



WP2
S-WP2.3

**QUESTIONNAIRE TO COLLECT
DATA FOR EXPOSURE
INDICATORS:
Indicators and Recommendations
for Prevention and Control**

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University of Athens
Department of Hygiene,
Epidemiology
& Medical Statistics
School of Medicine



Center for Research and Prevention of Injuries
(CE.RE.PR.I)

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Project Coordinator:

Eleni Petridou,

Center for Research & Prevention of Injuries (CEREPRI)

Department of Hygiene, Epidemiology and Medical Statistics

Athens University, Medical School

Edited by CEREPRI:

Eleni Petridou

Vasiliki Kalampoki

Commented by:

Constantine Frangakis

Gerald Furian

Maria-Segui Gomez

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Developed by the Center for Research & Prevention of Injuries (CEREPRI)
Department of Hygiene, Epidemiology and Medical Statistics
School of Medicine, Athens University
GREECE

Telephone: +30 210 746 2187

Fax: +30 210 746 2105

E-mail: epetrid@med.uoa.gr

Apollo@med.uoa.gr

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I. EXECUTIVE SUMMARY

Background: Road traffic injuries (RTIs) have the highest frequency among all types of fatal injuries and one of the highest fatality rates worldwide. Therefore, they deserve and they have gained considerable public attention so far. Given the significant societal and economic burden of RTIs, the development of a systematic way for studying, monitoring relevant indicators and suggesting policy strategy for road injury prevention is indispensable.

Objective: The report aims to present the findings of a survey that was developed in the framework of APOLLO project (“The burden of injuries in EU: Indicators and Recommendations for Prevention and Control”) under the supervision of DG-SANCO. This proposal seeks to provide EU countries with an opportunity to make the best use of existing mortality and morbidity data to produce indicators. More specifically, the main objectives of the survey were to: (a) gather information via a systematic literature review for exposure factors of RTIs, (b) map the availability and reliability of existing data collections systems and measurement approaches for RTIs across Europe, (c) develop a theoretical framework on the best strategies to measure the impact of exposure factors at the occurrence of RTIs and (d) recommend appropriate future data collection efforts suitable to capture information on a composite indicator for RTIs.

Method: After the identification –via a systematic literature review- of the most serious existing exposure factors in relation to RTI causation, two methodologies have been explored aiming to reveal further appropriate indicators: (a) a theoretical statistical framework along with a series of road traffic databases that were identified in order to analyze respective data, (b) a self-reporting electronic tool assessing the impact of risk-taking behavior in RTI involvement.

Findings: Regarding the identified exposure indicators, literature review suggested that the most frequently stated and those having the highest

contribution at the occurrence of RTAs were: alcohol intake, seat belt use, helmet use, speeding, and mobile phone use. Investigation of existing data sources regarding exposure indicators for RTAs, revealed that EU countries lack relevant accurate and detailed coding systems. To control for the gap in RTIs indicators across EU countries, the self-reporting electronic tool that was introduced led to the development of a composite indicator adequate for monitoring exposure to RTIs.

Conclusions: The report aims to communicate information that addresses to everyone who is interested to study exposure indicators on RTAs. These formulated recommendations are important components in decision-making. The need to continue and develop prevention policies is necessary, as most of the RTAs could have been avoided if respective prevention policies had been developed. In the absence of adequate EU data, the effective prevention of RTIs is likely to remain elusive for the foreseeable future. To this end, we recommend a composite indicator that should be taken into consideration of researchers when recording RTIs data.

II. INTRODUCTION

The present report starts with a description of the aim of the survey, followed by a detailed presentation of the literature review to identify prevalence of exposure factors for RTAs and an introduction of the two methodologies that attempted to develop a systematic way of studying and monitoring indicators.

Aim of the survey

The rapid development and expansion of the road network and the increase in number of motor vehicles have led to a substantial rise in levels of both passenger and freight movement. RTAs—the leading cause of death by injury and the tenth-leading cause of all deaths globally—now make up a surprisingly significant portion of the worldwide burden of ill health. An estimated 1.2 million people are killed worldwide in road crashes each year, and as many as 50 million are injured. Injuries resulting from RTAs continue to pose a serious public health concern and are the leading cause of death among people under the age of 25. Understanding the circumstances under which drivers and passengers are more likely to be killed or more severely injured in a RTA can help improve the overall driving safety situation. Without increased safety effort and appropriate action to match the growing number of motor vehicles in low to middle income countries, RTI is predicted to be the third leading contributor to the global burden of disease and injury by 2020.

Despite the growing burden of RTIs, road safety has received insufficient attention at both international and national levels. RTIs can be predicted and prevented, and their consequences can be alleviated if the appropriate policies, strategies, road safety regulations and guidelines are in place.

An organized effort to promote injury prevention in EU member states was recently organized with the APOLLO project “*Strategies and best practices for the reduction of injuries*”, an Injury prevention program developed under the supervision of the European Commission. This program consisting of 6 joint sub-programs, aims to deliver an EU-wise pragmatic vision for change in unintentional injury prevention by:

- a) Producing a sustainable reduction in the burden of injuries in the EU through the development and implementation of a comprehensive, proactive and integrated policy strategy for injury prevention
- b) Identifying and applying specific strategies to manage the burden of injuries
- c) Producing and disseminating of results in a way that supports self-sustainable injury control

One of the APOLLO sub-programs, namely, Working Package Two (WP2), seeks to produce and divulge measures of burden of injuries among EU citizens while building capacity among EU injury researchers to document such burden. This proposal aims to provide participating countries with an opportunity to make the best use of existing mortality, morbidity, disability and cost data to produce indicators on short- and long-term physical, social and economic consequences of intentional and unintentional injuries while producing a review of preventive interventions that justify return on the investment and could be rapidly implemented in our environment. Information on the actual burden and the proposed policies to reduce injuries will be instrumental the incoming years. In addition to these primary goals, WP2 seeks, through five independent but related subprojects, to go further the work on the determination of indicators related to injury severity, exposure and costs. It also seeks to guide a review on the efficiency of different injury prevention interventions to address the most burdensome injuries.

To this end, in the context of the current module, exposure indicators for RTIs will be firstly identified throughout a systematic literature review and then two methodologies will be developed in order to propose an appropriate indicator.

The present study targets to a scientific community, namely, to injury prevention experts and safety practitioners who may intent to launch and implement injury prevention interventions in a European, national or local level. It is expected to serve as a useful guide for the potential implementers of preventive interventions related to RTIs.

III. SYSTEMATIC LITERATURE REVIEW

a. Methodology



The aim of the present review was to explore, gather available evidence and focus on exposure variables for RTIs. Those exposure indicators have been more intensely studied in comparison to other types of injuries and there might be hope that of some of them, routinely collected data will be available for the research purposes of this project. In the current section a description of the selection process of the studies is outlined. Because the number and breadth of exposure indicators for RTIs is too large to be reviewed at once, it was decided to focus the present survey on priority areas that were established after a literature review. Following the preliminary literature search it was found that the most commonly stated exposure variables were:

- Use of seat belt and child car restraints
- Use of helmet
- Alcohol
- Drugs (illicit drugs or drug interactions)
- Use of mobile phone, including hands free and blue tooth devices
- Visual impairment
- Hearing impairment
- Health problems
- Speeding
- Aggressive driving
- Sleepiness/tiredness
- Distance traveled

- Driving hours
- Conditions of the road
- Weather conditions

Thereafter, we searched for routinely available data related to each of these 15 factors on the EU level. In general, it seems to be a paucity of such measures, whereas some of them are only available for specified time periods or provided in the context of ad hoc research projects. On the positive side, there is mounting evidence in the literature that adherence with a handful safety road behaviors may yield sizeable gains in the battle against RTIs. Therefore, we decided to concentrate the literature search and critically assess the prevalence of the following leading indicators: **alcohol intake**, **seat belt use**, **helmet use**, **mobile phone use** and **speeding** in the occurrence of RTAs.

Search strategy

A computerized literature search in *English* was conducted at: MEDLINE, SafetyLit, Scopus, the Cochrane Library, Embase, the Cochrane Library, World Health Organization (WHO) Department of Injury and Violence Prevention publishing group databases, ITRD database and a search of reference lists from systematic reviews was undertaken from January 2004 till December 2006 by a number of CEREPRI research experts. The selection of the above-mentioned electronic databases was based on the fact that they are widely regarded as standard information sources in the medical field.

The computerized literature search in *German* was conducted at the library of the Austrian Road Safety Board (KfV) and particularly in the ITRD (International Transport Research Documentation) of OECD. More than 30 renowned institutes and organisations from more than 23 countries provide input to the ITRD database. The period of selection was from January 2004 till December 2006 by Gerald Furian and the research experts of his team.

Key Words

Key words for the systematic literature review included combinations of 'road traffic accidents' 'motor vehicle accidents' 'road traffic injuries' 'motor vehicle injuries' 'motor vehicle crashes' 'crashes' 'driver' 'passenger' 'rider' 'pedestrian' 'vulnerable road user' with the following terms: 'alcohol' 'binge drinking' 'drinking in a row' 'drunk driver' 'seat belt use' 'safety belt use' 'helmet use' 'child car restraint' 'booster seat use' 'child safety seat use' 'mobile phone use' 'cell phone use' 'wireless telephones use' 'speeding' 'reckless driving' 'aggressive driving' 'risky driving behavior'.

Selection criteria

After the primary identification, studies were included if they fulfilled the following criteria:

1. Published between 2004 - 2006
2. Association between road traffic accident and seat belt use or helmet use or mobile phone use or speeding or alcohol intake was measured
3. The language was English or German

There was no restriction on the country of research. Studies from countries of high, medium and low income have the same probability of inclusion. Since the purpose of the review was to collect information for a variety of exposure factors, we could not extend the search in many years before. Therefore it was decided to limit the search in the last 3 years.

The articles that appeared to meet the inclusion criteria were retrieved in full and then assessed by the reviewers against 14 rating criteria developed by CEREPRI (Table 2). In the development of those criteria, a number of widely used checklists were of use to the reviewers, including a framework for assessing qualitative research. Nevertheless it was decided to adapt information of the existing checklists to the needs of the current review instead of making use of a predefined checklist. These criteria assessed the actual quality of studies and the aim was to rank the practices on a 2 or 3-point scale according to the

nature of each criterion (1: lowest quality, and 2 or 3: highest quality). Each study was independently assessed for its quality based on those ranking criteria.

Table 2. Rating criteria

Criteria	Rating
1) The question/objective of the study is properly defined	1=no information given 2=few information or not clearly stated 3=full and complete information
2) Adequacy of the study design: methods on sample and data collection techniques (what type of data, data were provided by whom, quality of sampling design) are clearly stated	1=no information given 2=few information or not clearly stated 3=full and complete information
3) Recruitment/ adequate sample	1=sample not clearly stated 2=inadequate/insufficient sample 3=adequate sample
4) Whether selection bias may have occurred	1=severe evidence of selection bias 2=little evidence of selection bias 3=no evidence of selection bias
5) Withdrawals and dropouts/satisfactory response rate	1=low retention 2=some retention 3=high retention
6) Confounders identified and taken into account in the analysis	1=confounders not identified 2=confounders identified but not clearly stated whether they have been included in the models 3=confounders identified and properly taken into account
7) Adequate definition of exposure factors	1=definition of exposure not given 2=inadequate/insufficient definition 3=clear definition

8) Confidence intervals or P-values are presented	1=not given at all 2=partially given 3=adequately given
9) Beware of multiple comparisons (given that on average 1 out of 20 comparisons will be statistically significant by chance)	1=evidence of multiple comparisons 2=non evidence of multiple comparisons
10) The appropriateness of statistical analysis' techniques. Design of statistical analysis (evaluation of statistical methods used, whether only descriptive methods are used or a more in-depth analysis was performed)	1=simple analysis (e.g percentages) 2=more elaborated statistical analysis 3=an in-depth analysis using the appropriate statistical tools
11) Tabulations/adequate presentation of results	1=no/little information tabulated 2=some informative tabulations 3=adequate tabulation of results
12) Provided odds ratios	1=not given at all 2=partially given 3=adequately given
13) Alcohol level estimated by toxicological tests and not only by self-reports	1=alcohol level estimated by self-reports 2=alcohol level estimated by toxicological tests/the article does not include alcohol as exposure variable
14) The degree that the study under evaluation help to answer the review's questions	1=some relevance to the aim of the review 2=medium relevance 3=absolute relevance

b. Results

The initial broad search yielded 389 studies that appeared to meet the inclusion criteria after the scanning of titles and abstracts. Nevertheless, after a thorough evaluation and application of the rating criteria, only 108 fulfilled them. Table 3 describes the retrieved articles and the articles that were excluded. Further on the full texts of the 108 articles were retrieved and were subject to a further data extraction process. An examination of the references for each of these articles warranted obtaining 1 additional relevant study.

Table 3. Distribution of included and excluded papers

	N
Gathered	390
Included papers	109
Excluded papers and reasons for exclusion	281
Not within topic (no prevalence of exposure factor/not association with RTA)	265
Not published in English/German	16

Table 4 shows the results of the systematic literature review. For each study the following pieces of information were included: Title of publication, publication date, source, author(s), study design, participants, objective of the study, exposure factors, adjustment for confounders and summary of main results. The articles are presented in order according to their quality, starting from the best study.

Table 4: Tabulation of systematic literature review results

Authors/Year/Title	Study design	Participants	Objective	Exposure Factors	Adjustment for confounders	Results
J.G. Ramaekers a,*, G. Berghaus b, M. van Laar c, O.H. Drummerd Drug and Alcohol Dependence 73 (2004) 109–119 Dose related risk of motor vehicle crashes after cannabis use	Review	NA	The aim of the review is to answer: • Does cannabis impair psychomotor, cognitive, and actual driving performance and increase the risk of becoming involved in traffic accidents? • Is there a relation between performance impairment and cannabis dose or its concentration in plasma? • Do combined effects of cannabis and alcohol on driving performance differ from those of either drug alone? • Does cannabis affect all aspects of the driving task alike?	Alcohol, drug	NA	The effects of THC and alcohol on driving performance and risk of motor vehicle crashes appear to be additive, but the sum can be large and potentially dangerous. Combined use of THC and alcohol produces severe driving impairment and sharply increases the risk of drivers' accident culpability as compared to drug free drivers, even at low doses. The ORs of becoming involved in fatal or injurious traffic accidents under the influence of alcohol are : Terhune and Fell (1982); OR=5.4 (CI:2.8–10.5) Williams et al. (1985); OR=5.0 (CI: 2.1–12.2) Terhune et al. (1992); OR=5.7 (CI:5.1–10.7) Drummer (1994);OR= 5.5 (CI:3.2–9.6) Hunter et al. (1998); OR=6.8 (CI:4.3–11.1) Lowenstein et al. (2001); OR=3.2 (CI:1.1–9.4) Drummer et al. (2003b);OR= 6.0 (CI: 4.0–9.1)
Mary I. Chipman Traffic Injury Prevention, 5:67–75, 2004 Side Impact Crashes— Factors Affecting Incidence and Severity: Review of the Literature	Review	NA	A review was conducted of the evidence of driver, road, and vehicle characteristics affecting either the risk of occurrence or the severity of injury in such crashes for papers published from 1996 to early 2003.	Seat belt	NA	Reiff et al. (2001): The odds of overall mortality for belted versus non-belted occupants was 0.40 McLellan et al.(1996) : The proportion of injured in MVA wearing three-point seat belts was 68% Hillary et al. (2002): The authors noted that seatbelts not only reduced the risk of injury but reduced the severity of injury when sustained Cummings et al. (2002a): The odds ratio for restrained adults was estimated at 0.75; 0.63–0.91
Kenneth Heng, Stephen Hargarten', Peter Layde, Andy Craven And Shankuan Zhu Alcohol and Alcoholism 2006 41(4):451-454 Moderate Alcohol Intake And Motor Vehicle Crashes: The Conflict Between Health Advantage And At-Risk Use	Review	NA	To review the evidence on moderate alcohol intake and motor vehicle crash (MVC) risk, and discuss the possible public health tension in balancing risk reduction and increment with respect to moderate alcohol intake	Alcohol	NA	In 2003 in the United States, 40% of all fatal crashes were alcohol related. Of all the alcohol-related fatal crashes, 13% of drivers had BAC of 0.01–0.07 g/dl. Studies show 3- to 17-fold increased risk of a fatal MVC with BAC < 0.08 g/dl compared to sober drivers.

<p>Vicki Angulo-Vazquez and Joseph P. De Santis</p> <p>JSPN Vol. 10, No. 4, October-December, 2005</p> <p>Booster Seat or Seat Belt? Motor Vehicle Injuries and Child Restraint Laws in Preschool and Early School-Age Children</p>	Review	NA	<p>In an attempt to understand the relationship of factors that could result in injury or death from a motor vehicle accident in preschool/early school-age children, the problem can be situated within an epidemiological framework or context.</p>	Seat belt, booster seat	NA	<p>Socioeconomic status also seems to have an effect on safety restraint usage. Children from lower income families are less likely to be secured in age-appropriate restraint systems.</p> <p>In reviewing medical records, children in the age group of 2-5 years who were in seat belts were at a higher risk for significant injury (OR [odds ratio] = 3.5, CI [confidence interval] =2.4–5.2, $p < 0.05$ than children who were in age-appropriate child restraint devices.</p> <p>Hispanic parents reported restraining their children in motor vehicles only 19% of the time, compared with 62% in all other race/ethnic groups.</p>
<p>B Liu, R Ivers, R Norton, S Blows, SK Lo</p> <p>Cochrane Database of Systematic Reviews 2003, Issue 4.</p> <p>Helmets for preventing injury in motorcycle riders</p>	Review	NA	<p>To quantify the effectiveness of wearing a motorcycle helmet in reducing mortality and head and neck injury following motorcycle crashes. This review will collate the current available evidence on helmets and their impact on mortality, and head, face and neck injuries following motorcycle crashes.</p>	Helmet	NA	<p>We found no randomized controlled trials, but five well conducted case-control studies met our inclusion criteria. Helmets provide a 63 to 88% reduction in the risk of head, brain and severe brain injury for all ages of bicyclists. Helmets provide equal levels of protection for crashes involving motor vehicles (69%) and crashes from all other causes (68%). Injuries to the upper and mid facial areas are reduced 65%.</p>
<p>Erin Kelly, Shane Darke & Joanne Ross</p> <p>Drug and Alcohol Review (September 2004), 23, 319 – 344</p> <p>A review of drug use and driving: epidemiology, impairment, risk factors and risk perceptions</p>	Review	NA	<p>Specifically the aims of this review were to:</p> <p>(i) Examine the prevalence of drug driving in a range of populations;</p> <p>(ii) Examine the effect of drugs on driving performance;</p> <p>(iii) Identify the risk factors associated with drug driving;</p> <p>(iv) Discuss the risk perceptions related to drug driving.</p>	Alcohol and drugs	NA	<p>Results from laboratory, simulator, driving and field studies provide unequivocal evidence that alcohol produces driving impairment and consequently increases MVA risk.</p> <p>Overall, while differences arise due to the type of drug in consideration, it is apparent that high doses of drugs, multiple drug use and drugs used in combination with alcohol are all likely to produce a significant threat to traffic safety.</p>
<p>Jennie Connor, Robyn Norton, Shanthi Ameratunga, and Rod Jackson</p> <p><i>Epidemiology</i> Volume 15, Number 3, May 2004</p> <p>The Contribution of Alcohol to Serious Car Crash Injuries</p>	Case-control	<p>We conducted a population-based case-control study in Auckland, New Zealand between April 1998 and July 1999.</p> <p>Cases were 571 car drivers involved in crashes in which at least 1 occupant was admitted to the hospital or killed. Control subjects were 588 car drivers recruited on public roads, representative of driving in the region during the study period.</p>	<p>This article reports the results from a case-control study of the contribution of alcohol to car crash injuries. This study included all fatal and nonfatal injury crashes occurring in a defined region over a 16-month period and attempted to account for major confounding variables.</p>	Alcohol	Age, gender, ethnicity, socioeconomic status, time of day, sleepiness, seat belt use	<p>Approximately 30% of car crash injuries in this population were attributable to alcohol, with two-thirds involving drivers with blood alcohol concentration in excess of 150 mg/100 mL.</p> <p>For self-report of 2 or more 12-g alcoholic drinks in the preceding 6 hours compared with none, the odds ratio (OR) was 7.9 (95% confidence interval :3.4–18); for blood alcohol concentration 3 to 50 mg/100 mL compared with <3 mg/100 mL, the OR was 3.2 (1.1–10); and for blood alcohol concentration greater than 50 mg/100 mL compared with <3 mg/100 mL, the OR was 23 (9–56).</p>

