claims for Lumley Insurance Ltd, Australia	Of the 10,500 rental vehicles insured, 20 claims a week with an average claim of AU$5,000. The main cause of accidents involved tourists 'Right of Way', 'Loss of Control' and 'Rear Ending a Vehicle' as well as 'Hitting a Stationary Vehicle'. Where the driver was at fault, 'Lost Control' and 'Hit an Animal' comprised 50% of claims. Fatigue was assessed as a contributory factor, with accidents occurring around noon and between 17.00 and 18.00. Those renters under 25 years of age had a disproportionately higher number of claims than other age groups, which continued to rise until age 28. The claims peak in the 40–45 age group, but this reflected the greater proportion of renters in this age group. Most costly crashes occurred in the country or the outback. The three mostly types of cause of rental vehicle crash are: collision with kangaroos, especially at dusk, right of way collisions and loss of control collisions, where jetlag may be a major cause.
1999	New South Wales Roads and Traffic Authority	Analysis of road traffic crashes involving international residents 1993–97; overseas visitor pedestrian accidents in 1988–97 in New South Wales	Total crashes declined 32% 1992–97 and related casualties dropped by 25%. Overseas visitors had a greater proportional involvement in more serious crashes. Overseas visitors tended to be older in fatalities, of whom 78% were male; overseas drivers tended to be driving four-wheel drives; crashes involving overseas visitors tended to occur in country areas. Some 200 overseas pedestrian casualties occurred 1998–97. These are rare and more likely to be a female.

Table 1 (*cont.*) The tourist motor vehicle accident literature: Key research findings

Year	*Author(s)*	*Sample*	*Findings*
1999	Office of Road Safety, Western Australia Department of Transport	Road accident data 1995–98	Some 1% of drivers involved in a police reported crash resulting in a fatality, serious or minor injury had an international licence.
1999	Petridou *et al.*	19,320 hospital injuries; 1739 tourist cases for the Greek Island of Kerkyra for 1996–97	15% of all accidents were traffic-related among permanent residents and Greek tourists. But traffic-related accidents represent 40% of tourist accidents, and were disproportionally frequent. The risk of traffic accidents was much higher for men than women, with younger tourists at the greatest risk. However, due to the absence of data to calculate person-time at risk, it may not necessarily be that tourists are at a higher risk, since they may drive greater distances. In addition, younger tourists may drive more frequently at night-time. What was beyond question was the concentration of road traffic-related injuries in the peak tourist season.
1999	Queensland Transport	Road accident data 1993–98 involving international tourists	Visitor fatalities grew 34% in 1993–97, slightly less than the 39% growth in international visitors. Analysis of car crash characteristics showed that 83% of crashes involved cars; 66% occurred at intersections and 47% occurred in built-up areas. The geographical distribution of crashes highlighted country and outback areas as the most likely location of crashes.
1999	Transport South Australia	Analysis of road accidents and trauma involving international visitors 1994–98	1994–98, 202 crashes involved overseas drivers. Most fatal and serious crashes occurred in country districts. The most common type of crash in metropolitan areas were: 'rear end crashes'. In rural areas, 'roll-over crashes' were most common. The majority of accidents occurred in the summer months.
1999	Victoria Roads	Analysis of road crash casualties involving an international licence 1994–98	Of 17,000 casualty crashes reported each year, in 1998 only 130 reported to Victorian Police involved international licences.
1999	Wilks	Review of the international literature and findings of Australian studies	Analysis of tourist road safety issues in Australia and advice for drivers; future research directions identified.

Table 1 (*cont.*) The tourist motor vehicle accident literature: Key research findings

Year	*Author(s)*	*Sample*	*Findings*
1999	Wilks *et al.*	Review of Australian situation and Queensland data 1992–97	Implications of the Sydney 2000 Olympic Games for tourist road safety, since 43% of all international visitors to Australia drive a private car or company car; 15% rent a car; 2% drive motor homes or a campervan and 3% use a four-wheeled vehicle. Review of traffic laws and road conditions of international visitors to Australia, including which side of the road visitors are used to driving on; miles of road in the home country; road signage in miles/kms; blood alcohol limit in home country; maximum speed limits in urban and rural areas; seat belt laws. Developing a national tourist road safety research programme was also examined, including the need for road crash data; hospital records; insurance claims and collaboration with other agencies.
2001	Modler	An examination of 18 road accidents involving tourists to Solitaire, Namibia	15 of the 18 drivers were from Europe and most drivers were in rented vehicles, usually 4×4. Lack of seat belt wearing, lack of experience on gravel roads and driving 4×4s, and speeding were identified as the main risk factors.
2001	Page, Bentley, Meyer and Chalmers	5863 cases of injuries to overseas visitors were examined from the records of the New Zealand Health Information Service 1982–96	The authors estimate that even on conservative measures at 1999 prices, overseas visitor accidents cost the New Zealand government NZ$21,333,200. Raising issues of cost alongside the importance of visitor well-being and welfare.
2001	Master and Prideaux	Examines the issues related to the safety of international visitors in tourism destinations	Using Queensland, Australia as a case study, the paper's main focus is motor vehicle and water activity accidents in order to develop strategies for consideration of the authorities involved in destination management.
2001	Sharples and Fletcher	An investigation of the relative involvement of tourists in road accidents against local drivers in rural Scotland	Using STATS19 data for 1999 and 2000, postcode data was used to identify status of drivers to determine whether they were local, UK based tourists or overseas drivers. Their findings would indicate that overseas and UK visitor drivers were no more likely to be involved in accidents than local drivers but that cause of accident was likely to be different.
2002	McInnes, Williamson and Morrison		A review of literature on accidents and injury to tourists and travellers.

Table 1 (*cont.*) The tourist motor vehicle accident literature: Key research findings

Year	*Author(s)*	*Sample*	*Findings*
2002	Wilks and Coory	An examination of all overseas visitor hospital admissions in Queensland, Australia from 1995 to 2000	The main reasons for admission were motor vehicle accidents (21.8%) and water-related injuries (17.7%). Unfamiliar environments or unfamiliar activities appeared to be relevant to injuries sustained in most cases.
2002	Wilks, Pendergast and Wood	An examination of the deaths of 1513 overseas visitor deaths in Australia	Among the accidental deaths, road traffic accidents and water-related incidents were the main causes.
2003	Thompson, Ashley, Dockery-Brown, Binns, Jolly and Jolly	Records of health problems of tourists to the North Coast of Jamaica were reviewed from June 1998 to June 2002	Accidents were the most common problems health crises with those under 40 more frequently reporting accidents or injuries. Research seeks to reduce health problems and improve emergency health services for tourists.

Source: Revised from Wilks (1999); Page *et al.* (2001)

by key agencies such as the Police to augment and supplement existing analyses of RTAs while relating the findings to available tourism data. Although inconsistencies inevitably arise through incomplete data, problems of data linkage and geographical coverage of data, it is evident that such research advances our understanding through a multidisciplinary approach to a multi-faceted problem – namely why and how tourists have RTAs in one part of the UK – Central Scotland. This in-depth approach looks beyond existing statistics to probe and question what factors contribute to the tourist-related RTAs, in view of the existing tourism literature (e.g. Page *et al.*, 2001; Wilks & Watson, 1998). The paper commences with a brief review of the RTA literature to explain why this issue is worthy of research followed by a short discussion of the context of the study and the methodology and data sources used. Attention then turns to a hitherto unused data source made available to the researchers – 'STATS19' forms supplied by Central Scotland Road Accident Investigation Unit (CSRAIU). These are used to explore the differences in the nature of accidents in the Central Scotland Police Force Area for visitors and non-visitors. The results and findings are then critically examined in view of the existing literature and the context of the study area.

The Road Traffic Accidents and Visitors: The Literature

Within the cognate area of travel medicine, there is a plethora of studies on disease and disease prevention for the traveller (e.g. Lopez-Velez, 2003; Moore *et al.*, 2003; Steffen *et al.*, 2002). Yet the paradox is that disease accounts for less than 5% of deaths abroad. Separate studies on US citizen travellers (Hargarten *et al.*, 1991) and Scottish travellers (Paixao *et al.*, 1991) dying abroad demonstrated in

Table 2 Cause of death abroad for US Citizens and Scottish Citizens

US citizens		*Scottish citizens*	
Cause of death	*Percentage*	*Cause of death*	*Percentage*
Cardiovascular Disease	49.0	Cardiovascular	68.7
Injury (unintentional)	22.0	Trauma	20.7
Infectious Disease	1.0	Infection	3.6
Cancer	5.9	Other Disease	6.4
Suicide/Homicide	2.9	Not stated	0.6
Medical	13.7		
Other/Unknown	5.5		

Source: Extracted from Hargarten *et al.* (1991) and Paixao *et al.* (1991)

both cases that the two major causes of death abroad were cardiovascular disease and trauma/injury (see Table 2).

Although there must be some care in translating the results of these studies to an international context, they do highlight the importance of trauma and injury as a contributor to morbidity, even though both studies only deal with deaths actually occurring abroad. Disease undoubtedly causes a large number of deaths and prolonged illness for travellers both while abroad and on return to their home country, and may lead to spread of the infection in the generating country. Disease among travellers therefore should not be trivialised. However, there is clearly a large percentage of deaths through injury in both studies. According to Paixao *et al*. (1991), those dying through trauma are more likely to be younger (32% in the 20–29 group and 80% under 50) and male with road traffic accidents accounting for a large number of these deaths. In fact:

> It is probably not surprising that most injuries and accidents occur in the younger age groups who are often involved in more active pursuits. However, traumatic deaths such as road accidents do seem to be a major hazard for younger tourists (especially male) and more attention should be drawn to this. (Paixao *et al*., 1991: 115)

Hargarten *et al*. (1991) produced similar results and attributes 26.8% of injury deaths to motor vehicle accidents. Hargarten *et al*. (1991) also compare death rates from injury per 100,000 males of travellers against the US mortality rates; this demonstrates a considerably higher risk of death by injury amongst travellers in all age groups, with the exception of the over 75 group. In some cases the mortality rates for travellers are three times greater than the US rates. The majority of deaths would appear to be caused by cardiovascular disease; however this is mainly in the over 50 groups; in younger age groups, traumatic deaths such as road traffic accidents are the main hazards particularly for males. Death from cardiovascular disease is likely to be a pre-existing condition and, although it may be exacerbated by local conditions at the destination, it is probable that such deaths would have occurred wherever the person was. Traumatic deaths through accidents may have more scope for prevention, reducing costs both financial and personal. The 'every-

day' nature of road traffic accidents combined with our reliance on, and relationship with, road transport, particularly cars, tends to encourage us to trivialise the associated risks (Mitchell, 1997) despite road traffic accidents being a major cause of death and injury for tourists and non-tourists alike.