<p>Shinji Nakahara, Witaya Chadbunchacha, Masao Ichikawa, Nakorn Tipsuntornsak, Susumu Wakai</p> <p>Accident Analysis and Prevention 37 (2005) 833–842</p> <p>Temporal distribution of motorcyclist injuries and risk of fatalities in relation to age, helmet use, and riding while intoxicated in Khon Kaen, Thailand</p>	Cross sectional	<p>Data of motorcyclists injured in Khon Kaen municipality in northeastern Thailand and transferred to Khon Kaen Regional Hospital were obtained from the trauma registry system of the hospital.</p> <p>9948 injured motorcyclist cases examined</p>	<p>This study investigated the temporal distribution of risky behaviors among injured motorcyclists, that is, riding unhelmeted or while intoxicated, and showed how they are associated with risk of fatal injuries.</p>	Helmet, alcohol	Age, gender, time of day	<p>Unhelmeted motorcyclists accounted for 74.9% and had a higher risk of fatal injuries than helmeted drivers (OR = 3.87; 95%CI: 1.62, 9.90). Intoxicated motorcyclists represented 36.5% and had a higher risk of fatal injuries than sober individuals (OR = 2.97; 95%CI: 1.78, 4.97).</p> <p>Unhelmeted driving was prevalent and associated with higher fatality risk among younger drivers, whereas intoxicated driving was less prevalent among teens but associated with increased risk among those aged 20–39 years.</p>
<p>Michael D. Keall*, William J. Frith, Tui L. Patterson</p> <p>Accident Analysis and Prevention 36 (2004) 49–61</p> <p>The influence of alcohol, age and number of passengers on the night-time risk of driver fatal injury in New Zealand</p>	Cross sectional	<p>Data on 103 fatally injured drivers were analysed from all crashes occurring between 9.30 p.m. and 2.30 a.m. on Friday and Saturday nights for the years 1995–2000 in the areas covered by the exposure data.</p> <p>Control data were used from 85,163 drivers who were breath tested at randomly selected inconspicuous roadside sites in 50 km/h speed limit areas between 1995 and 2000.</p>	<p>The purpose of the study is to estimate the effects of alcohol, driver's age and the influence of passengers carried on the risk of driver fatal injury in New Zealand.</p>	Alcohol	Age, gender, number of passengers, time of day	<p>The risk ratio for fatal injury was estimated at 2.01 (95% CI: 1.9-2.2) for 20mg/dl increase of BAC</p> <p>Teenagers have over five times the risk of drivers aged 30+ at all BAC levels modelled (less than 200 mg/dl) and drivers in their 20s have three times the risk of drivers aged 30+.</p>
<p>Michaelsingleton, Huifang Qin Jingyu Luan</p> <p>Traffic Injury Prevention, 5:144–150, 2004</p> <p>Factors Associated with Higher Levels of Injury Severity in Occupants of Motor Vehicles That Were Severely Damaged in Traffic Crashes in Kentucky, 2000–2001</p>	Cross sectional	<p>This study probabilistically linked Kentucky's statewide motor vehicle crash and inpatient hospital discharge data files for 2000 and 2001, and selected cases representing occupants of vehicles that were reported by police as having either "severe" or "very severe" damage.</p> <p>There were 629,905 occupants involved in crashes in Kentucky in those years.</p>	<p>The purpose was to identify occupant, vehicle, crash, and roadway/ environmental factors that were associated with increased risk of severe injury in crashes where the occupant's vehicle was severely damaged.</p>	Restraint use	Age, gender	<p>Unrestrained SDV occupants were 3.4 (95% CI: 3.20–3.55) times as likely as restrained SDV occupants to experience a higher injury severity level.</p>
<p>Pablo Lardelli-Claret, Jos'e Juan Jim'enez-Mole'on, Juan de Dios Luna-del-Castillo, Aurora Bueno-Cavanillas</p> <p>Accident Analysis and Prevention 38 (2006) 563–566</p>	Cross sectional	<p>The data source was the Spanish register of traffic crashes with victims compiled by the Government's General Traffic Directorate. Data for crashes recorded from 1993 to 2002, inclusive, were studied.</p> <p>We used a matched cohort design to analyze all 5260 rear-seated passengers in</p>	<p>The aim is to study the effect of age, gender, use of restraint systems and seat position on the risk of death for rear-seated passengers of cars involved in road crashes.</p>	Seat belt, child restraint systems	Age, gender	<p>The adjusted relative risk of death was 0.56 (95% CI: 0.38, 0.82) for those using a restraint system in comparison with those who did not</p>

Individual factors affecting the risk of death for rear-seated passengers in road crashes		vehicles occupied by two or three rear-seated passengers for accidents in which at least one of these passengers was killed				
Uwe Ewert, Beatrice Fitz BFU Report, 53 Bern: Schweizerische Beratungsstelle für Unfallverhütung bfü, 2004 Safety belt. Reasons for non-wearing and measures to enlarge the rate of wearing a safety belt	Cross sectional	Survey among car drivers – 5000 questionnaires were given to persons wearing or non-wearing their safety belt.	Survey of car drivers with a multiple logistical regression model to predict the seat belt wearing behaviour. To assess situative and individual risk factors for non-wearing the safety belt	Seat belt	Age, sex, alcohol, time, day, region, position of car seat, kind of street	The following risk factors for non-wearing of safety belt were found: Sitting position in the car: at the back Age: between 10 to 55 years, especially 10 to 34 years Sex: male Driving under the influence of alcohol Regions of Switzerland: Région lémanique and Tessin Kind of streets: in town and on country roads Time of day: at night Day of the week: Saturday, Sunday
Andrea Fabbri, Giulio Marchesini, Massimo Dente, Tiziana Iervese, Marco Spada, Alberto Vandelli Annals of Emergency Medicine Volume 46, no. 2: August 2005 A Positive Blood Alcohol Concentration Is the Main Predictor of Recurrent Motor Vehicle Crash	Cross sectional	Of the 2,354 enrolled subjects in the original study, 29 died during hospital admission. The 2,325 survivors were followed up either until December 31, 2003, or to a new visit for recurrent motor vehicle crash.	The objective of the study is to determine the main variables predicting recurrent crashes in subjects attending an emergency department (ED) for injuries after motor vehicle crash.	Alcohol	Age, gender	A positive blood alcohol was the main predictor of recurrent motor vehicle injury (relative risk 3.73; 95% CI 3.00 to 4.64; P<0.001)
Chad G. Ball, Andrew W. Kirkpatrick,, Frederick D. Brenneman Can J Surg, Vol. 48, No. 5, October 2005 Noncompliance with seat-belt use in patients involved in motor vehicle collisions	Cross sectional	We identified trauma patients who were involved in MVCs over a 24-month period and contacted them 2–4 years after the injury by telephone to administer a standardized survey. During the 24-month study period 567 trauma patients who were involved in MVCs were admitted to the Sunnybrook Trauma Unit; 386 (68%) completed the telephone questionnaire.	In this study we wished to define the relative frequency of seat-belt use in injured Canadian drivers and passengers and to determine if there are risk factors particular to seat-belt noncompliance in this cohort.	Seat belt, alcohol	Age, gender	Unbelted patients had a significantly ($p = 0.019$) higher mean ISS, a longer hospitalization ($p = 0.047$), an increased HAIS ($p = 0.022$) and a greater volume of blood transfused ($p = 0.040$) than patients who had used their seat belts We found that 55.4% of all MVC trauma patients in our study admitted to consuming alcohol before driving.

Sauter C,Zhu S, Allen S,Hargarten S, Layde PM. WMJ 2005 Feb;104(2):39-44. Increased risk of death or disability in unhelmeted Wisconsin motorcycleists	Cross sectional	Data from the National Highway Traffic Safety Administration-sponsored Crash Outcome Data Evaluation System (CODES) for Wisconsin, 2002, were used to study motorcycle crash victims. 2462 motorcycle crash victims were identified	The purpose of this study is to investigate the relationships among motorcycle rider helmet, alcohol use and the full spectrum of health outcomes following crashes.	Helmet	Age	Compared to helmeted motorcycle riders, unhelmeted riders were more likely to require inpatient hospitalisation (RR=1.4; 95% CI: 1.1,1.8) or die (RR=1.9; 95% CI: 1.0, 3.7) Unhelmeted riders were more likely to suffer injuries of the head (OR=2.3;95 CI:1.5,3.3) or face (OR=3.0 ;95% CI: 2.1, 4.2) than helmeted riders
Mark Asbridge, Christiane Poulin, Andrea Donato Accident Analysis and Prevention 37 (2005) 1025–1034 Motor vehicle collision risk and driving under the influence of cannabis: Evidence from adolescents in Atlantic Canada	Cross sectional	Participants were drawn from the 2002/2003 Student Drug Use Survey in the Atlantic Provinces, an anonymous cross-sectional survey of adolescent students in the Atlantic provinces of Canada. A sample of 6087 senior students in Atlantic Canada	This paper examines the relationship between driving under the influence of cannabis (DUIC) and motor vehicle collision (MVC) risk. A series of models were analyzed adjusting for demographic characteristics, driver experience, and substance use.	Alcohol, drugs	Demographic characteristics, driver experience, and substance use	About 11.7% of senior students drove under the influence of alcohol at least once in the past year And 15.1% of students drove under the influence of cannabis The odds ratio of a MVA for those driving under the influence of alcohol was 2.40 (P<0.001) The odds ratio of a MVA for those driving under the influence of cannabis was 1.84 (P<0.001)
Suzanne P McEvoy, Mark R Stevenson, Anne T McCartt, Mark Woodward, Claire Haworth, Peter Palamara, Rina Cercarelli BMJ Online Firstbmj.com Role of mobile phones in motor vehicle crashes resulting in hospital attendance: a case-crossover study	Report of a case crossover study	Data were provided by one of three main hospital emergency departments in the metropolitan area of Perth, Western Australia. 456 drivers aged ≥ 17 years who owned or used mobile phones and had been involved in road crashes necessitating hospital attendance between April 2002 and July 2004.	The aim of the study is to explore the effect of drivers' use of mobile (cell) phones on road safety.	Cell phone	Age, gender	Driver's use of a mobile phone up to 10 minutes before a crash was associated with a fourfold increased likelihood of crashing (odds ratio 4.1, 95% confidence interval 2.2 to 7.7, P < 0.001). Risk was raised irrespective of whether or not a hands-free device was used (hands-free: 3.8, 1.8 to 8.0, P < 0.001; hand held: 4.9, 1.6 to 15.5, P = 0.003). Increased risk was similar in men and women and in drivers aged ≥ 30 and < 30 years.
Yuki Fujita, Akira Shibata Traffic Injury Prevention 7,4, December 2006, pages 325 – 327 Relationship between Traffic Fatalities and Drunk Driving in Japan	Cross sectional	Data on traffic accidents were collected from Fukuoka Prefectural Police records of traffic accidents which occurred in that prefecture between 1987 and 1996 The data showed that 58,421 male drivers were involved in traffic accidents during the 10-year study period, and that 271 of these were killed as a result of the accident.	The present study was performed to clarify the relation between alcohol use and traffic fatalities in accidents involving motor vehicles in Japan.	Alcohol	Age, calendar year, time, and road form	The odds ratio of alcohol use before driving, after adjusting for age, calendar year, time, and road form, was 4.08 (95% confidence interval, 3.08-5.40), which means that about 75% of fatalities (attributable risk percent among exposed) might have been prevented if drivers had not drunk before driving.

<p>Alten S., Zhu S, Sauter C, Lavde P, Hargarten S.</p> <p>2006 Apr; 13(4):427-34</p> <p>A comprehensive statewide analysis of seatbelt non-use with injury and hospital admissions: new data, old problem</p>	Cross sectional	<p>Data were provided from the 2002 Crash Outcome Data Evaluation System (CODES) for Wisconsin</p> <p>23,920 occupants of motor vehicle crashes, aged 16 years or older, who were treated in an ED, were analysed.</p>	To investigate the association of seatbelt nonuse with injury patterns, injury severity, and in-patient hospital admission among adults presenting to emergency departments (EDs) in a statewide, population-based, sample of motor vehicle crashes.	Seat belt	Age, gender	<p>Unbelted occupants comprised 20% of study patients treated in the ED and discharged, 44% of patients treated in the ED and admitted, and 68% of patients dying in the ED. Unbelted occupants were more likely to be admitted (odds ratio [OR] = 2.6) than belted individuals and were more likely to suffer severe injuries to the head, face, thorax, abdomen, spine, upper and lower extremities (OR ranging from 1.6 to 3.9)</p> <p>Compared with belted occupants presenting to an ED, their unbelted counterparts were more likely to be male (56% vs. 40%) and to have used alcohol (17% vs. 4%). Unbelted occupants were younger (31 years vs. 38 years) than belted occupants.</p>
<p>Desapriya E, Pike I, Raina P.</p> <p>Int J Inj Contr Saf Promot. 2006 Jun; 13(2):89-94.</p> <p>Severity of alcohol-related motor vehicle crashes in British Columbia: case - control study</p>	Case-control	<p>Injury severity rates and vehicle damage severity rates were taken from 2002 Insurance Corporation of British Columbia traffic collision data.</p> <p>Altogether, there were 83 565 vehicles involved in 47 495 police-reported crashes in the database that was received. Of these, 4600 (10%) crashes were described as 'alcohol involved crashes' by the police. After limiting the choice to only alcohol-related crashes and excluding pedestrian, bicyclist, out-of-province vehicles, trucks, construction, commercial vehicle, buses, etc., there were 3990 alcohol involved Crashes</p>	The objective of the present study was to compare the injury severity and vehicle damage severity rates of alcohol-related crashes with rates of non-alcohol-related crashes in British Columbia (BC).	Alcohol	Age, gender	<p>In the case - control analysis, the risk of fatal collision was increased for those drinking and driving compared with those driving sober (OR 4.70; 95% CI 3.15 - 7.01).</p> <p>Risk of injury collision was increased for those drinking and driving compared with those driving sober (OR 1.32; 95% CI 1.19 - 1.37).</p>
<p>Michael M. Gonzales, L. Miriam Dickinson, Carolyn DiGuseppi, Steven R. Lowenstein</p> <p>Annals of Emergency Medicine Volume 45, no. 2: February 2005</p> <p>Student Drivers: A Study of Fatal Motor Vehicle Crashes Involving 16-Year-Old Drivers</p>	Cross sectional	<p>Data were used from the Fatality Analysis Reporting System (1995 to 2001).</p> <p>2420 fatal motor vehicle crashes were included</p>	Motor vehicle crashes are the leading cause of death for US teenagers, accounting for 40% of fatalities. The purpose of this study was to compare novice (aged 16 years) and experienced (aged 25 to 49 years) drivers involved in fatal motor vehicle crashes with respect to crash characteristics and driver behaviors.	Speeding, alcohol, seat belt, reckless driving	Age, gender, geographic locale, year	<p>158 fatalities (6.5%) were novice drivers (aged 16 years).</p> <p>Novice drivers were more likely to have been speeding (odds ratio [OR] 1.87, 95% confidence interval [CI] 1.34 to 3.08); driving recklessly (OR 4.78, 95% CI 3.31 to 6.92) and less likely to be involved in crashes caused by alcohol (OR 0.24, 95% CI 0.14 to 0.41)</p> <p>Crashes involving novice drivers more often occurred in rural locales. (OR 1.51 [CI] 1.08–2.11)</p> <p>Moreover, almost half of 16-year-old drivers involved in fatal motor vehicle crashes were not wearing their safety belts.</p>
<p>M. Vaez , L. Laflamme</p> <p>Accident Analysis and Prevention 37 (2005) 605–611</p>	Cross sectional	It considers a national cohort of young Swedish drivers followed in police registers with regard to their first car-crash experience.	This paper broadens investigation into the association between MVCs and drivers' sociodemographic characteristics. Two main questions are addressed:	Alcohol, drugs	Age, gender, origin, educational attainment	<p>The police reported 946 drivers were suspected of being under the influence of alcohol or other substances. This amounts to 6% of all crashes involving motor vehicle drivers.</p> <p>Alcohol or other substance use significantly</p>

Impaired driving and motor vehicle crashes among Swedish youth: An investigation into drivers' sociodemographic characteristics		From 1988 to 2000, police reported a total of 16,178 MVCs (implying 16,178 drivers), of which 10,631 led to personal injury.	1. To what extent does impaired driving (due to alcohol or drugs) increase the risk of severe or fatal injury in MVCs among young drivers? 2. Does involvement in impaired driving crashes (single or multiple vehicle crashes) leading to personal injury vary between categories of single sociodemographic personal attributes (sex, age, class of origin and educational attainment)?			increases the odds (OR 3.26, 95% CI, 2.45–4.27) of severe and fatal injuries (compared with no impairment).
Francesco Zambon and Marie Hasselberg Traffic Injury Prevention, 7:143–149, 2006 Factors Affecting the Severity of Injuries Among Young Motorcyclists—A Swedish Nationwide Cohort Study	Retrospective cohort study	All subjects whose records indicated an injury as a motorcycle driver in the Swedish National Road Administration Accident Database were selected, and constituted the study population 1,748 subjects were included	To determine factors affecting the severity of motorcycle injuries, considering variables related to the individual, the environment, the vehicle, and the crash.	Alcohol, speeding	Age, gender, origin, socioeconomic position	Positive suspicion of alcohol misuse becomes the main risk factor of MVA (OR = 2.7; 95 percent CI 1.6 to 4.4) Speeding over 50km/h had an odds ratio of 1.3 but it was not found significant (CI: 0.9-1.7)
E Javouhey, A-C Guérin, B Gadegbeku, M Chiron and D Floret Archives of Disease in Childhood 2006;91:304-308 Are restrained children under 15 years of age in cars as effectively protected as adults?	Cross sectional	A road trauma registry in the Rhône region of France (population 1.5 million inhabitants; main city, Lyon) has been in use since January 1995. Data collection is based on the participation of all medical units involved in the health care of crash victims in the Rhône region and its close surroundings (201 units). Among the 7568 casualties who were injured as restrained car passengers in car accidents, 1033 were less than 15 years old.	To compare the injury distribution between children and adults, injured as restrained car passengers.	Seat belt	Age	Overall, 35.4% of children and 25.2% of adults were unrestrained. The odds ratio of fatal injury for unrestrained children was 5.52 (95% CI: 1.01-39.64) and for unrestrained adults was 2.69 (95% CI: 1.55-4.67). Compared to adults, restrained children aged 5–9 were 2.7 times (OR 2.74; 95% CI 1.17 to 6.43) as likely to sustain an AIS2+ abdominal injury, and tended to be more at risk of AIS2+ head injuries, but were less at risk of AIS2+ chest injuries.