Road Traffic Accidents in the UK: The Context

Britain has a good record of road safety, with death rates from road traffic accidents (RTAs) among the lowest in Europe (EuroRAP, 2002). Indeed in Scotland, mortality rates from car accidents more than halved from 1980 to 2002 both in actual numbers and in standardised rates; emergency admittance rates to hospitals as a result of RTAs demonstrate a similar pattern (ISD Scotland, 2003). Despite these decreases, road traffic accidents are still the main cause of accidental deaths in the under 45s in Scotland (ISD Scotland, 2002). Recent research by EuroRAP (European Road Assessment Programme), however, is interesting because it not only looks at road safety and injuries in an European context but also provides detail at a road level and therefore, is worthy of discussion.

EuroRAP and road safety

According to Lynam *et al*. (2003), EuroRAP established a pilot programme in 2001 to examine three themes at a European level:

- a comparison of death rates on road networks in different European countries;
- mapping and analysis of fatal and serious injury accident rates in Great Britain, the Netherlands, Sweden and Catalonia;
- inspection of the safety quality of the road networks and extent to which the infrastructure protects road users from death and serious injury when accidents occur.

(The technical report which outlines these approaches can be accessed at http://www.eurorap.org). One of the outcomes of the detailed analysis are risk rate maps as shown in Figure 1 illustrating the statistical risk of death and serious injury occurring on Britain's motorways and major roads. What the research by EuroRAP suggests is that '9% of deaths outside built up areas are on motorways, 19% on dual carriageways, 38% on single carriageways of national or regional importance and 34% on other single carriageways. The fatal and serious accident rate of the A road network is about four times that of the national motorway network' (Lynam *et al*., 2003: 170).

Figure 1, derived from the most recent EuroRAP research, illustrates that Scotland has a much less dense road network at the motorway and A road (trunk road) level than England and Wales. This is partly a function of population density, the rural nature of the environment outside of Central Scotland and the geographically dispersed nature of settlement in the Highlands and Islands of Scotland and Borders area (south of Glasgow and Edinburgh). In terms of the risk rating of the roads by EuroRAP, it takes a stretch of road and calculates the incidence of fatal and serious injury accidents according to previous recorded incidents. Although Figure 1 indicates that the Central Scotland area has only two routeways with medium risk (e.g. the M9, A9(M) and A9, A811 and A84)

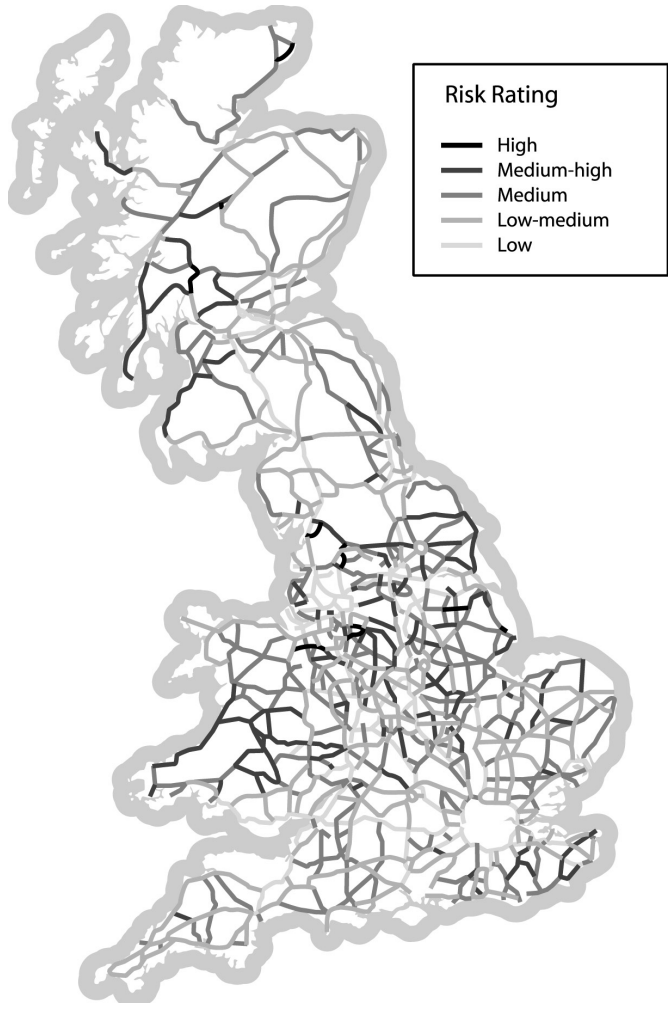

Figure 1 EuroRAP risk rate map of roads in Great Britain, 1999–2001

Risk rate maps

Part of the programme is to map road networks according to the fatal and serious accident rate per billion vehicle kilometres (bvkm). This highlights the risk to a driver of death or injury as:

High > or = 180 fatal & serious accidents / bvkm
Medium-High 106–<180 fatal & serious accidents / bvkm
Medium 61.6–<106 fatal & serious accidents / bvkm
Low-Medium 15–<61.6 fatal & serious accidents / bvkm
Low 0–<15 fatal & serious accidents / bvkm

these are major transit routes through the region to the Highlands of Scotland. Within Figure 1 accident blackspots are not identified, although these are more localised in terms of their accident rating, such as the Dunblane roundabout at the end of the M9 which has among the most accidents for a roundabout in Central Scotland. What the EuroRAP data is also useful for, is the identification

of stretches of road with poor safety performance which leads to high levels of death and serious injury, complementing much of the work of local authorities and road safety groups.