Stephanie Blows, Shanthi Ameratunga, Rebecca Q. Ivers, Sing Kai Lo, Robyn Norton Accident Analysis and Prevention 37 (2005) 619–624 Risky driving habits and motor vehicle driver injury	Cross sectional	Cross-sectional data were used amongst 21,893 individuals in New Zealand, including 8029 who were aged 16–24 years and 276 who reported a history of motor vehicle driving injury.	This study aims to examine lifestyle and psychological determinants of serious injury by examining the relationship between risky driving habits, prior traffic convictions and motor vehicle injury	Speeding, alcohol, seat belt	Age, gender	Driving at 20 km/h or more over the speed limit was associated with an increased risk for younger drivers (PR 3.4, 95% CI 1.6–7.0); the increased risk was not significant in older drivers (PR 2.0, 95% CI 0.7–5.7).
Shao-Hsun Keng Accident Analysis and Prevention 37 (2005) 349–355 Helmet use and motorcycle fatalities in Taiwan	Cross sectional	The data for this study are from the Traffic Accident Files (TAF) for the period of 1999–2001 collected by NPA. The TAF consists of all reported traffic accidents involving an injury or fatality in Taiwan. The final number of observations for the full sample is 107,632 crashes. Next, identification strategy is used to obtain the selection corrected sample. The selection-corrected sample decreases to 26,425 crashes, which is close to a 75% decline.	This paper uses the logit model and the police-reported crash data from Taiwan to estimate the effectiveness of helmets in preventing deaths in traffic accidents.	Helmet	Age, gender, time of day	Without helmets, the number of motorcyclists killed in 2001 would have jumped by 51%. The estimated proportion of helmeted motorcyclists has increased from 71 to 78% between 1999 and 2001, suggesting that helmet use is rising after the implementation of mandatory helmet law in 1997. Helmets reduce the probability of death in a crash by 40% The odds for unhelmeted motorcycle drivers to be killed on the road are 1.67 times greater than helmeted motorcycle drivers.
Ariana Vorko-Jovic, Josipa Kern, Zrinka Biloglav Journal of Safety Research 37 (2006) 93 – 98 Risk factors in urban road traffic accidents	Cross sectional	The data were provided from Ministry of Interior's Road Traffic Accident (RTA) Surveillance for the Republic of Croatia There were 528 RTA victims consisting of 260 severely, 213 mildly injured, and 55 killed at the scene of an accident and during transportation.	The urban road traffic accident (RTA) risks for the city of Zagreb, Croatia, from 1999 through 2000 were analyzed with the aim of reducing the increasing injury incidence.	Speed, seat belt, type of road, helmet, cell phone	Gender	Fatal outcomes occurred more frequently than non-fatal when speed exceeds upper limit (OR=2.56; 95%CI, 1.43–4.61) Fatal outcomes occurred more frequently than non-fatal when seat belt was not used (OR=2.33; 95% CI, 1.22–4.45) Driving at a speed exceeding the upper limit resulted in more fatal or severe injuries than mild injuries (OR=1.47; 95% CI, 1.02–2.11). Car occupants who were not using seat belts had more fatal and severe injuries than mild injuries (OR=1.74; 95% CI, 1.22–2.48). Only 13 (24.5%) of 53 motorcycle drivers were wearing a helmet. Only seven (1.3%) drivers reported using a cellular phone before the accident. Males driving at excessive speed have a higher risk for dying (OR=2.99; CI, 1.538–5.814). Males who do not use seat belts have a higher risk for dying (OR=4.34; 95% CI, 2.142–8.771). There is a high dying risk for males driving at excessive speed and not using seat belts (OR=5.08; 95% CI, 2.089–12.344)

<p>Jonathan C. Hundley, Patrick D. Kilgo, Preston R. Miller, Michael C. Chang, Rebecca A. Hensberry, J. Wayne Meredith and J. Jason Hoth,</p> <p>J Trauma. 2004; 57:944 – 949.</p> <p>Non-Helmeted Motorcyclists: A Burden to Society? A Study Using the National Trauma Data Bank</p>	Cross sectional	<p>Two groups of patients, helmeted and non-helmeted motorcyclists, were identified using the the National Trauma Data Bank (NTDB) over an 8-year period.</p> <p>A total of 9,769 patients were identified</p>	<p>In this study, we evaluated the effect that helmet use had upon injury severity, outcome controlling for alcohol or drug use, resource utilization and financial burden</p>	Helmet	Alcohol, drugs	<p>The odds ratio of mortality is 1.71 (p<0.001) for non-helmeted motorcyclists compared to helmeted motorcyclists. When controlling for alcohol or drug use, mortality continued to be significantly associated with non-helmet use.</p> <p>Nonhelmeted motorcyclists accrued greater hospital charges (p<0.001).</p> <p>Alcohol/drug use was significantly more common in nonhelmeted motorcyclists (46.7%) when compared with helmeted motorcyclists (31.5%).</p>
<p>P Cummings, F P Rivara, C M Olson and K M Smith</p> <p><i>Injury Prevention</i> 2006;12:148-154;</p> <p>Changes in traffic crash mortality rates attributed to use of alcohol, or lack of a seat belt, air bag, motorcycle helmet, or bicycle helmet, United , 1982–2001</p>	Cross sectional	<p>Since 1975, the National Highway Traffic Safety Administration has maintained the Fatality Analysis Reporting System (FARS) which has data from all crashes on US public roads with a death within 30 days</p> <p>858 741 people who died in a crash from US traffic crashes in 1982–2001</p>	<p>To estimate the contributions of five risk factors to changes in US traffic crash mortality: (1) alcohol use by drivers and pedestrians, (2) not wearing a seat belt, (3) lack of an air bag, (4) not wearing a motorcycle helmet, and (5) not wearing a bicycle helmet.</p>	Seat belt, helmet, alcohol	None	<p>43% (366 606) of all crash deaths could be attributed to alcohol , 30% (259 239) to not wearing a seat belt and 1% each to lack of a motorcycle (12 095) or bicycle (10 552) helmet. Jointly, the above risk factors accounted for 61% (528 105) of the deaths;</p> <p>Over the 20 years, 46% of the dead were exposed to at least some alcohol; either they were a driver, pedestrian, or bicyclist with some level of blood alcohol, or their driver or another driver in the crash had some alcohol in their blood. Among dead vehicle occupants 75% wore no seat belt. Half (51%) of dead motorcyclists and 98% of dead bicyclists were not wearing a helmet.</p> <p>Over the 20 years, mortality rates attributed to each risk factor declined: alcohol by 53% (95%CI: 49%-56%); not wearing a seat belt by 49% (95% CI: 47%-52%); no motorcycle helmet by 74% (95% CI: 63%-81%); no bicycle helmet by 39% (95% CI: 33%-45%)</p> <p>There were 153 168 lives saved by decreased drinking and driving, 129 297 by increased use of seat belts, 4305 by increased air bag prevalence, 6475 by increased use of motorcycle helmets, and 239 by increased use of bicycle helmets. Jointly the favorable trends in the above risk factors prevented 293 898 deaths.</p>

<p>Heng K W J, Lee A H P, Zhu S, Tham K Y, Seow E</p> <p>Singapore Med J 2006; 47(5):367</p> <p>Helmet use and bicycle-related trauma in patients presenting to an acute hospital in Singapore</p>	<p>Cross sectional</p>	<p>Data was collected from all individuals treated for bicycle-related trauma between September 1, 2004 and May 31, 2005 using a closed-ended questionnaire.</p> <p>160 bicyclists with mean age of 34.4 years (range 10 to 89 years) were surveyed.</p>	<p>To describe the relationship between bicycle helmet use and injury pattern sustained by patients presenting to an emergency department (ED) in Singapore for bicycle-related trauma.</p>	<p>Helmet, Alcohol</p>	<p>Age, gender, nationality</p>	<p>Helmets were worn by 10.6 percent of the patients. Alcohol was clinically detected in 11.3 percent of bicyclists.</p> <p>Comparing the helmeted group with the non-helmeted group, injury patterns by body region were: head injury 5.9% versus 40.0% (p-value is less than 0.01); facial injury 5.9 % versus 37.1 % (p-value is less than 0.05).</p> <p>Alcohol consumption was more common in males (p=0.045) and with increasing age (p=0.014).</p> <p>Significantly more bicyclists aged 30 years and older did not wear helmets (p=0.04). Helmet use did not correlate with sex or nationality</p>
<p>Kelvin K.W. Yau*</p> <p>Accident Analysis and Prevention 36 (2004) 333–340</p> <p>Risk factors affecting the severity of single Vehicle traffic accidents in Hong Kong</p>	<p>Case-control</p>	<p>Data were obtained from the newly implemented traffic accident data system (TRADS), which was developed jointly by the Transport Department, Police Force and Information Technology Services Department, Hong Kong. In particular, single vehicle accident data of three major vehicle types, namely private vehicles, goods vehicles and motorcycles, which contributed to over 80% of all single vehicle accidents during the 2-year-period 1999–2000, were considered.</p> <p>(N = 794 for private vehicles, N = 220 for goods vehicles, N = 162 for motor cycles)</p>	<p>This study aims to determine the factors affecting the severity of single vehicle accidents by a population-based case-control study.</p>	<p>Seat belt</p>	<p>Age, gender</p>	<p>Higher risk of fatal and serious-injury is found for drivers (or passengers) without wearing seat-belts (OR = 3.003, 90% CI = 1.374–6.562).</p> <p>The conditional proportion of fatal and serious-injury when the driver (and the passengers) properly wears seat-belt is 24% while it becomes 45% when seat-belt has not been worn.</p>
<p>J. Michaelwalsh, Ron Flegel, Leo a. Cangianelli, and Randolph Atkins</p> <p>Traffic Injury Prevention, 5:254–260, 2004</p> <p>Epidemiology of Alcohol and Other Drug Use Among Motor Vehicle Crash Victims Admitted to a Trauma Center</p>	<p>Cross sectional</p>	<p>Data were provided by The R. Adams Cowley Shock Trauma Center (STC) of the University of Maryland Medical Center (UMMC) is a Level I (Committee on Trauma, 1999) regional trauma center for adult trauma victims (≥14 years of age) from the most populated counties in Central Maryland and Baltimore city.</p> <p>During this time, blood and urine was collected from 322 MVC victims.</p>	<p>The objectives of this research were to (1) determine the incidence and prevalence of alcohol and other drug use among motor vehicle crash (MVC) victims admitted to a regional Level-I trauma center, and (2) to examine the utility of using a rapid point-of-collection (POC) drug-testing device to identify MVC patients with drug involvement.</p>	<p>Alcohol, drugs</p>	<p>Age, gender</p>	<p>Overall 59.3% (191/322) of MVC victims had positive toxicology test results. The number of victims testing positive for alcohol-use alone was relatively small (15.83%) compared to the 33.54% that tested positive for drug use only. Approximately one in ten (9.93%) tested positive for a combination of alcohol and some other drug(s).</p> <p>Alcohol was detected in 25.8% of the study cohort.</p>

Alexandra Klimentopoulou, Elena Paliokosta, Elizabeth Towner, Eleni Petridou	Cross sectional	Data on all childhood (0–14 years) nonmotorized bicycle- related injuries recorded in the EDISS for the years 1996–1998 were retrieved.	To evaluate the burden and patterns of nonmotorized bicycle-related injuries in Greece.	Helmet	None	No child was wearing a helmet either among those injured or among the school survey participants.
European Journal of Trauma 2004 · No. 3 Urban & Vogel		2,711 children with bicycle-related injuries (4.8%) were found among the 56,132 injured children				It can be estimated that of the bicycle-related injuries a fraction approaching 8% (217/2,711) could be avoided by restricting bicycle use by children on roads heavily frequented by cars.
Bicycling-Related Injuries among Children in Greece						
Joon-Ki Kim, Sungyop Kimb, Gudmundur F. Ulfarsson , Luis A. Porrello	Cross sectional	The analysis is based on police-reported accident data between 1997 and 2002 from North Carolina, USA.	This research explores the factors contributing to the injury severity of bicyclists in bicycle–motor vehicle accidents using a multinomial logit model. The model predicts the probability of four injury severity outcomes: fatal, incapacitating, non-incapacitating, and possible or no injury.	Helmet, speeding, alcohol	None	The largest effect is caused when estimated vehicle speed prior to impact is greater than 80.5 km/h (50 mph), where the probability of fatal injury increases more than 16-fold.
Accident Analysis and Prevention 39 (2007) 238–251		2934 bicycle accidents were available for study.				Speeding was a factor in 1.1% of the accidents, alcohol intoxication in 5.9% and 94% did not wear a helmet
Bicyclist injury severities in bicycle–motor vehicle accidents						Helmets decrease the probability of fatal injury and possible or no injury (OR=0.451 for both incapacitating and non-incapacitating injuries comparing helmeted vs no helmeted).
Albrecht, M. Hasse, A.; Schulze, H.	Cross sectional	Drivers, passengers and pedestrians injured from a Road Traffic Accidents	Description of alcohol traffic accident	Alcohol	Age, sex	During 1994 and 2004 the number of accidents with injured persons caused by drunk driving decreased by 44%. Still, alcohol as a cause of car accidents is named most frequently in the age group of 21-24 years old for men, followed by 18-20 and 25-34 years for men. The proportion of male accident drivers with alcohol as a cause of the accident is 8 times higher than female accident drivers. Alcohol accidents with injured persons are occurring most frequently in the evening and especially during weekend nights. Young adult drivers s are over represented in night accidents.
Deutsche Hauptstelle Für Suchtfragen e.v. (Hrsg.): Jahrbuch Sucht 2006. Neuland Verlagsgesellschaft mbH, Geesthacht 2006, S. 129-140						
Addictive drugs in road traffic - data and facts						
Anne T. McCartt, Veronika Shabanova Northrup	Cross sectional	Information on belt use among teenagers is based on data extracted from the Fatality Analysis Reporting System (FARS). FARS, a large database managed by NHTSA, contains current and historical information on virtually all fatal crashes occurring on public roads in the United States.	This paper examines teenage belt use rates in the United States, including the factors associated with use and the differences in use rates across the 50 states. The paper was written within the context of ongoing coordinated national efforts to increase seat belt use. Thus, the intent was not only to provide a richer understanding of the factors influencing belt use among teenagers, but also to help target efforts to increase belt use among a high-risk	Seat belt	None	During 1995–2000, mean belt use was 36% among fatally injured teenage drivers and 23% among fatally injured teenage passengers.
Journal of Safety Research 35 (2004) 29–38		22095 teenagers were included				One of the strongest predictors of higher belt use for both drivers and passengers was whether the crash occurred in a state with a primary seat belt law. The likelihood of a fatally injured teenage driver wearing a seat belt was more than doubled (OR = 2.2, p < .05) if the crash occurred in a primary law state rather than a secondary law.
Factors related to seat belt use among fatally injured teenage drivers						Seat belt use was 1.7 times more likely among female drivers than among male drivers (p < .05).

			group—teenagers.			Lower belt use among fatally injured teenage drivers was associated with increasing age; male drivers (30% vs 49%); drivers of SUVs, vans, or pickup trucks rather than cars; older vehicles; crashes occurring late at night; crashes occurring on rural roadways (35% vs 39%); single vehicle crashes; and drivers with BACs of 0.10 or higher (18% vs 40%)
						Among teenage drivers, belt use was highest at age 16. Teenage driver belt use declined as the number of teenage passengers increased, but increased in the presence of at least one passenger 30 years or older.
Rebecca Smith, Lawrence J. Cookb,*, Lenora M. Olson, James C. Reading, J. Michael Deanb	Cross sectional	Two statewide, surveillance databases were used in this analysis: motor vehicle crashes and hospital discharges. The 1992–1997 motor vehicle crash records were obtained from our Department of Transportation. This database contains information on drivers involved in all reported motor vehicle crashes. The hospital discharge database for the same years was acquired from the Utah Health Data Committee/Office of Health Care Statistics, Utah Department of Health. Data include information describing the patient, services received, and charges billed (excluding physician fees) for each inpatient stay.	Measure changes in the prevalence of behavioral factors including police-reported fatigue and alcohol intoxication, as well as self-reported seatbelt use, and assess their effect on hospitalization or death after a motor vehicle crash.	Primary variables of interest were: police-reported fatigue, alcohol intoxication, self-reported seatbelt use.	Not clearly stated	Seatbelt use offered a protective effect from hospitalization or death, while alcohol intoxication contributed to increased likelihood of hospitalization or death. Belt use odds ratios by year: 1992:0.25 (0.21–0.29) 1993: 0.19 (0.16–0.22) 1994: 0.18 (0.15–0.21) 1995: 0.17 (0.15–0.21) 1996: 0.20 (0.17–0.24) 1997: 0.17 (0.15–0.20) Alcohol intoxication odds ratios by year: 1992:2.67 (2.08–3.41) 1993:2.66 (2.08–3.41) 1994: 2.12 (1.63–2.75) 1995:2.35 (1.77–3.10) 1996: 2.82 (2.20–3.60) 1997:2.20 (1.64–2.95) There was an increasing trend for self-reported seatbelt use among crash-involved drivers from 80.5% in 1992 to 89.3% in 1997 ($P < 0.001$). Police-reported alcohol intoxication among crash-involved drivers showed a decreasing trend from 2.4% in 1992 to 1.5% in 1997 ($P < 0.001$).
Accident Analysis and Prevention 36 (2004) 249–255						
Trends of behavioral risk factors in motor vehicle crashes in Utah, 1992–1997						
		The analysis database consisted of 450,286 crash driver records				
Aida Bianco Z Francesca Trani Z Giuseppe Santoro Italo F. Angelillo	Cross sectional	A survey involving a random sample of 412 adolescents aged 14–19 years old attending randomly selected public secondary classes in Catanzaro (Italy) was conducted from April to June 2003.	The objective of this study was to investigate the use of attitudes towards, and adherence to motorcycle helmets in a group of adolescents in Italy.	Helmet	Age, gender	Drivers and passengers who were wearing a helmet when an accident occurred were 43.9% and 31% respectively.
Eur J Pediatr (2005) 164: 207–211						Having had at least one road accident in the last year was higher in males ($X^2=19.51, P<0.001$) and in those older ($t\text{-test}=-3.01, P=0.0028$).
Adolescents' attitudes and behaviour towards motorcycle helmet use in Italy		387 were returned giving a response rate of 93.9%.				

Statistik Austria(Ed.) Wien, 2006 Road traffic accidents in 2005	Cross sectional	Austrian road accident data 2005	To describe accidents of the year 2005 in detail, concerning hours of a day, days of a week, months, regional aspects, in town area or rural area, kind of street.	Alcohol	Age, gender, severity of injury, kind of traffic participation	The number of accidents, injured persons and persons killed is described in detail concerning classes of accident groups, age, sex, severity of injury, type of traffic participation. Accidents with children, school ways, alcohol, motor trucks, railways, buses, dangerous cargos, hit and run accidents, wrong-way drivers and wild animals are mentioned.
Rauh, W. Beyer, R.; Unterweger, J.; Czermak, P. Mobilität Mit Zukunft Nr. 3/2005, Verkehrsclub Österreich (VCÖ), Wien 2005, 47 S Focus traffic safety – Austria in comparison to the EU	Cross sectional	Motorized traffic participants, accident drivers	To provide an analysis of traffic safety and compare Austrian results with those of the EU countries	Age, speed	EU country	The level of traffic safety within the EU Member States varies. While the Scandinavian countries are role models, Austria is within the late-comers in many points. The risk of being hurt in a traffic accident in Austria is three times higher than in the EU countries having the highest traffic safety. Unadjusted speed is the main accident cause in Austria. The age group 21-24 years is the most vulnerable one. Young car drivers and older persons are causing most of all traffic accidents.
Statistik Austria (Ed.) Wien, 2005 Road traffic accidents in 2004		Austrian road accident data 2004	To describe accidents of the year 2004 in detail, concerning hours of a day, days of a week, months, regional aspects, in town area or rural area, kind of street.	Alcohol	Age, gender, severity of injury, kind of traffic participation	The number of accidents, injured persons and persons killed is described in detail concerning classes of accident groups, age, sex, severity of injury, type of traffic participation. Accidents with children, school ways, alcohol, motor trucks, railways, buses, dangerous cargos, hit and run accidents, wrong-way driver and wild animals are mentioned.
J Kaplan, J Kraner, West Virginia Office of the Chief Medical Examiner. L Paulozzi, Div of Unintentional Injury Prevention, National Center for Injury Prevention and Control, CDC. MMWR December 8, 2006 / 55(48);1293-1296 Alcohol and Other Drug Use Among Victims of Motor-Vehicle Crashes - West Virginia, 2004-2005	Cross sectional	CDC analyzed 2004 and 2005 data reported by the West Virginia Office of the Chief Medical Examiner (OCME) to the Fatality Analysis Reporting System (FARS) of the National Highway Traffic Safety Administration (NHTSA). A total of 784 motor-vehicle fatalities resulted from crashes on public roads in West Virginia.	The aim is to measure the prevalence of alcohol and drug use among persons killed in motor-vehicle crashes in West Virginia (where test results were available for >80% of fatalities)	Alcohol, drugs	Age, gender	Alcohol was detected in 32.5% of decedents tested for both alcohol and drugs. Illegal BACs (≥ 0.08 g/dL) were detected in 27.7% of decedents, and BACs ranging from 0.01 to 0.07 g/dL were detected in 4.9%. The prevalence of detectable blood alcohol was higher in males and highest among persons aged 16--34 years. Drivers were more likely to have detectable blood alcohol levels than passengers. Detectable levels of at least one drug were reported for 170 (25.8%) decedents. Of these, 149 (87.6%) had positive blood tests, and 21 (12.4%) had positive urine tests. The prevalence of detectable drug levels was higher in males and highest among persons aged 35--54 years. Drivers were more likely to have detectable drug levels than passengers. Among women and persons aged ≥ 55 years, drugs were more prevalent than alcohol. Nearly half (47.3%) of all decedents had alcohol or drugs in their bodies; 11.1% had both. Among decedents with detectable blood alcohol levels, 34.1% tested positive for drugs. Among decedents with no detectable blood alcohol levels, 21.8% tested positive for drugs.

Lower T, Egginton N, Owen R Aust N Z J Public Health 2003;27(3):333-6 Agricultural motorcycle injuries in WA adolescents	Cross sectional	Data included 326 students (Years 11 and 12) was drawn from the six designated agricultural colleges, in Western Australia.	To determine and compare the prevalence, nature and predictors of agricultural motorcycle injuries (2, 3 & 4 wheels) in a high-risk cohort of Western Australian adolescents.	Speeding, helmet	None	Predictors of injury were maximum travelling speed exceeding 101 km/hour (OR 4.53) and only sometimes wearing a helmet (OR 4.10).
David D. Clarke, Patrick Ward, Wendy Truman Accident Analysis and Prevention 37 (2005) 523–529 Voluntary risk taking and skill deficits in young driver accidents in the UK	Cross sectional	Data are from midland police forces in the UK covering the years 1994–1996 inclusive. A sample of 3437 accident reports was considered, including 1296 in detail involving drivers aged 17–25.	The focus of this study was on four main problem areas in young driver accident involvement: intersection turn accidents; accidents on bends/curves; rear-end shunt type accidents and accidents occurring during the hours of darkness. Certain contributory factors are known to be common in <i>all</i> young driver accidents, and one of these, speeding, is discussed here first followed by a summary of research on the four types of accidents to be examined, and a brief overview of research methodology.	Alcohol, speeding	Age, gender	26% of the sample where the driver exceeded the posted speed limit and this was considered a contributory factor in the accident 7% of the sample where the driver has been discovered to be over the legal limit for alcohol as measured in blood or breath sample
Michael D. Keall , William J. Frith, Tui L. Patterson Accident Analysis and Prevention 37 (2005) 816–824 The contribution of alcohol to night time crash risk and other risks of night driving	Case control	The control data, from the New Zealand Travel Survey were collected over a period of a year – from mid-1997 to mid-1998 – by interviewing in person, approximately, 14,000 people from 7000 randomly sampled households. The case data were driver-kilometre. It was defined as a case if the driver had been involved in a crash on that road section. A control driver-kilometre consisted of a kilometre of road travel not involving a crash driven by a representative sample of New Zealand drivers.	This study decomposes the New Zealand risk of driving at night into risk associated with alcohol and risk associated with inherently night time factors	Alcohol	Age, gender	The overall impact of alcohol use on driver risk was shown to decrease with increasing age For weekend nights, 21% of cases were estimated to be preceded by drinking alcohol according to the travel survey Given the levels of drinking and driving on weekend nights, the overall effect of alcohol was shown to contribute almost half of weekend night time risk for drivers aged under 40 on lower volume roads.
Soffer D, Zmora O, Klausner JB, Szold O, Givon A, Halpern P, Pelek Q. Isr Med Assoc J.2006 Feb;8(2):98-102 Alcohol use among trauma victims admitted to a level I trauma center in Israel.	Cross sectional	Data were obtained from the Israel National Trauma Registry, based on patient records in our institution (Tel Aviv Sourasky Medical Center) from January 2001 to December 2003. 5529 patients were included	To determine the incidence of alcohol-related trauma, and to specify the time of day, the cause of trauma, and the morbidity and mortality rates as compared to non-alcohol-associated trauma in the tertiary trauma unit of a large medical center in Tel Aviv.	Alcohol	Age, gender, origin	Of the 5529 patients in the study, 170 had high alcohol blood levels (> 50 mg/dl). Patients intoxicated with alcohol had higher rates of road accident injuries (35% versus 24% non-intoxicated) and stab wounds (29% vs. 7%). The Injury Severity Score of the alcohol-intoxicated patients was higher (32% > or = 16 vs. 12% > 16). The alcohol-intoxicated patients were more likely to be non-Jewish (34% vs. 9%), young (82% aged 15-44 years) and males (91%). Most of the alcohol-related injuries occurred during the weekend (47%) and during evening-late night hours (from 11 p.m. to 7

<p>E. Desapriya, I. Pike, S. Babul</p> <p>IATSS RESEARCH Vol.30 No.1, 2006</p> <p>Public Attitudes, Epidemiology and Consequences Of Drinking And Driving In British Columbia</p>	<p>Cross sectional</p>	<p>British Columbia's traffic accident system accumulates and maintains information on all reported traffic collisions occurring throughout the province. Annual crash data were obtained from Traffic Collision Statistics - Insurance Corporation of British Columbia (ICBC).</p> <p>Sample size not clearly stated</p>	<p>The objectives of this study are to:</p> <p>(1) Review the epidemiology of crash occurrence in BC/Canada</p> <p>(2) Examine driver and passenger fatalities and injuries in drinking and driving motor vehicle crashes, and estimate the risk of non seat belt use in injuries and fatalities</p> <p>(3) Review public attitudes about alcohol impaired driving in BC/Canada</p>	<p>Alcohol, seat belt</p>	<p>Gender, age</p>	<p>When compared to restrained occupants, unrestrained occupants were almost 5 times more likely to die (Odds Ratios (OR) 4.70), or be injured (OR 4.66).</p> <p>For all drivers, each 0.02 increase in BAC nearly doubles the risk of being involved in a fatal crash. For drivers ages 16-20, the risk of a fatal crash is even higher with each 0.02% rise in BAC. The estimated crash risk for male drivers ages 16-20 is at least three times higher than the risk for male drivers age 25 and older at all BAC levels.</p> <p>Of all drivers with alcohol as a factor involved in Police-attended casualty collisions, 79.3% were male.</p> <p>With respect to age, 7% of the alcohol-involved drivers were under the legal drinking age of 19.</p>
<p>J. Michael Walsh, Ron Flegel, Randolph Atkins, Leo A. Cangianelli, Carnell Cooper, Christopher Welsh, Timothy J. Kerns</p> <p>Accident Analysis and Prevention 37 (2005) 894-901</p> <p>Drug and alcohol use among drivers admitted to a Level-1 trauma center</p>	<p>Cross sectional</p>	<p>Data were provided by The R. Adams Cowley Shock Trauma Center (STC) of the University of Maryland Medical Center (UMMC) is a Level-1 (Committee on Trauma, 1999) regional trauma center for adult trauma victims (≥ 14 years of age) from the most populated counties in Central Maryland and Baltimore City.</p> <p>168 MVC victims of whom 108 were identified as the driver in the crash</p>	<p>The purpose of this research was to determine the incidence and prevalence of drug use, alcohol use, and the combination of drug and alcohol use among motor vehicle crash (MVC) victims admitted to a Level-1 trauma center.</p>	<p>Alcohol and drug</p>	<p>Age and gender</p>	<p>Toxicology results indicated that 65.7% of drivers tested positive for either commonly abused drugs or alcohol.</p> <p>Alcohol was the most prevalent single drug detected in 30.6% of the drivers admitted as a result of motor vehicle crashes. More than 1 in 4 drivers tested positive for marijuana use.</p> <p>Drug and alcohol use among drivers was similar to that of passengers while pedestrian MVC victims showed a slightly different pattern. Pedestrian MVC victims had higher rates of alcohol only, and lower rates of drug only use than drivers or passengers. Overall, however, there were no statistically significant differences in drug/alcohol use for drivers, passengers, or pedestrians.</p> <p>Overall, the drivers testing positive for alcohol and THC tended to be younger (under 35), while the drivers testing positive for cocaine, opiates, and benzodiazepines tended to be older (over 35). There were no statistically significant differences in drug or alcohol use between males and females.</p>

<p>Allan F. Williams , Sergey Y. Kyrychenko, Richard A. Retting</p> <p>Journal of Safety Research 37 (2006) 227– 232</p> <p>Characteristics of speeders</p>	<p>Observational study</p>	<p>Data ere provided by Virginia Department of Motor Vehicles (DMV)</p> <p>The sample consisted of 3,042 vehicles (1,862 speeders and 1,180 slower drivers). After screening these 3,042 photos to exclude ineligible vehicles (1,158) and illegible images (392), a total of 1,492 observations remained (856 speeders and 636 slower drivers).</p>	<p>To determine the characteristics of speeders, defined as drivers of vehicles traveling at least 15 mph above the posted speed limit and relatively faster than surrounding vehicles.</p>	<p>Speeding</p>	<p>Age, gender, number of years licensed</p>	<p>The models indicated that speeders had an average of 60% (95% CI: 4%-146%, P=0.0334) more crashes per year than the comparison group, 112% more total traffic violations, 131% more speeding violations and 119% more moving violations other than speeding.</p>
<p>KRISTIN AHLM and ANDERS ERIKSSON</p> <p>Traffic Injury Prevention, 7:219–223, 2006</p> <p>Driver’s Alcohol and Passenger’s Death in Motor Vehicle Crashes</p>	<p>Cross sectional</p>	<p>The study includes all motor vehicle passengers (n=420) who died in crashes in Sweden 1993 through 1996 and were medicolegally autopsied at the Departments of Forensic Medicine.</p>	<p>This study (1) analyzes the relationship between passenger’s death and alcohol inebriation of the driver and (2) estimates the role of alcohol as the cause of a crash by examining who was at fault, sober, or inebriated.</p>	<p>Alcohol</p>	<p>Age, gender</p>	<p>One-fifth of the fatally injured passengers and one- fifth of the tested drivers were under the influence of alcohol.</p> <p>The youngest drivers had the highest prevalence of drunken driving. The age group 20–29 years showed the highest proportion of alcohol positive individuals (31%).</p> <p>Drivers at fault were alcohol positive in 21% of these crashes and drivers were not at fault in 2% of these crashes. The relative risk for a driver at fault to be alcohol positive was 1.50 (95% CI 1.33–1.71).</p> <p>In 53% of the crashes where both the passenger and driver were alcohol positive, the passenger had a lower alcohol concentration than the driver.</p> <p>Notably, the children were riding with a driver who was under influence of alcohol in 13% of these crashes</p>
<p>Peter F. Ehrlich, J. Kristine Brown, Mark R. Sochor, Stewart C. Wang, Martin E. Eichelberger</p> <p>Journal of Pediatric Surgery (2006) 41, 1854– 1858</p> <p>Factors influencing pediatric Injury Severity Score and Glasgow Coma Scale in pediatric automobile crashes: results from the Crash Injury Research Engineering Network</p>	<p>Cross sectional</p>	<p>Data were provided from the Crash Injury Research Engineering Network (CIREN).</p> <p>461 pediatric motor vehicle crash occupants (242 boys, 219 girls) who sustained injuries were available to be analysed.</p>	<p>This study used detailed pediatric motor vehicle crash reconstructions from the Crash Injury Research Engineering Network (CIREN) to enhance understanding of injury outcomes in motor vehicle crashes involving children.</p>	<p>Restraint use</p>	<p>Age</p>	<p>In frontal crashes, mean ISS in properly restrained versus improperly restrained children was 12.4 versus 17.6 (P = .001). Mean GCS was 13.4 in properly restrained children versus 12.6 in improperly restrained children (P = .08). Survival to discharge percentage was 98% in the properly restrained group versus 92% in the improperly restrained group (P = .05).</p> <p>In lateral crashes, mean ISS in properly restrained versus improperly restrained children was 23.8 versus 19.9 (P = .1). Mean GCS was 10.4 in properly restrained children versus 11.7 in improperly restrained children (P = .03). Survival to discharge percentage was 82% in the properly restrained group versus 92% in the improperly restrained group (P = .13).</p>

<p>MARJAN SIMONCIC</p> <p>Journal of transportation and statistics Volume 7, Issue 2-3, 2005, Pages 13-25</p> <p>A Bayesian network model of two-car accidents</p>	<p>Bayesian network model</p>	<p>The empirical part is based on data from the road accidents database assembled by the Slovenian Ministry of the Interior from police reports.</p> <p>For the model, 1998 data containing 36,704 Slovenian police accident reports were used. From this total, 17,558 (48%) were of the selected type.</p>	<p>This paper presents a Bayesian network model of two-car accidents based on different factors that influence accident outcomes. The outcomes examined are "fatality or serious injury" and "other outcomes." Influencing factors include: road characteristics traffic flow characteristics, time/season factors, characteristics of the people involved in an accident (e.g., age, sex, driving experience, health status, intoxication), use of protective devices (seat belt, air bag), types of vehicles (especially their crash resistance design), and speed of the vehicles involved.</p>	<p>Alcohol, seat belt</p>	<p>Age, gender</p>	<p>Only a small share of drivers involved in accidents was intoxicated (4.3%) whereas 88% were using a seat belt.</p> <p>The probability that the cause of the accident is inappropriate speed (HI) is 0.279 in the case of accident type "Fos" (fatality or serious injury) and 0.134 for the accident type "Oth" (less severe injury). The odds ratio is therefore 2.1.</p> <p>There are also significant differences between men and women, with women being more likely to use seat belts than men.</p>
<p>Vira Kasantikul, James V. Ouelletb, Terry Smith, Jetn Sirathranont, Viratt Panichabhongse</p> <p>Accident Analysis and Prevention 37 (2005) 357–366</p> <p>The role of alcohol in Thailand motorcycle crashes</p>	<p>Prospective study</p>	<p>Researchers conducted on-scene, in-depth investigation and reconstruction of 969 collisions involving 1082 motorcycle riders and 399 passengers who were investigated in six different regions within Thailand over a 20-month period. Accidents were randomly sampled and included all levels of injury severity.</p>	<p>The objectives of this report of findings regarding alcohol were: (1) to identify the general characteristics of alcohol-involved motorcycle accidents by comparing them to the non-alcohol accidents, (2) to evaluate how alcohol contributes to accident causation, based on the accident reconstruction and causation analysis of these on-scene, in-depth investigations, and (3) to suggest countermeasures to reduce motorcycle accidents.</p>	<p>Alcohol</p>	<p>Age, gender</p>	<p>A total of 393 (36.3%) of the 1082 accident-involved riders had been drinking alcohol prior to the crash. Alcohol involvement was higher in Bangkok than upcountry, 40% versus 29%. In both Bangkok and upcountry about 88% of riders who had been drinking appeared to be seriously impaired .</p> <p>About 5% of car drivers who were interviewed had been drinking before being involved in a crash with a motorcycle. Like motorcyclists, alcohol-involved car drivers were significantly more likely to be the primary cause of a crash than nondrinking car drivers ($\chi^2 = 7.869, p < .005, d.f. = 1$). Thirty four of 52 drinking car drivers (65%) were the primary cause of the crash, compared to 173 of 387 non-drinking car drivers (45%).</p>
<p>Ouellet JV, Kasantikul V.</p> <p>Traffic Inj Prev 2006 Mar;7(1):49-54</p> <p>Motorcycle helmet effect on a per-crash basis in Thailand and the United States</p>	<p>Cross sectional</p>	<p>The data are drawn from two detailed, in-depth studies of motorcycle accidents, in which trained investigators collected extensive accident evidence on-scene immediately after the crash. This article compares helmeted and unhelmeted motorcycle riders on a per-accident basis for fatality rates, the rate of serious (AIS > 2) brain injuries among survivors, or an outcome that involved either of the two.</p> <p>Nine hundred motorcycle crashes in Los Angeles and 969 crashes in Thailand were investigated in detail at the accident scenes, including photos of vehicles, skids, damage, and sometimes the rider.</p>	<p>To compare the effectiveness of motorcycle helmets seen in prospective on-the-street motorcycle accident investigations.</p>	<p>Helmet</p>	<p>None</p>	<p>In both studies, approximately 6% of riders were killed and 20-25% were hospitalized. Overall, unhelmeted riders were two to three times as likely to be killed, and three times as likely to suffer either death or survival with AIS > 2 brain injury. Unhelmeted survivors had three to four times as many AIS > 2 brain injuries as helmeted riders on a per-crash basis. Nearly 100% of riders with AIS > 4 somatic injuries died. Such injuries were 30% of Thailand fatalities and 57% of L.A. fatalities, but only about 2-3% of the overall accident population. Among the 97-98% of riders with AIS < 5 somatic injuries, helmet use could prevent about three-fourths of fatalities and brain injuries.</p>