Tourist-related RTA research: Implications for the Scottish study

Wilks (1999) completed a comprehensive literature review dealing with international tourists and road safety in the lead-up to the 2000 Sydney Olympics. This was later revised and updated by Page *et al*. (2001) prior to presenting an analysis of data specific to New Zealand. The New Zealand study is of particular interest due to areas of commonality between Scotland and New Zealand; left-hand drive, similar terrain, roads, highly variable weather conditions and climatic variations. The significant increase in caravan/campervan traffic on dualled roads in the summer season also offers many similarities, as does the road configurations which are sometimes winding with a significant camber, so that the visitor to New Zealand will experience similar hazards to visitors to Scotland. The use of speed cameras and rural accident blackspot notices also provides some similarities.

The studies by Wilks (1999) and Page *et al*. (2001) deal specifically with overseas/foreign tourists; they do not consider the domestic tourist. Although the domestic tourist or visitor to an area may not have the same challenges as an overseas visitor, they may have some similar issues. Overseas visitors may face difficulties such as unfamiliarity with the road regulations of the host country and possible language barriers, but the domestic and overseas visitor will both face hazards such as driving on unfamiliar roads and distractions such as the novelty of breathtaking scenery.

It could be assumed that overseas visitors are more likely to be involved in road accidents and indeed headlines such as 'Tourist Road Hazard' (*Scotsman*, 2001) or 'Tourist caused crash' (*Evening Times*, 2001) would tend to reinforce this view. However, a recent study into road accidents involving tourists in rural Scotland would not support this view; Sharples and Fletcher (2001) analysed postcode data from 'STATS19' forms for 1999 and 2000 in rural areas of Scotland. The STATS19 forms are completed by police in the event of any road traffic accident resulting in injury. Prior to 1999 it would not have been possible to differentiate non-UK residents from UK residents with unknown postcodes due to lack of coding. Using post-1999 data, they found that accidents increased in times of higher visitor numbers but that the accident rate per vehicle mile was similar and that:

> There is no evidence that the foreign and UK visitor drivers are markedly more likely than local drivers to be involved in an accident. (Sharples & Fletcher, 2001: i)

Yet, the cause of accidents was found to vary between the UK drivers and foreign drivers, as may be expected:

> For the average driver who was at fault, loss of control, negotiating a bend, or going too fast for the conditions of the road were the main causes. However, for foreign drivers who were at fault, the most frequent causes

> were driving on the wrong side of the road, turning and crossing the centre line. (Sharples & Fletcher, 2001: ii)

Although caution must be taken in utilising this data, as its collection is dependent very much on the accurate completion of forms in what may be difficult or traumatic situations, it does allow an insight into differences in the nature and type of accidents involving different groups. Until recently it was likely that most overseas tourists driving in Scotland would have had a great deal of driving practice before reaching the Central Scotland Police Force Area due to the main ports of arrival being outside the area. But, the opening of ferry crossings at Newcastle and, more recently, at Rosyth in Central Scotland has meant that more overseas visitors can bring their car over straight onto Scottish roads. A recent study commissioned by VisitScotland indicated that 44% of inbound travellers on the Rosyth ferry were visiting Scotland for the first time (George Street Research, 2003), which has implications for road safety agencies in Scotland. The rise in use of regional airports with cheap flights arriving in Glasgow, Edinburgh, Prestwick and Aberdeen is also likely to bring more overseas visitors directly onto Scottish roads in hire cars. This trend will undoubtedly continue due to the popularity of the low-cost airlines and the additional £6.5m development money provided to encourage airlines to fly to and from Scotland (BBC News, 2003).

Although Britain, and Scotland in particular, has a low fatality rate and is a relatively safe country to drive in, this may not be the case for overseas tourists. Scotland, along with the rest of the UK, is likely to be perceived as a 'dangerous' place to drive due to the difference in driving conditions, particularly driving on the other side of the road, compared to the majority of other countries in the world. Cross-cultural differences are also likely to cause problems in the area of risk perception (Sivak *et al*., 1989a) and in risk taking behaviour (Sivak *et al*., 1989b) as well as particular differences in driving culture; for example, American drivers are accustomed to an opposite approach taken at intersections (Summala, 1998). Foreign drivers are considered a greater risk than domestic drivers in most countries and there has been empirical research that would support this (e.g. Leviäkangas, 1998). But, Britain has some advantages over other areas of Europe in that it is not a transit route. This may keep accident rates down, as there are fewer problems in terms of large volumes of people driving through the country with very different driving cultures and standards of vehicle maintenance. There are also likely to be fewer people driving extremely long distances and fewer people travelling through with little knowledge of the local road regulations and standards.

There are suggestions in the tourism literature that many people, when they travel on holiday, metamorphosis into a different creature commonly known as the tourist or, as one article aptly put it, 'touron' – half tourist, half moron (Danyliw & Loftus, 1997). With this metamorphose comes changes in attitude and behaviour patterns that leave them more susceptible to certain hazards; this has been explored in terms of crime and extreme sports but may be equally applicable to visitors while they are using the roads whether as a driver, a passenger or pedestrian. Tourists and visitors are likely to be more at risk from road accidents not purely due to unfamiliarity or their own behaviour, but the very fact that

people tend to drive longer distances on holidays and day trips (DLTR, 2001). This will increase their exposure to accidents. However, overall risk will be determined for an individual traveller by the number of accidents per unit of traffic (EuroRAP, 2002). Using this measure, serious and fatal accident rates are four times higher on A roads than on motorways in Britain (EuroRAP, 2002) and, as Scotland has fewer motorways but a higher proportion of road per capita (DfT, 2001), the risk for locals and visitors alike should, theoretically, be heightened. To date there has not been sufficient research to appreciate the reason why Scottish A roads appear to have lower fatal and serious accident rates than the national A roads. This however should be seen in the context that the majority of road deaths occur outside built-up areas on single carriageway roads, as:

> In Britain, 9% of deaths on major roads outside built-up areas are on the motorways, 19% are on dual carriageways, 38% are on single carriageways of national and regional importance and 34% are on other single carriageways. (EuroRAP, 2002: 12)

Methodology/Data Source

The data used has been taken from 'STATS19' data supplied by the Central Scotland Road Accident Investigation Unit (CSRAIU). In the four-year period 1999–2002 there were 2841 road traffic accidents in the Central Scotland Police Force Area involving 4842 vehicles and 7384 casualties. The data does not allow tourists to be specifically identified; however, one of the fields captured in the data is postcode information. This information can then be used to distinguish 'locals', i.e. those living within the Central Scotland Police Force Area, and 'visitors' i.e. those living outside of the Central Scotland Police Force Area. The number 1 in the postcode field should identify unknown postcodes, and non-UK residents should be identified with the number 2. Twenty-one percent of the records had to be dismissed from the analysis due to being identified as 1 or due to incomplete information, leaving records for 3831 drivers/vehicles and 5826 casualties identifiable as 'visitor' or 'local'.

Limitations

This data will not show the entire extent of road incidents in the area as they may not be recorded for various reasons, such as the minor nature of the incident or due to those involved not wishing to notify the authorities. The data set also suffers from incomplete records on postcode fields. Unfortunately, this may result in a disproportionate number of 'visitor' records being excluded as it is likely that local postcodes will, at least in part, be known by the police, whereas non-local areas, including overseas visitors, will be unknown and, therefore, be less likely to be recorded. There was concern expressed in the Sharples and Fletcher (1999) report that, although there had been some evident improvement, the STATS19 forms, on which their report and this paper are based, are not completed accurately much of the time. In a fifth of the records used in this paper the postcode fields were entered as 'unknown' or left blank and, although there is no way of knowing for certain what their contents should have contained, it is likely that a large number of these will be from outside the local area. One further complication which contributes to under-recording is the fact that there are likely

to be a number of overseas visitors entered using their temporary UK postcode (Sharples & Fletcher, 1999) adding to underestimation of the number of non-UK drivers.

Estimates of tourists and day visitors for the region – Central Scotland – are taken from STEAM figures, a supply based assessment of visitor numbers to the area, commissioned by the Regional Tourist Board and public sector to measure visitor activity. The data is consistent with the Police district in the main since the one Area Tourist Board region has several sub-regional STEAM reports which provides estimates of tourism activity at a local level. However, STEAM figures do not include people travelling through the area and commuters, but those identified as 'visitors' for the purpose of this study will include these groups.

Human error will also be a limiting factor, as the road accident data has been through a lengthy process: the individual officers recording the crime, then input into the computer by separate staff, before being reprocessed through a separate system to put into a usable format for the CSRAIU and then reprocessed to be put into a usable format for analysis. Each stage adds the opportunity for errors.

The Central Scotland Region

The Central Scotland Police Force Area is based in east central Scotland in the area known as the Forth Valley, covering the three local council areas of Stirlingshire, Clackmannanshire and Falkirk District (with a few marginal boundary differences). The population base in this area is approximately 279,480 consisting of: Clackmannanshire 48,077; Stirlingshire 86,212; Falkirk District 145,191.

In terms of tourism, there is a large variance between the three areas with Stirlingshire having the most recognisable 'tourism brand', the following figures are tourist days based on the 2001 STEAM data and include overnight and day trip figures (Table 3).

In Table 3 it is rather simplistic to use the mean average and perhaps a modal average would be more advantageous; but in terms of gaining an insight into the nature of accidents involving 'visitors' in contrast to those involving 'locals', it gives an indication that the average population of visitors vis-a-vis locals is roughly 1 visitor for every 14 locals, e.g. visitors make up approximately 7% of the overall population of people in the area at any one time. However, as discussed earlier in the Limitations section, those identified as visitors will be over-represented due to the inclusion of commuters not normally classified as tourists or day visitors.

Table 3 Tourism in the Central Scotland Police Force Area

Local authority area	*Overnight visitors*	*Day visitors*	*Total visitors*	*Average per day*
Clackmannanshire	347,560	35,060	382,620	1,048
Stirlingshire	2,652,890	2,985,540	5,638,430	15,448
Falkirk district	1,095,510	253,990	1,349,500	3,697
Total	4,095,960	3,274,590	7,370,550	20,193

Source: STEAM, 2001

The Stirling Visitor Survey, commissioned by Stirling Council, suggests that 85% of visitors use road transportation as their main mode of transport. The most popular mode of transport is the private car (48%) with a further 15% using a hire car (Tourism Resources Company, 2001). This is comparable to the findings by VisitScotland (2003) that 63% of all UK tourist trips (67% of all UK holiday trips) to Scotland use a car as the main means of transport. Unfortunately, as the information only covers transport to Scotland, the mode of overseas tourist transport is not clear as 81% arrive by air and 19% by sea or tunnel. Presumably many of those arriving by 'sea or tunnel' bring their own vehicle, while there may be a large percentage of those arriving by air hiring a car during their visit.