Zargar M, Khaji A, Karbakhsh M. East Mediterr Health J 2006 Jan-Mar;12(1-2):81-7 Pattern of motorcycle-related injuries in Tehran, 1999 to 2000: a study in 6 hospitals.	Cross sectional	Data were obtained from the trauma registry and questionnaires completed by trained physicians. Of a total of 8500 patients with trauma injuries, 1332 were motorcycleists.	The purpose of the study was to study motorcycle-related injuries in Tehran from 23 August 1999 to 21 September 2000 in 6 hospitals.	Helmet	None	Helmet use was noted in only 8.6% of cases. There were 28 fatalities and head injuries were the prominent cause of death. Of those who died, none had been wearing a helmet at time of the crash. Only 2.7% of helmeted riders sustained a head injury, compared with 11.2% of riders without a helmet.
Per Holmgren, Anita Holmgren, Johan Ahlner Forensic Science International 151 (2005) 11–17 Alcohol and drugs in drivers fatally injured in traffic accidents in Sweden during the years 2000–2002	Cross sectional	During the years 2000–2002, alcohol, pharmaceuticals and illicit drugs were analysed in blood samples from fatally injured drivers in Sweden. Data were delivered by the Swedish National Road Administration. The total number of drivers was 920 and in 855 of these, corresponding to 93%, a toxicological investigation was performed.	the frequency of toxicological analysis performed in fatally injured drivers ranged from 89% to over 96%. This high frequency together with an analytical approach that includes alcohol, pharmaceuticals and illicit drugs would make it possible to draw conclusions about the prevalence of drugs in these cases.	Alcohol, drugs	Age, gender	Alcohol was the most common drug detected in drivers with a prevalence of 19.8% in 2000, 25.0% in 2001 and 21.8% in 2002. In both years 2000 and 2002 women had a slightly higher median BAC than men but lower maximum BAC
Lisa K. Spainhour, Isaac A. Wootton, John O. Sobanjo, Patrick A. Brady Transportation Research Record Volume 1982/2006 Causative Factors and Trends in Florida Pedestrian Crashes	Case study review	Researchers reviewed state records, traffic crash reports, traffic homicide investigative report narratives, diagrams, and photographs and incorporated select accident reconstructions and site visits 353 fatal pedestrian crashes that occurred in Florida, primarily in 2000	The study identified contributing causes and trends of predominant pedestrian crash types. Researchers reviewed state records, traffic crash reports, traffic homicide investigative report narratives, diagrams, and photographs and incorporated select accident reconstructions and site visits.	Alcohol	None	Alcohol use by the pedestrian or the driver was determined as the primary factor in 45% of the cases. Where alcohol use was determinable, 69% of pedestrians crossing not in crosswalks were under the influence
TIMOTHY J. SMALL, JOANNE M. SHEEDY AND ANTHONY J. GRABS ANZ J. Surg. 2006; 76: 43–47 COST, DEMOGRAPHICS AND INJURY PROFILE OF ADULT PEDESTRIAN TRAUMA IN INNER SYDNEY	Cross sectional	The study was carried out at St Vincent's Hospital, Sydney including all adult pedestrians injured by motor vehicles and admitted as inpatients during the years 2002–2004. A total of 180 patients (64% men and 36% women) were identified.	The objective of this study was to examine the demographics, injury profile, outcomes and cost of pedestrian versus motor vehicle accidents in a central city hospital in Sydney.	Alcohol	Age	Of those patients who died or were injured forty-nine per cent of patients tested positive for consuming alcohol, with an average blood alcohol concentration (BAC) of 0.22%. Of those patients who died with measured BAC, 57% had consumed alcohol, with an average BAC of 0.18. Young adults (17–39 years) had the highest level of ETOH intoxication (48.9% with BAC >0.10%) and lowest mortality rate (3.7%). The elderly (65+ years) had a lower ETOH intoxication rate (27.3% with BAC >0.10%) and a significantly higher mortality rate (22.7%) (P < 0.001).
Roy A. Purssell; Mark Yarema; Jean Wilson; Ming Fang; Richard Simons; Sharon Kasic, CCHRA; Riyad B. Abu-	Cross sectional	We reviewed British Columbia Trauma Registry records from Jan. 1, 1992, to Mar. 31, 2000, and identified drivers of motor vehicles who were hospitalized for treatment of crash-related injuries. Patient	Our objective was to determine the proportion of intoxicated drivers hospitalized following motor vehicle crashes who were subsequently convicted of an	Alcohol, seat belt	Age, gender	In patients with levels >17.3 mmol/L, the police had listed ethanol as a contributing factor in 70.6% of cases. Of automobile drivers, 69% were reported to have

<p>Laban,; Jeffrey Brubacher, ;Ioana Lupu</p> <p>CJEM 2004 Mar;6(2):80-8</p> <p>Proportion of injured alcohol-impaired drivers subsequently convicted of an impaired driving criminal code offence in British Columbia</p>		<p>identifiers were then used to link with the Insurance Corporation of British Columbia's (ICBC) contraventions database and the ICBC Traffic Accident System collisions database.</p> <p>Of 6067 patients identified in the Trauma Registry, 4042 had not been administered a blood ethanol test, 209 had no driver's licence match in the relevant databases and 119 died, leaving 1697 eligible patients</p>	<p>impaired driving criminal code offence.</p>			<p>been wearing a seatbelt.</p> <p>Single-vehicle accidents, which comprised 50% of the total, were almost twice as frequent in intoxicated versus non-intoxicated drivers (67% v. 38.5%).</p>
<p>E. PIKOULIS, V. FILIAS, N. PIKOULIS, P. DASKALAKIS, E. D. AVGERINOS, G. TAVERNARAKIS, M. BELECHRI, P. PAPPA, C. THEOS, A. GERANIOS, E. GOUGOUDI, A. LEPPANIEMI and P. TSATSOULIS</p> <p>International Journal of Injury Control and Safety Promotion, Vol. 13, No. 3, September 2006, 190 – 193</p> <p>Patterns of injuries and motor-vehicle traffic accidents in Athens</p>	<p>Cross sectional</p>	<p>Specially trained health visitors of the Emergency Department Injury Surveillance System (EDISS) interviewed in person every injured victim who was brought into the Emergency Service of the 'Asclepeion' of Voula Hospital. The study was performed during a 3-year period, from 1996 to 1998</p> <p>The sample consists of 4564 victims of MVAs</p>	<p>The aim of this study is to present information on the pattern of injuries in Athens, in order to understand the magnitude of the problem and develop rational prevention programmes.</p>	<p>Helmet, seat belt</p>	<p>None</p>	<p>A total of 29.8% of motorcycle drivers and 5.7% of motorcycle passengers were wearing a helmet and 26.3% of car drivers and 14.1% of car passengers were wearing seatbelts.</p>
<p>Jaymie R. Meliker, Ronald F. Maiob, Marc A. Zimmermand, Hyungjin Myra Kim, Sarah C. Smith, Mark L. Wilson</p> <p>Accident Analysis and Prevention 36 (2004) 1129–1135</p> <p>Spatial analysis of alcohol-related motor vehicle crash injuries in southeastern Michigan</p>	<p>Cross sectional</p>	<p>Data were collected from April 1992 to August 1994 (Trauma Center) and April 1993 through June 1994 (teaching hospital).</p> <p>There were 2148 victims of a MVC in the sampling frame. Only 69 refused (3%), 1705 consented (79%), and 374 were never approached to participate (18%). Of the 1705 consenting subjects, 449 were not drivers of a passenger vehicle, and 329 were released before an interview was obtained, resulting in 927 eligible, consenting, interviewed subjects.</p>	<p>The aim of this study was to evaluate geographic patterns of alcohol-related motor vehicle crashes and to determine if locations of alcohol outlets are associated with those crashes.</p>	<p>Alcohol</p>	<p>None</p>	<p>Of the 773 MVCs successfully geocoded into the GIS, 139 (18.0%) had a driver with BAC\geq0.10%.</p> <p>The death rate for drivers in alcohol-related MVCs (6%) was about three times that for non-alcohol-related drivers (2%).</p> <p>Single-vehicle nighttime crashes (between 8 p.m. and 4 a.m.) accounted for 19% of all MVCs and 70% of alcohol-related MVCs. But only 50% of single-vehicle nighttime crashes were alcohol-related. On the other hand, 85% (11/13) of single-vehicle nighttime fatalities were alcohol-related.</p>

<p>Jack Y.K. Cheng, David T.W. Chan, Vincent K.K. Mok</p> <p>Forensic Science International 153 (2005) 196–201</p> <p>An epidemiological study on alcohol/drugs related fatal traffic crash cases of deceased drivers in Hong Kong between 1996 and 2000</p>	Cross sectional	<p>Between 1996 and 2000 in Hong Kong, a total of 197 FVC cases of deceased drivers were investigated.</p>	<p>This study is designed to evaluate the correlation between fatal vehicle crashes (FVC) and consumption of alcohol and/or drugs among drivers.</p>	Alcohol, drugs	None	<p>For SVC (single vehicle crashes) cases, drugs with/without alcohol were detected in 11 cases (12%). Alcohol alone was detected in 40 cases (44%). The remaining cases were classified as no significant finding.</p> <p>For MVC (multiple vehicle crashes) cases, only 1 (1%) case was positive for drugs, 21 cases (20%) for alcohol alone and 84 cases (79%) with no significant finding.</p>
<p>BARTL, G. & HAGER, B. Institut Gute Fahrt (Hrsg.), Wien, 2006</p> <p>Analysis of causes of car accidents, focusing drivers</p>	Cross sectional	<p>Standardized interviews with 2128 Austrian car drivers. 726 of them named 852 accidents in total. In addition, 1000 telephone interviews with driver and non-driver were carried out to ask for representative number of driven car kilometers per year, age and sex.</p>	<p>To provide an analysis of accident causation</p>	Alcohol, speed	Age	<p>36% of all accidents were caused by non-attention. In many cases the person's own thoughts were the point of distraction. 14% of accidents were caused by failure to adjust speed. Most drivers were driving too fast because of stress and thoughtlessness. Aggressiveness and risk seeking were a lesser cause of accidents. 14% of accidents were based on lack of driving experience, followed by a lack of a safety margin (10%), excessive demand (7%), fatigue (5%) and alcohol (5%). 42% of accidents were based on emotionally burdening situations. The accident rate of accidents with personal injuries by age, percentage of population and driven kilometers for persons aged 17-21 is 12 times that for persons aged 32-61 (risk for persons aged 32-61 years is 2.3 accidents for 10 000 000 driven kilometers). For persons aged 82-86 the accident risk is 3.3 times higher than for the middle-aged group and for persons aged 87-91 it is 11 times higher.</p>
<p>KRAINZ, D. WANNENMACHER, E.; BUCHEGGER, C.; EDER, S.; HEIMBUCHNER, K.; HEMETSBERGER, S.; LANG, S.; MAITZ, J.; ORTNER, A.; SKORIC, M.; STROBL, K.; WALCH, M.; WIESER, I.; WILFLING, B.; ZWANZIGER, C. Kuratorium für Verkehrssicherheit, Wien und Graz, Dezember 2004, 21 S.</p> <p>Phoning habits of persons at the car wheel</p>	Cross sectional	<p>The survey was carried out in spring-summer 2004. Participants: 1693 persons driving their car aged 17 to 83</p>	<p>To provide knowledge about the spreading of mobile phone within car drivers, phone habits during driving, facts regarding non-usage of hands free phone set, attitude to law, demographic correlations</p>	Mobile phone	Age, sex	<p>93.7% or 1587 persons of the included car drivers stated they own a mobile phone. Of them, just 43.9% own a hands free phoning set. Of these persons owning a hands free phoning set just 30.7% have a set fixed in the car. 28.7% of the mobile phone owners never phone in the car, but 21.3% phone a lot, according to their declarations. Male drivers phone more often than female ones. Men own hands free phone sets more frequently. Just 60.8% owner of hands free phone set always use it during phoning. 43.3% mobile callers without hands free phone set argued that this would not be necessary. Further, 15.7% stated it would be too expensive. In the group of men aged 25-34 the number of frequent callers is above-average. In company cars, phone frequency is higher than in private cars. The highest phone frequency was found in luxury cars.</p>

<p>R. Scott Nelson, Paul T. Gustafson, Randolph E. Szlabick,</p> <p>J Trauma. 2006;60:1297–1300.</p> <p>Motorcycle Collisions Involving White-Tailed Deer in Central and Northern Wisconsin: A Rural Trauma Center Experience</p>	Retrospective chart review	<p>A retrospective review of records from St. Joseph’s Hospital/ Marshfield Clinic, a tertiary referral center in central and northern Wisconsin, was performed to capture all motorcycle collisions involving animals for 9 years from October 1993 to October 2002.</p> <p>A total of 55 deer motorcycle collisions were identified over the 9-year period (49 drivers and 6 passengers).</p>	<p>While the numbers and trends of deer versus vehicle collisions are a growing concern for state and local leaders in the Midwest, as well as other regions of the country, the incidence and severity of injury to motorcyclists has not been reported in the medical literature and this is the purpose of the current study.</p>	<p>Helmet, alcohol</p> <p>None</p>	<p>None</p>	<p>Of the total sample of 55 participants 71% were not wearing helmets and 16% were found to be Intoxicated.</p> <p>None of the intoxicated patients were wearing helmets and their average ISS was significantly higher than the non-intoxicated helmeted population ($p = 0.09$).</p>
<p>Prabhakar Dhungana, Ming Qu</p> <p>Journal of Safety Research - Traffic Records Forum proceedings 36 (2005) 501 – 504</p> <p>The risks of driving on roadways with 50 miles per hour posted speed limit</p>	Cross sectional	<p>Probabilistic linkage of crash, emergency medical services, and hospital data was conducted for year 1999–2000</p> <p>Sample not clearly stated</p>	<p>Nebraska Crash Outcome Data Evaluation System (CODES) aimed this study to identify potential risk factors attributable to the increased crash fatality and injury rates on 50 mph-roads. More specifically, the study examined why the crash injury and death rates on 50 mph-roads were higher than would be expected in general.</p>	<p>Speeding, alcohol, seat belt</p>	<p>Age, gender</p>	<p>The estimated odds ratio for crash injury when comparing unbelted to belted was: OR=2.7 on <50 mph-roads OR=3.0 on 50 mph-roads OR=3.9 on >50mph-roads</p> <p>The estimated odds ratio for crash injury when alcohol was involved was: OR=2.0 on <50 mph-roads OR=2.8 on 50 mph-roads OR=2.0 on >50mph-roads</p>
<p>Rebecca Mitchell, Timothy Driscoll, Sandra Healey</p> <p>Accident Analysis and Prevention 36 (2004) 851–860</p> <p>Work-related road fatalities in Australia</p>	Cross sectional	<p>There were 543 workers fatally injured in work-related road fatality incidents during 1989–1992 in Australia.</p>	<p>This study aimed to provide a detailed description of all work-related road deaths in Australia during 1989–1992, compare the results to a prior investigation of work-related road fatalities, and consider the use of data from the Australian Transport Safety Bureau (ATSB) as a possible source of information on work-related road deaths.</p>	<p>Alcohol, dugs, speeding, helmet</p>	<p>None</p>	<p>The majority of involved vehicles (64.5%) were not over or unlikely to be over the speed limit., for (11.0%) the vehicles were definitely travelling in excess of the speed limit, for (9.6%) the vehicles were considered to be possibly travelling in excess of the speed limit.</p> <p>Alcohol appeared to be important in 7.2% of deaths for which blood alcohol information was available.</p> <p>Of these fatally injured workers, the majority (80.0%) were wearing a helmet at the time of the incident.</p>
<p>RA Shults, A Greenspan, A Dellinger, Div of Unintentional Injury Prevention, T Haileyesus, Office of Statistics and Programming, National Center for Injury Prevention and Control; KC Lee, EIS Officer</p> <p>MMWR June 9, 2006 / 55(22);624-627</p>	Cross sectional	<p>The National Electronic Injury Surveillance System-All Injury Program (NEISS-AIP) provides data on all injury-related hospital ED visits. For this report, NEISS-AIP was expanded to collect additional information about injuries and restraint use for child passengers aged ≤12 years involved in MVCs during 2004 and examined at 15 U.S. EDs.</p> <p>For the 1,370 children aged ≤12 years seen for injuries attributed to motor vehicles at the 15 participating EDs,</p>	<p>The aim of the study is to assess the prevalence of restraint use in children aged ≤12 years</p>	<p>Restraint use</p>	<p>Age, gender</p>	<p>Of the children injured in MVCs, 45% were either not restrained or inappropriately restrained. Most inappropriate restraint use occurred among children aged 4–8 years who were placed prematurely in seatbelts.</p> <p>The percentage of unrestrained children who were hospitalized was three times that of restrained children.</p> <p>The percentage of unrestrained children with multiple diagnoses was nearly twice that of restrained children (30% versus 18%).</p>

Nonfatal Injuries and Restraint Use Among Child Passengers -United States, 2004		CPSC contacted 911 households (66%). Of these 911 households, 738 (81%) agreed to participate; 649 (88%) child passengers in MVCs were eligible for this study.				Restraint use was similar for boys and girls
Motao Zhu , Susan B. Hardman, Lawrence J. Cook Journal of Safety Research - Traffic Records Forum proceedings 36 (2005) 505 – 507 Backseat safety belt use and crash outcome	Cross sectional	This study examined two 2002 New York State public databases: police crash reports and hospital discharge data. The study population was backseat vehicle occupants aged at least 16 years, riding in passenger cars or light trucks, in reported crashes in New York State during 2002. A total of 370 backseat passengers were hospitalized as a result of a crash.	The objective of this study was to impute missing values on safety belt use and adjust for over-reporting in police crash reports. We also examined risk factors for safety belt non-use by backseat passengers age 16 or older, and compared crash outcomes between belted and unbelted backseat occupants involved in crashes.	Seat belt	None	Of the 27,884 unbelted passengers in crashes, 259 were hospitalized, and of the 14,989 belted passengers, 111 were hospitalized. Hospitalization rates were 9.3 per 1,000 unbelted occupants and 7.4 per 1,000 belted occupants. Although unbelted and belted backseat passengers had an equal median length of stay (3 days), a total of 1,481 hospitalization days were accumulated by unbelted backseat passengers, compared to only 647 days by belted backseat passengers. Non-use of safety belts was consistently related to a higher rate in each group of Barell Injury Matrix. The traumatic brain injury rate was 2.9 per 1,000 involved for unbelted occupants and 2.3 per 1,000 involved for belted. The vertebral cord injury rate was 1.8 per 1,000 involved for unbelted occupants and 1.1 per 1,000 involved for belted.
Centers for Disease Control and Prevention (CDC). MMWR 2004 Feb 6;53(4):77-9 Child Passenger Deaths Involving Drinking Drivers --- United States, 1997—2002	Cross sectional	To characterize the occurrence of child passenger deaths involving drinking drivers during 1997--2002, CDC analyzed data from the Fatality Analysis Reporting System (FARS) of the National Highway Traffic Safety Administration. During 1997--2002, a total of 9,622 child passengers died in motor-vehicle crashes	The aim of the study is to characterize the occurrence of child passenger deaths involving drinking drivers	Alcohol	None	2,335 (24%) were killed in crashes involving drinking drivers. Of the 2,061 alcohol-related crashes involving drinking drivers in which children were killed, 1,624 (79%) involved at least one driver with a BAC of ≥ 0.08 g/dL.
KÖFALVI, G. Teil I: Verkehrsunfall und Fahrzeugtechnik 42.Jg., Heft 2/Februar 2004, S. 43-50. Teil II: Verkehrsunfall und Fahrzeugtechnik 42.Jg., Heft 3/März 2004, S. 71-76 Safeness of commercial vehicles in Europe. Results of activities of accident reconstruction. Part I. Part II.	Cross sectional	4500 accident drivers of commercial vehicles	To analyze accident sequence concerning commercial vehicles	Speed	Age, driving experience	Speed as an accident cause has a much smaller part within the accident causes of cars compared to commercial vehicles (55%). Defects of motor force transmission (all together 20%) and gadflies (56%) are the two biggest components. About 7% of HGVs had a defect leading to the accident.

<p>Dr Declan Bedford Dr A O'Farrell Dr Fenton Howell</p> <p>Ir Med J. 2006 Mar;99(3):80-3.</p> <p>Blood Alcohol Levels in Persons Who Died from Accidents and Suicide</p>	Cross sectional	<p>All cases where the person died as a result of injury or suicide in 2001 and 2002 in three countries of Ireland were included.</p> <p>There were 129 deaths eligible for inclusion. 55 out of 129 died as a result of RTAs</p>	<p>This study was undertaken to identify the (BACs) in persons who died as a result of suicide or injury.</p>	Alcohol	Gender	<p>In this study a fifth of the drivers killed had alcohol concentrations above the legal limit, a significant reduction on the 46% in a study thirty years ago. Of those drivers who died and had alcohol detected in their blood 80% were aged in their twenties and all male. Male drivers in their twenties were more likely to have a BAC higher than the legal limit than drivers of any other age (p<0.03).</p> <p>Drivers who were killed during night-time accidents were 8 times more likely to have a positive BAC compared to those drivers killed during the daytime, (OR 8.0, 95% CI 0.7 to 85.1, p<0.08). Males were 4.9 times more likely than females to be the driver of a vehicle involved in an accident causing a fatality (Odds Ratio 4.9; CI: 1.04-26.3, p<0.03).</p> <p>(66.7%) of pedestrians who were killed had alcohol detected in their blood.</p>
<p>Ann M. Carr, Julian E. Bailes, James C. Helmkamp, Charles L. Rosen, Vincent J. Miele,</p> <p>NEUROSURGERY VOLUME 54 NUMBER 4 APRIL 2004 861</p> <p>NEUROLOGICAL INJURY AND DEATH IN ALL-TERRAIN VEHICLE CRASHES IN WEST VIRGINIA: A 10- YEAR RETROSPECTIVE REVIEW</p>	Cross sectional	<p>We retrospectively reviewed trauma registry data for 238 patients who were admitted to the Jon Michael Moore Trauma Center at the West Virginia University School of Medicine after all-terrain vehicle crashes, between January 1991 and December 2000.</p>	<p>The purpose of this study was to profile all-terrain vehicle crash victims with neurological injuries who were treated at a Level I trauma center.</p>	Helmet, alcohol, drugs	None	<p>Only 22% of all patients were wearing helmets. Alcohol and/or drugs were involved in almost one-half of all incidents.</p> <p>Only 15% of victims less than 16 years of age were wearing helmets.</p>
<p>Lotte Larsen</p> <p>Journal of Hazardous Materials 111 (2004) 115–122</p> <p>Methods of multidisciplinary in-depth analyses of road traffic accidents</p>	Cross sectional	<p>The data collection included police reports, the group's investigation of accident sites and vehicles involved, and interviews with the involved road users and witnesses.</p> <p>Not clearly stated</p>	<p>The purpose of this multidisciplinary approach is to provide a rather precise knowledge of the contributing factors leading up to the accident.</p>	Speeding, seat belt, alcohol, drugs	None	<p>Regarding injury factors, the most prevalent was the failure to wear a seat-belt.</p> <p>The main accident factors in the 17 analysed head-on collisions were excessive speed (eight), drunk driving and driving under the influence of illegal drugs (five and four, respectively).</p> <p>The most frequent accident factors in the single vehicle accidents were speeding (22), negligence (17 occasions) and drunk or drugged driving (13 and 4, respectively).</p>

<p>Gastón Oscar Babio, and Antonio Daponte-Codina,</p> <p>J Trauma. 2006;60:620–626.</p> <p>Factors Associated with Seatbelt, Helmet, and Child Safety Seat Use in a Spanish High-Risk Injury Area</p>	<p>Cross sectional</p>	<p>Data for this study were taken from the adult sample (16 and older) of the 1999 Andalusian Health Survey (AHS).</p> <p>Total adult participants were 6,484 individuals.</p>	<p>The purpose of this study was to estimate predictors of using seatbelts, helmet and children safety seats.</p>	<p>Seat belt, helmet, child safety seat use</p>	<p>Age, gender</p>	<p>The likelihood of using seatbelts is 15% higher for females than for males (OR=1.15,P<0.05) and increases with age. People who have a university degree are much more likely to use seatbelts than others. Home ownership, an individual measure of wealth, is directly associated with seatbelt use (OR=1.27,P<0.05). Contrary to the latter and to other behaviors, seatbelt use is greater in lower than average family income communities.</p> <p>The likelihood of using helmet increases with age, higher educational level and average family income.</p> <p>The likelihood of use of child safety seats increases with the educational level. Also, people married or living with a partner (OR=3.42,P<0.01) and people who live in more populated communities (OR=2.05,P<0.01) are much more likely to use child safety seats.</p>
<p>Xuedong Yan , Essam Radwan, Mohamed Abdel-Aty</p> <p>Accident Analysis and Prevention 37 (2005) 983–995</p> <p>Characteristics of rear-end accidents at signalized intersections using multiple logistic regression model</p>	<p>Cross sectional</p>	<p>The 2001 accident database, obtained from the Florida Department of Highway Safety and Motor Vehicles (DHSMV), was used in this study.</p> <p>The dataset identified 7666 two-vehicle rear-end accidents that happened at signalized intersections and 15,734 non-rear-end accidents involved by not-at-fault drivers as exposure.</p>	<p>To examine the accident characteristics, this study utilized the 2001 Florida traffic accident data to investigate the accident propensity for different vehicle roles (striking or struck) that are involved in the accidents and identify the significant risk factors related to the traffic environment, the driver characteristics, and the vehicle types.</p>	<p>Alcohol, drugs</p>	<p>Age, gender, residence</p>	<p>The drivers under influence of alcohol, rug, or both alcohol and drug are substantially over-involved in accidents with odds ratios estimated at 149 (P<0.0001), 100 (P<0.0001) and 45 (P<0.0001) respectively.</p> <p>Moreover, the analysis confirmed he substantial affect of alcohol/drug use on driver's safety. Even drivers who had been drinking under legal alcohol use evel could be 9.58 times more likely involved in a rear-end accident than non-drinking drivers</p>
<p>Michael L. Nance, Nicolas Lutz,Kristy B. Arbogast, Rebecca A. Cornejo, Michael J. Kallan, Flaura K. Winston, and Dennis R. Durbin</p> <p>Ann Surg. 2004 January; 239(1): 127–131.</p> <p>Optimal Restraint Reduces the Risk of Abdominal Injury in Children Involved in Motor Vehicle Crashes</p>	<p>Cross sectional</p>	<p>Cross-sectional study of children aged younger than 16 years in crashes of insured vehicles in 15 states, with data collected via insurance claims records and a telephone survey.</p> <p>A probability sample of 10,927 crashes involving 17,132 restrained children, representing 210,926 children in 136,734 crashes was collected between December 1, 1998 and May 31, 2002.</p>	<p>While optimal restraint has been shown to reduce the risk of injuries overall, its effect on specific types of injuries, in particular abdominal injuries, has not been demonstrated, which is the aim of the current study.</p>	<p>Restraint use</p>	<p>Age, seating position</p>	<p>Among all restrained children, optimal was noted in 59% (n = 120,473) and suboptimal in 41% (n = 83,555).</p> <p>After adjusting for age and seating position (front vs. rear), optimally restrained children were more than 3 times less likely [odds ratio 3.51 (95% confidence interval, 1.87–6.60, P < 0.001)] as suboptimally restrained children to suffer an abdominal injury.</p> <p>The absolute risk of abdominal injury varied by age group, from 0.01% among 0 to 3-year-olds to 0.17% among 4- to 8-year-olds. As previously noted, 4- to 8-year-olds had the highest rate of suboptimal restraint.</p>

<p>CLAUDIA PILEGGI, AIDA BIANCO, CARMELO G.A. NOBILE,ITALO F. ANGELILLO,</p> <p>J Pediatr 2006;148:527-32</p> <p>RISKY BEHAVIORS AMONG MOTORCYCLING ADOLESCENTS IN ITALY</p>	Cross sectional	<p>1000 adolescents aged 14-20 years attending randomly selected public secondary schools of Italy, from which 894 responded.</p>	To investigate the relationship between risky behaviors and motorcycling in adolescents in Italy.	Helmet, speeding, cell phone, alcohol, drugs, smoking, tiredness	Age, gender, parental educational status, family members as source of information about motorcycle use	<p>Logistic regression analysis results showed that the adjusted odds ratio of traffic-related accidents occur twice as much in adolescents who used cell phones while driving compared with those who did not (95% CI 1.06-3.94)</p> <p>It was found that 25.7% had been involved in at least one traffic related accident during a 1-year period while motorcycling</p> <p>The frequency of self-reported routine helmet use as driver or passenger was low, ie, 54.2% and 28.5%, respectively. Routine helmet use was significantly higher in males (OR_1.76; 95% CI 1.05-2.96) significantly lower in those who were current smokers (OR_0.58; 95% CI 0.37-0.92) and alcohol drinkers (OR_0.45; 95% CI 0.25-0.82).</p> <p>20.7% and 14.3% riding at least once after drinking alcohol or taking drugs, respectively.</p>
<p>J. Kristine Brown, Yuezhou Jing, Stewart Wang, Peter F. Ehrlich</p> <p>Journal of Pediatric Surgery (2006) 41, 362-367</p> <p>Patterns of severe injury in pediatric car crash victims: Crash Injury Research Engineering Network database</p>	Cross sectional	<p>Data were collected from the CIREN multidisciplinary crash reconstruction network</p> <p>417 MVCs with 2500 injuries were analyzed</p>	This study aims to identify reproducible injury patterns in MVCs involving children.	Seat belt	None	<p>Seat belts were protective for pelvic (OR=0.4, CI: 0.2-0.8) and orthopedic (OR=0.3, CI: 0.2-0.5) injuries. Not significant difference found between seat belt use and injuries in spine, head, thoracic and abdomen.</p>
<p>Cummings P, Rivara FP.</p> <p>JAMA 2004 Jan 21;291(3):343-9</p> <p>Car occupant death according to the restraint use of other occupants: a matched cohort study</p>	Matched cohort	<p>United States traffic crashes in 1988-2000, using data from the Fatality Analysis Reporting System.</p> <p>SUBJECTS: Target pairs, at least 1 of whom died: 61 834 front-seat pairs, 5278 rear-seat pairs, and 21 127 pairs on the left or right side.</p>	To estimate the association between death of a car occupant (the target) and restraint use by other occupants.	Seat belt	None	<p>The risk of death was greater for a restrained front target occupant in front of an unrestrained occupant compared with a restrained front target in front of a restrained occupant (adjusted RR, 1.20; 95% confidence interval [CI], 1.10-1.31).</p> <p>For a restrained rear target occupant behind an unrestrained occupant compared with a restrained rear target occupant behind a restrained occupant, the adjusted RR was 1.22 (95% CI, 1.10-1.36).</p> <p>For a restrained side target occupant sitting next to an unrestrained occupant compared with a restrained side target occupant sitting next to a restrained occupant, the adjusted RR was 1.15 (95% CI, 1.08-1.22).</p> <p>Among unrestrained target occupants, the adjusted RRs were, for front targets, 1.04 (95% CI, 0.97-1.12), rear targets, 1.22 (95% CI, 1.10-1.36), and side targets, 0.85 (95% CI, 0.80-0.92).</p>

<p>K. Toro, M. Hubay, P. Sotonyi, E. Keller</p> <p>Forensic Science International 151 (2005) 151–156</p> <p>Fatal traffic injuries among pedestrians, bicyclists and motor vehicle occupants</p>	Cross sectional	<p>Cases of 664 fatal traffic accidents (371 pedestrians, 45 bicyclists, and 248 motor vehicle occupants) were collected from 1999 to 2001 using the database of the Forensic Institute in Budapest.</p>	<p>The objective of this study was to investigate characteristic injuries of pedestrians and bicyclists (unprotected) compared to motor vehicle occupants' (protected) in fatal traffic accidents.</p>	Alcohol	None	<p>BAC was over the legal limit in 129 (42%) and below in 183 (58%) cases. Blood alcohol concentrations were negative in 159 (51%), further results were: 0.01–0.5 g/l in 24 (7.7%), 0.51–0.80 g/l in 9 (2.8%), 0.81–1.50 g/l in 30 (9.6%), 1.51–2.50 g/l in 53 (17%), 2.51–3.50 g/l in 29 (9.2%), and above 3.51 g/l in 8 (2.5%) cases.</p> <p>Pedestrians and bicyclists had blood alcohol levels over the legal limit in 48%; motor vehicle occupants had 33%. The highest BACs levels were detected among pedestrians over 2.51 g/l in about 20%. Similar high concentrations were present only in 4% in the protected group.</p>
<p>Matthieu de Lapparent</p> <p>Accident Analysis and Prevention 38 (2006) 260–268</p> <p>Empirical Bayesian analysis of accident severity for motorcyclists in large French urban areas</p>	Cross sectional	<p>The statistical data source is the French database of accidents reported by police authorities (namely BAAC for Bulletin d'Analyse des Accidents Corporels).</p> <p>A sample of 6348 crashed motorcyclists was considered</p>	<p>The present article deals with individual probabilities of different levels of injury in case of a motorcycle accident. The approach uses an empirical Bayesian method based on the Multinomial-Dirichlet model to conduct an analysis of the probability distributions about the severity of accidents at the level of individuals in large and dense French urban areas during year 2003.</p>	<p>Helmet, weather, lighting, type of crash, road signals</p>	Age, gender	<p>The frequency of motorcyclists wearing helmet was: 12% for those not injured 82% for those slightly injured 5% for those severely injured 1% for those fatally injured</p> <p>The values of the parameters related to the effects of wearing a helmet on the shapes of the probability distributions of accident severity are not significant, no doubt due to the sample selection bias</p>
<p>M. Trinidad Gómez-Talegón, F. Javier Alvarez</p> <p>Accident Analysis and Prevention 38 (2006) 201–207</p> <p>Road traffic accidents among alcohol-dependent patients: The effect of treatment</p>	Prospective study	<p>A prospective study was carried out of 176 patients (147 males, 29 females; mean age 42.9 years) diagnosed as alcohol dependent according to the DSM-IV criteria in three alcoholic treatment centres in Castilla y León, Spain.</p>	<p>The aim of the study is to analyze the effect on traffic accidents of treatment of patients with alcohol-related problems. To do so, the prevalence of traffic problems in a sample of patients with a diagnosed dependence on alcohol was assessed for three periods: during their lifetime, in the year preceding the start of treatment and over the year of treatment.</p>	Alcohol	Age, gender	<p>Nearly one out of four patients (22.1%) had been involved in a traffic accident, mostly with only damage to the vehicles and less frequently with injuries or deaths.</p> <p>The prevalence of traffic problems among those patients who followed treatment for 1 year (4.3%) was lower than in the year before treatment (15.9%)</p>

<p>Shahid Shafi, Avery B. Nathens, Alan C. Elliott, and Larry Gentilello</p> <p>J Trauma. 2006;61:1374 – 1379.</p> <p>Effect of Trauma Systems on Motor Vehicle Occupant Mortality: A Comparison Between States With and Without a Formal System</p>	Cross sectional	<p>Data were acquired from several federal agencies including the Centers for Disease Control (CDC), The National Highway Traffic Safety Administration (NHTSA), the United States Department of Transportation (DOT), and the United States Census Bureau.</p> <p>Sample not clearly stated</p>	<p>Population-based studies using a “before-and-after” methodology report a reduction in motor vehicle collision mortality with implementation of statewide trauma systems (TS). However, concurrent improvements in roads, cars, restraint systems, and changes in rates of drunk driving, socioeconomics, speed limits, urban or rural mix, and traffic density may also be responsible for the progressive reduction in mortality rates. The hypothesis of the study is that a statewide TS independently reduces injury mortality, irrespective of other factors.</p>	Seat belt, speeding	<p>Gender, race, primary seat belt laws, miles traveled, population density, per capita income, types of registered vehicles and rural or urban mix.</p>	<p>Actual restraint use was associated with a slight increase in MVO mortality, which was an unexpected finding (RR=1.04; 95%CI: 1.02-1.05)</p> <p>Speed limits \geq65 mph were associated with an increase in MVO mortality rates (RR=1.59; 95%CI: 1.19-2.13)</p>
<p>ANDREW STEPTOE, JANE WARDLE, NURI BAGES, JAMES F. SALLIS, PABLO-ALFONSO SANABRIA-FERRANDd and MARIA SANCHEZ</p> <p>Psychology and Health August 2004, Vol. 19, No. 4, pp. 527–540</p> <p>Drinking and driving in university students: an international study of 23 countries</p>	Cross sectional	<p>The study was carried out between 1999 and 2001 with a network of research collaborators in 23 countries</p> <p>We assessed drinking and driving and associated attitudes and legislative practices in 8282 male and 10 816 female students at universities in 23 countries.</p>	<p>Alcohol-impaired driving is a major problem in many countries. We assessed drinking and driving and associated attitudes and legislative practices in the study population</p>	Alcohol	Age, gender, origin	<p>The highest alcohol rate was reported in both men and women in the USA, where 43% of male and 28% of female university students stated that they had driven after having too much to drink over the past year. After the USA, the next highest rates were reported in men from Venezuela, Columbia and Southern European countries (Greece, Spain, Italy and Portugal).</p>
<p>Bart Depreitere, Carl Van Lierde, Sigrid Maene, Christiaan Plets, Jos Vander Sloten, Remy Van Audekercke, Georges Van der Perre , Jan Goffin</p> <p>Accident Analysis and Prevention 36 (2004) 561–567</p> <p>Bicycle-related head injury: a study of 86 cases</p>	Cross sectional	<p>Data were obtained from police files, medical records, computed tomography head scans and a patient questionnaire.</p> <p>The database consists of a consecutive series of 86 victims of bicycle accidents who underwent a neurosurgical intervention in our hospital between 1990 and 2000.</p>	<p>In the present report, we describe the head injuries sustained by these 86 pedal cyclists with serious head injury. Moreover, we have investigated the relation between the different types of head injuries and outcome, in order to assess which would be the most important lesions to protect against if lesion-specific protection were possible.</p>	Helmet	Age, gender	<p>In 56 patients, it was documented that they were not wearing a helmet at the moment of the accident. In the remaining 27 cases, the questionnaire was not returned and no information on the wearing of a bicycle helmet was available. The wearing of a bicycle helmet was documented in only three victims.</p>