As the majority of usable data in the study pertained to United Kingdom residents, background data from the DTLR (2001) is presented here to develop a clearer understanding of possible differences in behaviour between visitor and locals. There are several fundamental differences between general 'everyday' travel patterns and holiday/day trip patterns. Holiday trips tend to be longer than average trips; 44.2 miles against an average for all purposes of 6.6 miles. Unsurprisingly, as distance increased so did the likelihood that a trip was for holiday purposes, with visiting friends being the most likely reason for trips over 50 miles.

Car journeys for holiday or day trip purposes have the highest level of occupancy compared to other purposes with an average of 2.3 passengers; compared, for example, with commuting trips with an average of 1.2 or shopping trip average of 1.6 (DTLR, 2001). This is likely to have implications for casualty numbers in the event of an accident; theoretically at least, there is likely to be a higher number of casualties per accident for visitor driven cars due to these higher car occupancy levels.

UK data suggests that men are more likely to travel longer distances by car (DTLR, 2001) and are more likely to hold a driving licence, particularly in the older age groups (DfT, 2003). This will make their exposure rates to accidents higher than those of women. Although there is no clear evidence to suggest that men drive more on holiday than women, as tourists visiting Scotland tend to be in the older age groups (VisitScotland, 2002) then there is likely to be a correspondingly higher proportion of male drivers.

Findings

Using the driver postcode and the accident grid reference, 'accident to home' distance can be calculated. This would indicate that the mean average distance from home is 21.75 km but the modal distance for accidents was 2 km from home, i.e. the majority of drivers were very local to the accident area. Although this study is centred on the Central Scotland Police Force Area, the calculations for 40 km away from home were made to allow comparison to the 'definition' of a local in the Sharples and Fletcher (1999) report; the argument put forward for this distance was based on the National Travel Survey data (see Sharples & Fletcher, 1999: 25). This allowed a triangulation 'check' on the data. In our sample 89% of accidents occurred within a 40 km distance from home; this was comparable to the Sharples and Fletcher report which had 87% 'local only' drivers and 8% 'mix local and non local' (Sharples & Fletcher, 1999: 29). The categories and classifications used in the STATS19 forms have been used to produce the results presented

Figure 2a and b Level of severity of accident for local and visitor drivers

here. Unless otherwise stated, the figures presented here utilise the definition of a local as within the postcode areas covered by the Central Scotland Police Force and non-locals are those outside of these postcode areas.

Visitor drivers are involved in 28% of accidents occurring in the Central Scotland Police Force Area; however, they are proportionately more likely to be involved in serious or fatal accidents (see Figure 2). This represents significant levels of human loss and suffering but also has serious resource implications for the emergency services that deal with the consequences of these accidents. A greater understanding of the main differences between local and visitor driver accidents may assist in developing strategic measures for prevention and coping more effectively.

Although visitor drivers, over the course of the year, are involved in 28% of all accidents, they show a slight rise in April, then a larger rise in June, peaking in July before descending again in August. This mainly coincides with Easter and Summer holiday periods, although visitor accidents as a percentage of total accidents in August only make up 28% of the total, the average proportion. This contrasts to the local drivers' accident pattern, showing distinct peaks in November, January and August (see Figure 3).

Although it could be expected that more visitors may be involved in an accident at the weekend when more leisure travel takes place, Friday is the peak day for accidents whether for locals or visitors. The hour of day that accidents take place does show significant differences:

- with locals tending to have more accidents during the peak work travel times (see Figure 4);
- locals, on average account for 72% of the accident vehicles, between 05.00 hr and 08.00 hr;
- visitors accidents peak between 10.00 hr and 11.00 hr which comprise 40% of total accidents.

This is probably due to exposure rates as local drivers are more likely to be travelling to and from work, and visitors, particularly leisure visitors, will be able to avoid peak time traffic.

Visitor drivers were more likely to be male with over three-quarters against two-thirds of local drivers; this may be due to higher exposure rates if males are more likely to drive on leisure trips but also may be due to business travellers who are predominantly male. Road types also showed significant differences