<p>Thomas Troglauer , Tove Hels, Peter Falck Christens</p> <p>Accident Analysis and Prevention 38 (2006) 105–111</p> <p>Extent and variations in mobile phone use among drivers of heavy vehicles in Denmark</p>	Survey	<p>The data were collected through written questionnaires distributed by mail to a sample of 2000 professional drivers in Denmark during the spring of 2003.</p> <p>In total 1153 responded to the questionnaire.</p>	<p>The purpose of this study was to investigate the extent and variations in phone use among drivers of heavy vehicles. It was hypothesised that mobile phone use while driving would be a widespread activity among the truck drivers and that the amount of usage would be higher in this group than among private drivers. A secondary purpose was to investigate the impact of mobile phone use on traffic safety.</p>	Cell phone	None	<p>It was found that more than 99% of the drivers used mobile phones while driving.</p> <p>0.5% reported that their use of mobile phones had contributed to an accident, while 6% had experienced their mobile phone use causing a dangerous situation. However, 66% reported experiencing dangerous situations because of others road users' mobile phone use. The odds ratio of drivers experiencing dangerous situations when using cell phone was significantly higher than drivers not reporting dangerous situations (odds ratio=2.08 [CI];1.23,3.50).</p> <p>The younger the driver, the higher the mobile phone use. The odds of being in a higher phone use category for drivers in the age group 25–34 years was 0.72 times the odds of drivers in the age group 18–24 years being in a higher phone use category.</p>
<p>Ted Miller , Cecelia Snowden, Johanna Birkmayer , Delia Hendrie</p> <p>Accident Analysis and Prevention 38 (2006) 1162–1167</p> <p>Retail alcohol monopolies, underage drinking and youth impaired driving deaths</p>	Cross sectional	<p>Surveys on youth who drank alcohol and binge-drunk recently and their beverage choices; census of motor vehicle fatalities by driver blood alcohol level.</p> <p>Sample not clearly stated</p>	To explore associations of state retail alcohol monopolies with underage drinking and alcohol-impaired driving deaths.	Alcohol	None	<p>Lower consumption rates in monopoly states, in turn, were associated with a 9.3% lower alcohol-impaired driving death rate under age 21 and with an 8.3% lower odds that a driver under 21 who died in a crash was BAC-positive ($p=0.017$) in monopoly states versus non-monopoly states.</p> <p>Alcohol monopolies may prevent 45 impaired driving deaths annually</p>
<p>R S Mangus, C J Simons, L E Jacobson, E W Streib and G A Gomez</p> <p>Inj Prev 2004;10:56-58</p> <p>Current helmet and protective equipment usage among previously injured ATV and motorcycle riders</p>	Cross sectional	Two hundred eighty surveys were completed.	Injury recidivism among trauma patients may be related to an individual pattern of high risk behaviors. The extent to which an injury episode modifies this behavior pattern is unknown. A self report, voluntary, anonymous, cross sectional survey was administered to motorcycle and all-terrain vehicle (ATV) riders at a popular recreation site.	Helmet	None	<p>Persons with a history of minor ATV/motorcycle injury only were less likely to use a helmet or protective equipment (78% v 74%, $p = 0.58$ and 49% v 41%, $p = 0.29$). Persons with a history of any major ATV/motorcycle injury were also less likely to use a helmet or protective equipment (77% v 56%, $p = 0.03$ and 48% v 40%, $p = 0.53$).</p>

<p>Julie Brown, Mary E McCaskill, Michael Henderson and Lynne E Bilston</p> <p>Journal of Paediatrics and Child Health 42 (2006) 345–349</p> <p>Serious injury is associated with suboptimal restraint use in child motor vehicle occupants</p>	Retrospective case review	<p>Data from all child occupants presenting at the Children’s Hospital at Westmead between July 2002 and January 2005 subsequent to a motor vehicle crash.</p> <p>Data were collected for 152 child occupants aged 2 and 8 years.</p>	To investigate the relationship between restraint usage and injury outcome in child motor vehicle occupants aged 2–8 years.	Child restraint	Age	<p>While nearly all children (94%) used some restraint, most (82%) used a suboptimal form of restraint. Thus only 18% of the total sample were found to be optimally restrained.</p> <p>Younger children were more likely to be optimally restrained than older children (2–4 years old 26%, 5–6 years old 19%, 7–8 years old 2%).</p>
<p>Dursun Delen *, Ramesh Sharda, Max Bessonov</p> <p>Accident Analysis and Prevention 38 (2006) 434–444</p> <p>Identifying significant predictors of injury severity in traffic accidents using a series of artificial neural networks</p>	Sensitivity analysis	<p>Data were acquired from the National Automotive Sampling System General Estimates System, which covers approximately 0.85% of all US crashes reported by the police</p> <p>This study used 30358 police-reported accident records</p>	This study uses a series of artificial neural networks to model the potentially non-linear relationships between the injury severity levels and crash-related factors. It investigates the injury severity experienced by drivers in automobile crashes without limiting the study to any specific geographic area of the United States.	Alcohol, drugs, seat belt, type of the vehicle, lighting, condition of the road, type of collision, date of the accident	Age and gender	<p>The use of a restraint system like a seat belt, use of alcohol or drugs, persons’ age and gender, and vehicle role in the accident were found to have an important influence on the outcome of the crash.</p> <p>At the same time, weather conditions or the time of the accident did not seem to affect the severity risk of injury.</p>
<p>Jennifer S. Zakrajsek , Jean T. Shope</p> <p>Journal of Safety Research 37 (2006) 443–451</p> <p>Longitudinal examination of underage drinking and subsequent drinking and risky driving</p>	Cross sectional	<p>Participants were 3,156 young adults, from the high school graduation classes of 1991 and 1992, who had participated in the longitudinal Alcohol Misuse Prevention Study</p>	Alcohol use, alcohol misuse, and risky driving from adolescence into young adulthood were compared by drinking onset age.	Alcohol, drugs	Gender, race, age, marital status, education attainment	<p>Three percent of the participants had at least one alcohol related crash in their driving history. Thirty-nine percent of the alcohol crashes occurred before the age of 21; 39% were between the ages of 21 and 25; and 22% occurred when the participants were 26 and older. Differences in the likelihood of an alcohol crash by drinking onset did not reach significance during any age period.</p>
<p>ALLAN F. WILLIAMS and JOANN K. WELLS</p> <p>Traffic Injury Prevention, 6:56–59, 2005</p> <p>Characteristics of Vehicle - Animal Crashes in Which Vehicle Occupants Are Killed</p>	Cross sectional	<p>Police reports on 147 fatal vehicle–animal crashes during 2000–2002 were obtained from nine states in which 160 people died, 114 vehicle operators, and 46 passengers.</p>	The goal was to determine common crash types, types of animals involved, and steps that could be taken to reduce the crashes and injuries.	Helmet, seat belt	None	<p>Thirty-five percent were reported to be wearing helmets.</p> <p>Overall seat belt use was reported to be 39% (39% among drivers, 38% among passengers).</p>

<p>S Knight, L J Cook and L M Olson</p> <p>Inj Prev 2004;10:53-55</p> <p>The fast and the fatal: street racing fatal crashes in the United States</p>	Cross sectional	<p>The National Highway Traffic Safety Administration Fatality Analysis Reporting System data for 1998–2001 were used for the analyses.</p> <p>There were 149 568 fatal crashes and 315 (0.21%) involved street racing and 399 fatalities occurred in these crashes.</p>	<p>The objective of this study was to determine the annual incidence of fatal motor vehicle crashes involving street racing and to describe the characteristics of these crashes compared to other fatal crashes in the United States.</p>	speed	None	<p>In contrast to other fatal crashes, street racing fatal crashes were more likely to occur on urban roadways and were nearly six times more likely to occur at travel speeds ≥ 65 mph</p>
<p>Y.G.L. Bastos, S.M. de Andrade, D.A. Soares, T. Matsuo</p> <p>Public Health (2005) 119, 930–932</p> <p>Seat belt and helmet use among victims of traffic accidents in a city of Southern Brazil, 1997–2000</p>	Cross sectional	<p>For this study, data were obtained from the Londrina SIATE database. The study population consisted of the victims of car and motorcycle accidents from the metropolitan area of Londrina, seen at SIATE between 1 January 1997 and 31 December 2000.</p> <p>A total of 6298 motorcyclists and 3796 car occupants were seen at the Londrina SIATE during the study period.</p>	<p>The objective of the present study was to analyse the use of safety devices (helmets and seat belts) among victims of motorcycle and car accidents</p>	Helmet, seat belt	None	<p>The frequency of non-use of motorcycle helmets decreased throughout the study years (from 62.5% in 1997 to 13.9% in 2000), with the difference between years being significant ($P!0.001$). No linear trend was observed, suggesting a non-constant rate of decline.</p> <p>Failure to use a seat belt did not show a linear declining trend, although a significant difference in the frequency of this behaviour was observed between years ($P!0.001$), probably due to the reduction from 54.3% in 1997 to 36.1% in 1998. Since then, the proportion of non-users of seat belts has remained constant.</p>
<p>Panagiotidis DN, Theodossiadis PG, Petsias CB, Kyriaki TE, Marakis TP, Friberg TR, Moschos MN.</p> <p>European Journal of Ophthalmology 2004 Mar-Apr;14(2):144-8.</p> <p>Ocular injuries secondary to motor vehicle accidents</p>	Prospective study	<p>In this prospective study the authors included 67 consecutive patients with ocular trauma secondary to motor vehicle accidents who were hospitalized in the Athens University Eye Clinic from September 1993 to December 1996.</p>	<p>Ocular trauma is one of the main causes of visual reduction or loss, particularly in the younger population.</p>	Seat belt	None	<p>Only 3 (5.2%) of the 58 persons injured inside automobiles used safety belts and none of the motorcyclists used crash helmets during the accidents.</p>
<p>Walter L. Biffi, Joshua D. Schiffman, David T. Harrington, John Sullivan, Esq., Thomas F. Tracy, Jr. and William G. Cioffi</p> <p>J Trauma. 2004;56:24 – 29.</p> <p>Legal Prosecution of Alcohol-Impaired Drivers Admitted to a Level I Trauma Center in Rhode Island</p>	Cross sectional	<p>Between January 1, 1997, and June 30, 1998, 3,274 patients were admitted to the trauma service at Rhode Island Hospital (RIH), of whom 525 were drivers in an MVC.</p> <p>The BAC was measured in 387 (74%) drivers.</p>	<p>The purpose of this study was to measure the rate of legal prosecution among impaired drivers admitted to a trauma center after MVCs, and to determine the recidivism rate among these individuals.</p>	Alcohol	Age, gender	<p>Blood alcohol concentration (BAC) was measured in 387 (74%) of 525 drivers, of whom 137 (35%) had BAC > 100 mg/dL.</p>

<p>Matthieu de Lapparent</p> <p>Accident Analysis and Prevention 37 (2005) 1086–1092</p> <p>Individual cyclists' probability distributions of severe/fatal crashes in large french urban areas</p>	<p>Cross sectional</p>	<p>The statistical data source is the French database of accidents reported by police authorities (namely BAAC for Bulletin d'Analyse des Accidents Corporels).</p> <p>The initial dataset of crashes for year 2000 reports 6590 bicycle accidents. Among these latter, 5427 happened in urban areas, which represent 82.35% of the total number of crashes. 918 accidents happened in very dense urban areas.</p>	<p>The present article deals with individual cyclists' probabilities of severe injury or death from a bicycle accident. We use an empirical Bayesian method to conduct an analysis of the fatal/severe probability distribution of a bicycle accident, at the level of individuals, in dense French urban areas.</p>	<p>Helmet, weather, lighting, type of crash, road signals</p>	<p>Age, gender</p>	<p>Only 5% of the 918 bicyclists was wearing a helmet</p> <p>Wearing a helmet lowers the average probability to have a fatal/severe accident, whatever the location and its characteristics (model estimate=-1.2284)</p>
<p>PAUL J. HEWSON</p> <p>Traffic Injury Prevention, 6:127–134, 2005</p> <p>Cycle Helmets and Road Casualties in the UK</p>	<p>Cross sectional</p>	<p>The study was based on the police reported "Stats 19" data.</p> <p>The sample consists of 16960 cyclists</p>	<p>Bicycle helmets have been advocated as a means of reducing injury among cyclists. This assertion, derived from a number of case controlled studies carried out in hospitals, conflicts with results from population level studies. In the Western countries where these case control studies have been performed, it appears that cycling morbidity is dominated by sports and leisure users. The generalizability of studies on helmet effectiveness in relation to utilitarian transport cycling is not clear. This study therefore considers population level data for reported road traffic injuries of cyclists and pedestrians.</p>	<p>Helmet</p>	<p>Age, gender</p>	<p>In particular, no association could be found between differing patterns of helmet wearing rates and casualty rates for adults and children.</p>
<p>Todd A. Nelson and John W. Hafner Jr,FACEP</p> <p>Pediatric Emergency Care Volume 21, Number 11, November 2005</p> <p>Emergency Department Pediatric All-terrain Vehicle Injuries in West Central Illinois</p>	<p>A retrospective descriptive study</p>	<p>The study was performed of local emergency department cases entered into the US Consumer Product Safety Commission database. All visits involving an all-terrain vehicle-related injury in children younger than 18 years from January 1994 to December 2001 were explicitly reviewed and compared with aggregate national Consumer Product Safety Commission pediatric all-terrain vehicle data.</p> <p>One hundred eighty-seven children (age range, 2–17 years) from 14 West Central Illinois counties were treated in the emergency department during the study period.</p>	<p>This study was prepared to evaluate pediatric all terrain vehicle-related injuries treated in a tertiary care emergency department in West Central Illinois.</p>	<p>Helmet</p>	<p>None</p>	<p>Of those injured, 13% had known helmet use, 39% had no helmet use and 48% of cases had no documentation</p> <p>No difference in the ISS was seen for helmet use</p>

<p>Martinus Richter, Hans-Christoph Pape, Dietmar Otte, and Christian Krettek, FRACS</p> <p>J Trauma. 2005;58:591–595.</p> <p>The Current Status of Road User Injuries Among the Elderly in Germany: A Medical and Technical Accident Analysis</p>	Cross sectional	<p>Since 1972, a local traffic accident research unit has collected prospective data for all reported traffic accidents in Germany.</p> <p>In 12,309 documented traffic accidents between 1985 and 1998, 1,843 elderly citizens (65 years and older) were involved, 1,260 of which were reported to have been injured.</p>	<p>A medical and technical analysis of the reported traffic accidents leading to injury among the elderly was performed and compared with that for younger road users to establish a basis for effective prophylaxis.</p>	Seat belt, speeding	None	<p>Serious or severe injuries occurred for 36.5% of the injured elderly road users as car occupants (unrestrained, 58%; restrained, 34%), Among the injured ERUs, serious or severe injuries occurred for 24% of the bicyclists and pedestrians in crashes with a collision speed slower than 30 km/hour (18.6 mph), as compared with 78% occurring in crashes with a collision speed faster than 50 km/hour (31mph). Approximately half of the involved bicyclist- and pedestrian-related injuries among the ERUs could have been avoided if the colliding motorized vehicle would have been driven 15 km/ hour (9.3 mph) slower.</p>
<p>WÖGERBAUER, E. Freie Fahrt Heft 3/März 2005, S. 72. Auto Touring Heft 3/März 2005, S. 74.</p> <p>Darling, I am in the car ...</p>	Cross sectional	Interviews of 1700 car drivers	To perform a survey on phoning during driving	Mobile phone	None	<p>This study showed that 94% of car drivers own a cellular phone. Two thirds of car drivers use their mobile phone during the journey. 60% of calls are private. 12% stated they read sms (short messages) while driving the car. Further, 5% write and send sms while driving their car.</p> <p>Observation of driving cars showed that each 12th driver on the wheel is phoning with the mobile phone on the car. Phoning drivers have a greater distance to the car in front of them, they reduce their speed and also reduce their wheeling movements. The accident risk of drivers phoning is 5 times higher than the risk of non-phoning drivers.</p>
<p>Gregory H. Bledsoe and Guohua Li</p> <p>2005 Southern Medical Association</p> <p>Trends in Arkansas Motorcycle Trauma After Helmet Law Repeal</p>	Cross sectional	<p>Annual motorcycle registration data for the years 1990 through 2001 were obtained from the Arkansas Department of Finance and Administration.</p> <p>6870 motorcycle crashes are included in the study</p>	<p>This study aimed to assess the impact of the 1997 Arkansas helmet law repeal on motorcycle registrations, crash and fatality risks, and alcohol involvement in motorcycle crashes.</p>	Helmet, alcohol	None	<p>After the repeal, an increase in motorcycle registrations correlated with a marked rise in the total number of crashes and fatalities; however, fatalities per crash remained virtually the same. The proportion of motorcycle fatalities that were not wearing a helmet increased from 47.0% (47/100) before the repeal to 78.2% (104/133) after the repeal ($P = 0.001$). The overall percentage of fatal motorcycle crashes involving alcohol use remained unchanged after the repeal (37.6% [29/77] to 38.5% [40/104], $P = 0.91$), but the percentage of fatal crashes involving drinking nonhelmeted drivers increased from 14.2% (11/77) to 33.6% (35/104) ($P = 0.003$). Inebriated motorcyclists killed in crashes were overwhelmingly nonhelmeted (87.5%, 35/40) after the repeal, up from 37.9% (11/29) before the repeal ($P < 0.001$).</p>

David W. Eby , Jonathon M. Vivoda, Renée M. St. Louis Journal of Safety Research 37 (2006) 261–265 Driver hand-held cellular phone use: A four-year analysis	Cross sectional	This study presents the results of 13 statewide surveys of cellular phone use in Michigan between August 2001 and September 2005. Data include 133453 drivers	The purpose of this study was to assess changes in the rate of hand-held cellular phone use by motor-vehicle drivers on a statewide level in Michigan.	Mobile phone	None	The results showed that cellular phone use has increased from 2.7% to 5.8% in four years.
BARTL, G.: CIECA – 50th Congress 2006, Marseille Lifelong education: the context in terms of road accidents.		Traffic participants in EU: car drivers, two wheel vehicles, pedestrians		Speed, alcohol	Age	56% of traffic participants in the EU were killed in cars, followed by 18% on two wheel vehicles and 15% as pedestrians. Young and older people were much more likely to be injured or killed as car drivers, when taking kilometers driven and the population curve into consideration. In general, the main cause of accidents was inattention (about one third). In detail, accident causes can be attributed specifically to age groups
SEIFERT, J. EKKERNKAMP, A. Deutscher Universitäts-Verlag GmbH, Wiesbaden, 2006 Accident cause research Concrete prevention considering new criteria		112 traffic accidents and 289 involved persons (184 men, 105 women) were analyzed	To identify reasons of accident causation	Speed, seat belt	Gender	Of the 289 involved persons, 178 (62%) were hurt (55%) or killed (11%). Car accidents in rural areas lead to more severe injuries than car accidents in town. The degree of severity is influenced by the direction of the collision, cause of accident, sitting position, sex and location of the accident. Crucial causes of accidents stated were unadjusted speed (25%), mistakes on priority in traffic (20%) and limitation of fitness to drive (17%). Women have more accidents caused by mistakes on priority in traffic. Men have more accidents caused by high speed. Risk-taking reduces with increased age. The risk-taking reduction in age is equal in women and men. Car drivers with severe and very severe injuries showed higher risk-taking behaviours than drivers with less severe injuries (median). Within 11%, seat belt band was an object (or one of the objects) causing injury.
WÖGERBAUER, E. Heft 1/Januar 2006, S. 67. Freie Fahrt Heft 1-2/Januar-Februar 2006, S. 67. Speak free! Break off with hot ears during driving		N/A	To estimate the consequences of phoning during driving	Mobile phone	None	A study realized by an Austrian mobile phone company (mobilkom austria) showed that more than half of Austrian car drivers are phoning while driving their car, holding their cellular phone on their ears. This is despite being informed about the risks and danger of calling without a hands free phone set. A study, realized by KfV showed phoning without a hands free phone set is leading to an addition 40% of driving mistakes. Phoning drivers are reducing their speed, but the gas pedal and wheel are handled hastily and abruptly. Further, traffic signs and light signs are recognized too late or are even overlooked.