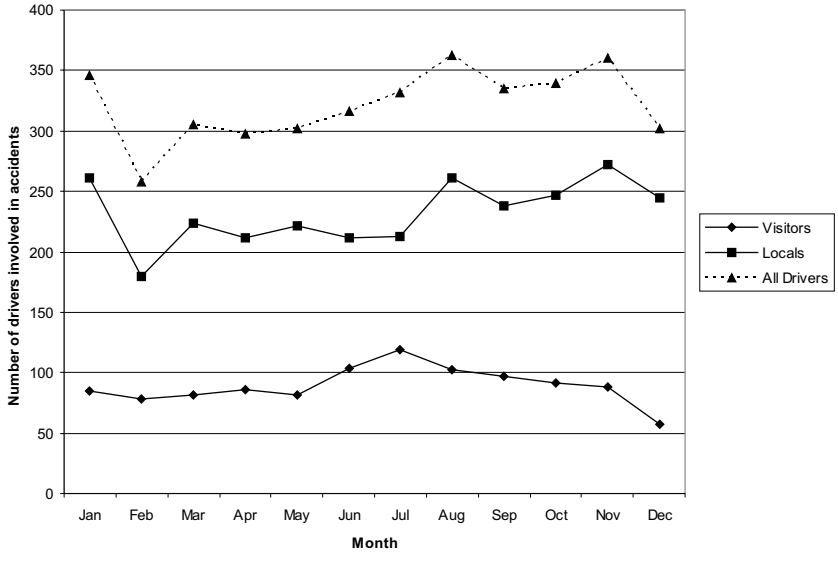

Figure 3 Visitor and local drivers involved in accidents 1999–2002 by month

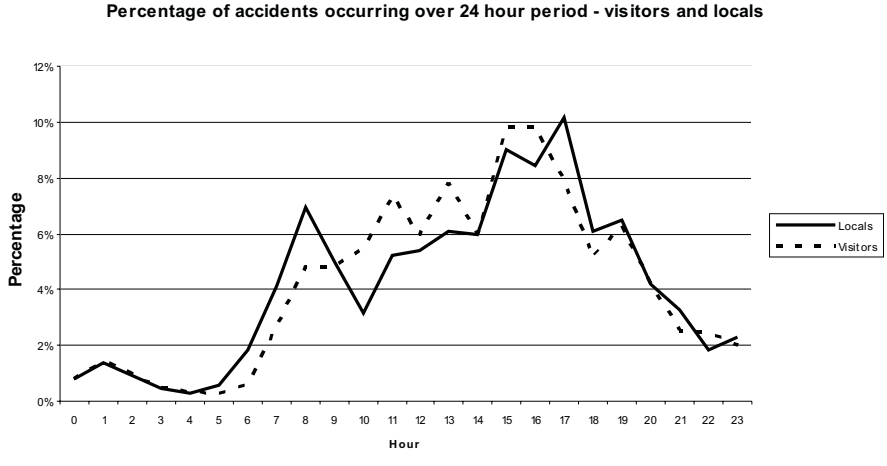

Figure 4 Visitor and local drivers involved in accidents 1999–2002 by hour of day

between local and visitor driver accidents, with visitors more likely to be involved in an accident on A, A(M) or M classified roads (see Table 4), this again is likely to be due to exposure rates with visitor drivers more likely to stick to main routes due to unfamiliarity with local roads.

Actual road classification does not give an indication of location in terms of urban or rural; however a speed limit of 30 or below will indicate that the accident occurred in a built-up area. Analysis of the speed limit would then confirm that visitors tend to have fewer accidents in built-up areas (see Table 5).

Table 4 Road type where accident occurred for local and visitor drivers

Road type	*Local* n	*Visitor* n	*Local (%)*	*Visitor (%)*
Motorway	123	126	4.4	11.8
A(M) road of motorway standard	24	10	0.9	0.9
A road	1294	677	46.5	63.3
B road	498	119	17.9	11.1
C road	59	7	2.1	0.7
Unclassified road	788	131	28.3	12.2
Total	2786	1070	100	100

Table 5 Speed limit of road where accident occurred for local and visitor drivers

Speed limit	*Local* n	*Visitor* n	*Local (%)*	*Visitor (%)*
Up to 30 miles per hour	1709	353	59.2	32.1
40 miles per hour	81	29	2.8	2.6
50 miles per hour	30	3	1.0	0.3
60/70 miles per hour	1067	714	37.0	65.0
Total	2887	1099	100	100

Table 6 Average age of local and visitor drivers in years

	Local	*Visitor*
Sample	3872	1655
Mean	34.1	35.7
Standard deviation	18.1	17.5
Mode	19	25
Median	31	33

The typical profile of visitor drivers involved in accidents is 36 years of age compared to locals who are aged 34 years; but differences become more apparent when looking at the modal age of those involved in accidents: 25 for visitor drivers against only 19 for local drivers (see Table 6).

As 66% of tourists to Scotland (VisitScotland, 2002) are aged over 35, a higher average age for accidents may be expected. For non-UK drivers there was insufficient data for robust analysis, but of the 40 identified as non-UK drivers, the mean was 40 years and the modal age was 38 years.

Although the cause of accident must be treated with caution due to the very subjective nature of completion of reports in difficult situations, it does give some indication of the differences between local and visitor drivers, with local conditions being more significant for visitor drivers. However, perhaps more important is the type of accident impact experienced. In order to ascertain the type of impact from the data source it was necessary to read through the descriptions given. Unfortunately not all records had discernible descriptions, therefore Figure 5 is based on 883 records – 582 local drivers and 301 visitor drivers.

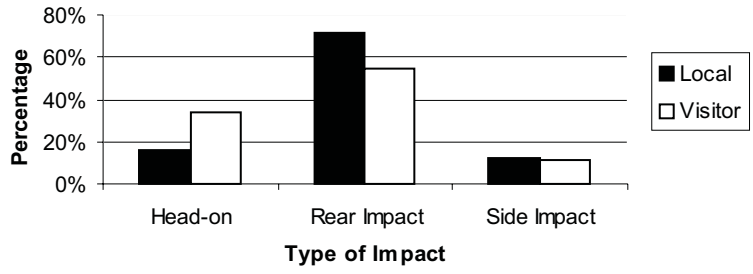

Figure 5 Type of impact for accidents involving local and visitor drivers

Even from the limited sample shown in Figure 5, there are clearly differences in the type of impact, with visitor drivers far more likely to be involved in head-on collisions.

Implications

The main features of the results are that visitor drivers are more likely to be involved in head-on collisions, on main, open road routes with higher speed limits, and that these accidents are more likely to be serious or fatal than for local drivers. Although certain conclusions may be drawn from this data, the inevitable outcome, given the discussion of data limitations, is how little we understand and appreciate the evident differences between local and visitor accidents. This is certainly not unique to Scotland, as the literature reviewed in Table 1 shows. It is staggering to find so few studies of tourist road accidents given the significance of the car as a mode of transport for visitors. It is almost a hidden issue internationally, somewhat punctuated by major RTAs involving tourists that hit the headlines and then interest wanes. The role of the car as a mode of tourist transport has a long-established research background in most of the popular tourism and recreation texts dating from the 1960s and 1970s, reflected in government statistics in most countries that acknowledge the significance of this flexible form of transport in shaping tourism and recreational trips. This highlights a fundamental acceptance among researchers of the car's importance and yet a reluctance to engage in research to monitor its impact and significance, particularly in relation to the wider agenda on tourist safety.

There is certainly a pressing need for research that identifies the differences between residents and visitors in terms of RTAs if resources are to be allocated in the most effective manner to reduce this unseen problem. The need for specifically targeted road safety measures, not only for overseas visitors, would seem to be evident, although unfortunately non-UK drivers and casualties were not identified in statistically significant quantities in this study and may therefore be skewing the data to an extent. However, taken with other studies such as Sharples and Fletcher, there would seem to be significant differences in accident cause between local and visitor UK drivers. This is an area which is an unacknowledged problem. The current situation regarding overseas visitors to Scotland is in urgent need of further investigation as ever increasing numbers of European visitors take advantage of affordable flights to regional airports and the recently opened ferry crossings to Rosyth. In other words, this attests to the fact that the car is a very

opportunist form of travel: where opportunities are provided, it quickly takes advantage of them, as evidence from road building in Europe and the USA shows traffic grows to fill capacity. In the case of ferry travellers to Scotland from mainland Europe, these visitors may not, as has traditionally been the case, have had experience driving on British roads prior to reaching Scotland. In a recent study of a large sport-related event in Central Scotland, the researchers identified that over a third of the visitors hired cars, many of whom were from mainland Europe where they drive on the other side of the road. Unfamiliarity with road systems and driving on the left may combine with the specific hazards inherent in Scottish roads, leading to potentially fatal consequences. This is not that different from the situation prevailing in other countries such as the USA and Australia, where unfamiliarity and language barriers may add to the problem combined with cultural differences associated with driving on the opposite of the road. Although this may be a UK wide concern, Scotland has its own distinct responsibilities with devolved government, and the issue of visitor safety is one that needs to be addressed to ensure visitor well-being and to protect Scotland's reputation as a safe destination. This seems to be self-evident, at a time when tourism agencies are seeking to promote the virtues of Scotland to the inbound European and long-haul market in an attempt to grow market segments.

Action which might be seen as cost effective and which mirrors international best practice includes: *Keep Left* campaigns available in several languages, and general campaigns that visitors will be exposed to, which will only be effective if they are reaching the target audience and addressing the key issues. The results above would indicate that there are specific differences between visitors and locals, the implications of which will affect not only the police but also those concerned with road safety, the other emergency services and those providing health care. What is evident in Central Scotland is that tourists and day visitors are a vital part of the local economy, and while there may be a moral obligation to protect visitors from undue danger, there are also sound economic reasons for doing so. Scotland is generally considered a 'safe' destination and many visitors choose this area precisely for its safe image. Statistics representing actual risk are useful for planning road safety but risk perception of those using the roads is also a vital aspect of safety. Perception affects behaviour and, in terms of visitors, may discourage, or prevent them from visiting some areas of Scotland, thereby reducing their time here and spread of spending into peripheral areas. As with other safety messages there is a need to warn without unduly alarming visitors and yet to ensure the safety messages are effective with the needs of the particular groups in mind. Paradoxically, there is a need to ensure that visitors do not feel too safe as they may then take less care on the roads.

The actual numbers of deaths and injuries suffered by visitors to an area and whether these numbers are less or more than the average for the local population is, to an extent, immaterial. The key issues which should be high on the RTA research agenda in relation to tourism include:

- Are these accidents preventable within reasonable bounds of cost and convenience?
- Are there differences in the required prevention methods for visitors versus the local population?

- Within the 'category' of visitors, is there a need for different accident prevention methods for sub-groups such as overseas or particular age groups?
- Are safety perceptions amongst visitors accurate?

In order to answer any of the above questions, there is a requirement for more robust data. While additional research can be costly and time-consuming, the results could allow more effective targeting of resources to reduce accident numbers and severity, thus savings in the long-term in both human suffering and resources. When the focus returns to resourcing such research and any subsequent action, then the question of responsibility inevitably arises. When Page *et al.* (2001) published their research on motor vehicle transport accidents occurring in New Zealand a clear cost to the authorities was given in dollars to demonstrate that the issue of resource allocation may well be one of relative cost savings that may be balanced against the cost of any action taken to reduce visitor accidents. Loss of tourism income must also be considered as visits will be cut short and repeat visits are less likely for those experiencing negative incidents. This argument of resource savings and economic consequences must be reinforced, as in the article by Page *et al.* (2001), with the moral considerations of reducing undue suffering. As we would wish to ensure the well-being of a guest to our home, so must we do what we can to ensure the well-being of those invited to our country. Responsibility for resourcing such important areas should not then be left to be haphazardly implemented from one local authority, police force area or tourist board area to another; it requires a centralised approach to ensure consistency and avoid undue replication of effort. The EuroRAP research is an excellent start to identifying the likely risks for all drivers, but it also needs to be related to the risks that tourists face as drivers, that can pose additional problems in local areas. Although arguments can be made that responsibility for visitor well-being falls across a number of organisations and individuals (Walker & Page, 2003), not least of all the visitor, there are areas that require a national approach – and this is clearly one.

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