<p>RUBY, M.M. und SPOERER, E. (Hrsg.): Sichere Mobilität. Verkehrsteilnehmer im Spannungsfeld von Anforderung und Leistung. In Motion. Humanwissenschaftliche Beiträge zur Sicherheit und Ökologie des Verkehrs 1, Gesellschaft für Ausbildung, Fortbildung und Nachschulung (AFN) und Institut für Nachschulung und Fahrer-Rehabilitation (INFAR), Köln und Salzburg 2005, S. 25-34</p>	<p>Seniors as accident drivers</p>	<p>To analyze the influence of aging driver population to the accident occurrence</p>	<p>Speed, alcohol</p>	<p>Age</p>	<p>Over represented causes of accidents by senior drivers are disregarding priority in traffic and mistakes in turn off, turn around and run ins. Underrepresented causes of accidents are speed and alcohol. Traffic offences of aged drivers are almost all due to excessive demands on the driver, rather than willful violation of traffic rules</p>
<p>Prospective shifts in accident occurrence caused by increasing aging of the driver population.</p>					
<p>DVR Report 34.Jg., Nr. 4/2004, S. 8-11</p> <p>Risks on country roads</p>	<p>Drivers on country roads</p>	<p>To analyze the accident risk at country roads</p>	<p>Speed</p>	<p>Age</p>	<p>The risk of being killed by a traffic accident on country roads is twice as high as in town and 5 times higher than on the motorway. The persons most vulnerable are beginner drivers aged 18 to 24 years. Accident causes within this specific risk group in particular are excessive speed, reckless car passing, mistakes in reactions within unexpected situations or false estimation of distances.</p>

IV. BACKGROUND METHODOLOGIES

IV. I. Statistical framework

A large body of evidence has documented that seat belt non-use, helmet non-use, mobile phone use when driving, alcohol use and speeding increase the risk of serious and fatal injuries following a road traffic accident. With the current statistical analysis we intended to develop a systematic way of monitoring indicators for motor vehicle injuries and suggest policy strategy for road injury prevention. We attempted to improve the quality of RTIs information in the EU by developing a monitoring system for indicators and making recommendations for the improvement of statistical information on this type of injuries.

Specifically, we are seeking to estimate the variation in the frequency of RTIs observed during the years as well as the variation of exposure factors in order to propose a theoretical forecast model that can adequately respond to whether changes in the exposure index can explain changes in the frequency of injuries. In case the relationship is analogue, we could explain the variation of RTIs in relation with the exposure factors. On the basis of information on previous years and the respective changes in RTIs over time, the model will aim to make predictions on the number and severity of RTAs for forthcoming years. Therefore the aim of the statistical modelling can be summarized as follows:

1. To develop exposure index based on data and model synthesis
2. To identify changes in RTIs over time
3. To formulate and answer the question: “Do changes in exposure index explain injuries changes?”
 - If yes, then intervene on most important exposures

- If no, then search to find the missing exposures

Comparing the suggested methodology with the already existing models, the following differences can be stated:

<u>Standard models</u>	vs	<u>suggested WP2 models</u>
one exposure at a time		synthetic exposure
assume all relevant exposures are measured		tests whether we do actually have the relevant exposures

To this end, we created a statistical model, with participants those who have been involved in a road traffic accident, as follows: the dependent variable would be the severity of injury (e.g. death, severe injury, slight injury, no injury). The independent variables would be - if possible- age, gender, seat belt use, helmet use, mobile phone use when driving, alcohol use, speed, condition of the road, weather conditions and any other relevant variable that would be available in the database to be used. Therefore we could estimate the danger of a severe accident in accordance with the exposure factors.

a. Possible Data Sources



Analysis of data would provide information on the desired exposure indicators. In the process of looking for a suitable database, the following criteria had been set:

- Row data (by injured person)
- Demographic details for the injured person (e.g. age, gender) and year/month when the injury occurred. Ideally, datasets for over 10 year period should be made available.
- The role of the injured person in case of RTIs (e.g car driver, motorcycle driver, car passenger, motorcycle passenger, pedestrian).
- Outcome of the accident (e.g death, severe injury, slight injury, no injury)
Exposure variables pertaining to the injured person (e.g if the dataset describes RTAs, we need information on factors such as seat belt use, helmet use, alcohol use, condition of the road e.t.c)
- The frequency of the outcome of injury under investigation should present a significant change over the study period.

Exploration of datasets available for injury cases from RTAs has been carried out and a summary of findings is presented below. The sources that could maybe used in order to apply the theoretical statistical framework were:

- **Greek database from emergency departments of 4 collaborating hospitals (EHLASS):** The main characteristic of this system is to collect data concerning hospital emergencies, using a rather universal methodology for all member states in order to make possible a detailed characterization and measure of the relative importance of different types of the most common accidents and of the products involved in these accidents. EHLASS is operational in Greece since December 1986, but formal reports are edited since 1992. This system is managed by the Ministry of

Health and Welfare. The project was supervised by Dr E. Petridou, Head of the Center for Research and Prevention of Injuries (CEREPRI). Data collection started with 4 hospitals participating in the survey (2 hospitals in the Greater Athens area, 1 in Volos and 1 in Corfu) and included the years 1996-2004 (*Contact person: Nick Desypris, University of Athens*)

▪ **The Austrian Road Accident Database:** The Database contains anonymous personal data on accidents and injuries. The data are provided by the data owners in Austria (Statistics Austria) for purposes of road traffic safety (injury prevention). Participants are all injured and killed pedestrians, drivers or passengers, all non-injured drivers, all non-injured passengers, including those under the influence of alcohol that obstructed the driver, all non-injured pedestrians, in particular those under the influence of alcohol if they were involved in the accident due to their behavior. (*Contact person: Gerald Furian, Kuratorium für Verkehrssicherheit*)

▪ **Granada city traffic police database:** Granada city traffic police provided with data of low injured/seriously injured/ and casualties in traffic. The sample was taken during several weeks in 2003 (*Contact person: Candida Castro, University of Granada*)

▪ **STRADA database:** The STRADA (Swedish Traffic Accident Data Acquisition) information system is a coordinated national registration of traffic accidents and traffic injuries run by the police and the health care authorities. This information system concerns the whole road transport system. Organisations such as the Police, the National Federation of County Councils, the National Board of Health and Welfare, the Swedish Association of Local Authorities, the Swedish Institute for Transport and Communications Analysis (SIKA), and Statistics Sweden (SCB), cooperate with the Swedish Road Administration (SRA). Since 2003 the police report data cover the entire country, and currently half of all hospitals with emergency units contribute to STRADA. The objectives of STRADA are to support the traffic safety work on a national, regional and local level, to provide facts for making

decisions about more accurate safety measures, and to make public administration more efficient (*Contact person: Bengt Sjöo*)

▪ **Spanish Hospital Discharge Database:** Information on the available data sources for non-fatal injuries were gathered via a telephone interviews with national injury experts in 24 countries in Europe. Questions were asked regarding hospital discharge data, emergency department data, health interview data and the EU-based injury database (IDB) as well as specific data sources on traffic crashes, occupational injuries and disabilities. The information collected included the type of coding system for injuries and external causes, the wideness of application (national, regional local), knowledge about the catchment population/area as well as the information available (*Contact person: Maria Seguí-Gomez, University of Navarra*)

Moreover, realizing the lack of an adequate database in Europe, we decided to elaborate our search in the United States. Two following two databases have been identified:

▪ **Mortality Data-Vital Statistics NCHS's Multiple Cause of Death Data, 1959-2005:** Database provides mortality data by multiple cause of death for all deaths occurring within the United States. Each record is based on information abstracted from death certificates filed in vital statistics offices of each State and District of Columbia. Causes of death were coded according to the International Classification of Diseases, Ninth Revision 1991-1998 and the Tenth Revision 1999 on (*Contact person: Arialdi M. Miniño, Centers for Disease Control and Prevention*)

▪ **National Highway Traffic Safety Administration (NHTSA) Traffic Records:** Information is provided on factors such as seat belt use, helmet use, alcohol use, condition of the road e.t.c. Complete, accurate and timely traffic safety data are collected, analyzed and made available for decision-making at the national,

state and local levels to reduce crashes, deaths and injuries on the nation's highways

(Contact person: Lois Fingerhut, Centers for Disease Control and Prevention)

b. Limitations of existing Data Sources



In our effort to identify and evaluate the quality of existing European data, we realized that unfortunately none of the databases met our requirements. Although the statistical models were available, in practice the existing databases did not manage to reveal reliable findings. The reasons for inappropriateness of data sources were multiple and are stated below:

- **Greek database from emergency departments of 4 collaborating hospitals (EHLASS):** The sensitivity of predictions was very low since the data sample was not large enough for such an analysis.
- **The Austrian Road Accident Database:** The classification of the degree of injury severity is performed by the police according to the regulations of the Austrian Criminal Code (StGB). This makes unreliable the estimation of injury severity and increase the likelihood of bias.
- **Granada city traffic police database:** The database does not include information on the circumstances of the road traffic accident (whether the driver wears a set belt, is driving after drinking etc). Moreover the data is available only since 2003 and consequently this time period is too short for making reliable provisions.
- **STRADA database:** Despite our multiple attempts to contact the responsible person, we did not manage to receive any answer for a possible provision of the data.

- **Spanish Hospital Discharge Database:** Exposure indicators were not included. Information was available only for the demographic characteristics of the injured person, the length of stay, the diagnosis and the mechanism of injury.

- **Mortality Data-Vital Statistics NCHS's Multiple Cause of Death Data, 1959-2005:** Vital statistics records only contain information on injuries that resulted in death (whether unintentional, assault, self-caused or of undetermined intent). Therefore the primary problem with road traffic or any external cause of injury is that adequate data on hospitalisations is not available. They can provide more information regarding the kinds of injuries, but approximately 1/3 of all injuries in the national sample do not have external cause reported.

- **National Highway Traffic Safety Administration (NHTSA) Traffic Records:** Injury data is collected only on a sample, which is not representative of the whole region.

IV. II. Development of a questionnaire to collect data for a composite indicator for RTIs



The main deficiencies in routinely available RTIs databases include the lack of detailed data suitable to capture information for indicators. Data on RTIs indicators are scarce and EU countries record different methods of data collection what complicates the between countries comparisons. To control for the gap in RTIs indicators across EU countries, a self-reporting electronic tool was introduced, under the title ‘Student’s Health Card’ (SHC), for assessing the impact of risk-taking behavior in RTI involvement. SHC designed to entail adequate questions regarding those exposure factors that have been identified in the systematic literature review as the leading causes of a RTA. It intends to help everyone more easily understand, which are the most important changes we can make to improve our own health as well as the health of our families and communities, to measure determinants and trends across EU countries and to support European health policies. The rationale was to incorporate the most significant exposure factors for RTIs in one electronic questionnaire, which has been developed and has been thoroughly tested for correctness and internal validity.

SHC an innovative, internet based, health promotion scientific program was developed by the Department of Hygiene and Epidemiology of Athens University Medical School focuses on the sensitization and education of medical students in prevention and health care problems as well as the provision of appropriate medical care through the development of a broader network. The electronic application is accessible through the Internet (<http://karta.med.uoa.gr/>). SHC covers a wide range of epidemiological aspects, such as student’s demographic data, family’s history data, data of the pediatric history emphasizing in the vaccination coverage, behaviors and way of living, psychiatric history.

For the purposes of the current project, eight lifestyle and behavioral variables were isolated and used to depict a risky behavior profile, namely: non- use of seat belt,

non-use of helmet, use of mobile phone while driving, driving after drinking, riding with a drunk driver, fascination by high speed, binge drinking (i.e. five or more drinks in a row) and smoking. Each of these variables was graded with either “0” if the corresponding response indicated a safe behavior, or “1”, if the reverse applied. Students who were not exposed to the possible risk for each variable were included in the safe category (e.g. driving after drinking variable was graded with “0” among students reporting that they did not drive). Subsequently, we calculated a behavioral risk score (rating from 0 = very safe behavior to 8 = very risky behavior) as the sum of the above variables. This risky behavior score would be the desired composite indicator adequate to measure the risk of RTIs.

This questionnaire seeks to identify the data that need to be collected primarily and thus provide guidance to EU countries in the early stages of developing and implementing programs to prevent RTAs. It could provide a useful tool for policy making on the basis of looking broadly at a full range of modifiable risk factors, creating a composite indicator and highlighting the role of early intervention.

Questions along with the relevant codification are provided below:

SECTION A: Alcohol

Question Description: How many times did you drive a car after drinking any alcohol during the last 3 months?

Coding:

- 1 = I never drove a car in the last 3 months
- 2 = Never
- 3 = 1 times
- 4 = 2 or 3 times
- 5 = 4 or 5 times
- 6 = 6 or more times

Question Description: How many times did you drive a car after having 5 or more alcoholic drinks during the last 3 months?

Coding:

- 1 = I never drove a car in the last 3 months
- 2 = Never
- 3 = 1 times
- 4 = 2 or 3 times
- 5 = 4 or 5 times
- 6 = 6 or more times

Question Description: How many times did you ride a motorcycle after drinking any alcohol during the last 3 months?

Coding:

- 1 = I never drove a motorbike in the last 3 months
- 2 = Never
- 3 = 1 times
- 4 = 2 or 3 times
- 5 = 4 or 5 times
- 6 = 6 or more times

Question Description: How many times did you ride a motorcycle after having 5 or more drinks during the last 3 months?

Coding:

- 1 = I never drove a motorbike in the last 3 months
- 2 = Never
- 3 = 1 times
- 4 = 2 or 3 times
- 5 = 4 or 5 times
- 6 = 6 or more times

Question Description: How many times did you ride in a car or other vehicle driven by someone else who had been drinking alcohol during the last 3 months?

Coding:

- 1 = I was never a passenger on a vehicle in the last 3 months
- 2 = Never
- 3 = 1 times
- 4 = 2 or 3 times
- 5 = 4 or 5 times
- 6 = 6 or more times

Question Description: How many times did you ride in a car or other vehicle driven by someone else who had been drinking 5 or more alcoholic drinks during the last 3 months?

Coding:

- 1 = I was never a passenger on a vehicle in the last 3 months days
- 2 = Never
- 3 = 1 times
- 4 = 2 or 3 times
- 5 = 4 or 5 times
- 6 = 6 or more times

Question Description: During the last 3 months how many times did you have five or more alcoholic drinks in a row within a couple of hours?

Coding:

- 1 = Never
- 2 = 1 times
- 3 = 2 times
- 4 = 3 times
- 5 = 4 times
- 6 = 5 times
- 7 = 6 times
- 8 = 7 times
- 9 = 8 times
- 10 = 9 or more times

Question Description: If you drink alcohol, which of the following do you usually drink?

Coding:

- 1 = I don't drink alcoholic beverages
- 2 = Drinks with low concentration of alcohol (beer)
- 3 = Drinks with moderate concentration of alcohol (wine)
- 4 = Drinks with high concentration of alcohol (spirits, grappa, whisky, vodka)
- 5 = Other
- 6 = I don't wish to answer
- 7 = Beer and wine
- 8 = Beer and spirits
- 9 = Wine and spirits
- 10 = Beer and wine and spirits
- 11 = Beer and other
- 12 = Wine and other

SECTION B: Seat belt use

Question Description: What are the main reasons for not using a seatbelt as a driver?

Coding:

- 0 = I do not drive a car
- 1 = I always use a seatbelt
- 2 = Habit
- 3 = Neglect
- 4 = I do not consider seatbelt use as necessary
- 5 = Discomfort
- 6 = Not available
- 7 = Other

Question Description: How often have you been using a seatbelt while riding in a car driven by someone else during the last 3 months?

Coding:

- 1 = I was never a passenger on a car in the last three months
- 2 = Never
- 3 = Seldom
- 4 = Sometimes
- 5 = Nearly always
- 6 = Always

Question Description: What are the main reasons for not using a seatbelt when riding in a car driven by someone else?

Coding:

- 1 = Habit
- 2 = Carelessness
- 3 = I didn't think it was necessary
- 4 = Inconvenience
- 5 = It was not available
- 6 = Other
- 7 = I don't wish to answer
- 8 = It was not available and carelessness
- 9 = Carelessness and inconvenience
- 88 = I always wear a seatbelt

SECTION C: Helmet use

Question Description: How often have you been wearing a helmet while you driving a motorcycle during the last 3 months?

Coding:

- 1 = I never drove a motorbike in the last three months
- 2 = Never
- 3 = Seldom
- 4 = Sometimes
- 5 = Nearly always
- 6 = Always

Question Description: What are the main reasons for not wearing a helmet while driving a motorcycle?

Coding:

- 1 = Habit
- 2 = Carelessness
- 3 = I didn't think it was necessary
- 4 = Inconvenience
- 5 = I didn't have one
- 6 = It was too expensive
- 7 = I seldom drive a motorbike
- 8 = Other
- 9 = I don't wish to answer
- 10 = Habit and carelessness
- 11 = It was too expensive and I seldom drive a motorbike
- 12 = I always wear a helmet while riding a motorcycle
- 13 = I don't ride a motorcycle

Question Description: How often have you been wearing a helmet when riding a motorcycle driven by someone else during the last 3 months?

Coding:

- 1 = I was never a passenger on motorbike in the last three months
- 2 = Never
- 3 = Seldom
- 4 = Sometimes
- 5 = Nearly always
- 6 = Always

Question Description: What are the main reasons for not wearing a helmet while riding a motorcycle driven by someone else?

Coding:

- 1 = Habit
- 2 = Carelessness
- 3 = I didn't think it was necessary
- 4 = Inconvenience
- 5 = I didn't have one
- 6 = It was too expensive
- 7 = I seldom drive a motorbike
- 8 = Other
- 9 = I don't wish to answer
- 10 = Habit and I didn't think it was necessary
- 11 = I didn't have one and it was too expensive
- 12 = I always wear a helmet
- 13 = I don't ride a motorcycle

SECTION D: Mobile phone use

Question Description: How often have you been using a mobile phone with handsfree/loudspeaker while driving a car during the last 3 months?

Coding:

- 1 = I never drove a car in the last three months
- 2 = Never
- 3 = Seldom
- 4 = Sometimes
- 5 = Nearly always
- 6 = Always

Question Description: How often have you been using a mobile phone without handsfree/loudspeaker while driving a car during the last 3 months?

Coding:

- 1 = I never drove a car in the last three months
- 2 = Never
- 3 = Seldom
- 4 = Sometimes
- 5 = Nearly always
- 6 = Always

Question Description: How often did you use a mobile phone with handsfree/ loudspeaker while riding a motorcycle during the last 3 months?

Coding:

- 1 = I never drove a motorbike in the last three months
- 2 = Never
- 3 = Seldom
- 4 = Sometimes
- 5 = Nearly always
- 6 = Always

Question Description: How often did you use a mobile phone without handsfree/ loudspeaker while riding a motorcycle during the last 3 months?

Coding:

- 1 = I never drove a motorbike in the last three months
- 2 = Never
- 3 = Seldom
- 4 = Sometimes
- 5 = Nearly always
- 6 = Always

V. RESULTS

a. Results of statistical framework

Since it was not possible to identify a suitable database, we are not in position to provide estimates and test the theoretical framework in practice. Nevertheless given that the Greek database from emergency departments of 4 collaborating hospitals (EHLASS) was the one that included detailed information on a series of exposure indicators, it was, thus, selected to give estimates on the prevalence of exposures. Since the number of recorded injuries remains rather stable during the years, it was decided to present cumulative results of the eight-year period. Results are shown in Table 5 by exposure status and role in the road traffic accident for an eight-year period (1996-2003) for the 40,312 participants. Injury severity was defined according to the Injury Severity Score (ISS) with the point 7 being used as cut-off point for the injury definition.

The large majority of injured persons were motorbike drivers (45%) followed by pedestrians (17%), car drivers (15%), car passengers (13%) and motorbike passengers (10%). Overall, 5% of the injured persons were under the effect of alcohol but among car drivers the percentage was 8%. Almost 65% of motorcycle drivers and 90% of motorcycle passengers was not wearing a helmet. Only 35% of car drivers and 20% of car passengers was wearing a seat belt. The decreased proportion of injuries noted during the winter months can be attributed to the limited transportation of the whole population due to weather conditions. Overall, in 16% of the cases the condition of the road surface was poor but for motorbikes the respective percent was 26%. Cars appear to be mostly affected by road slipperiness compared to motorcycles.

Table 5: Distribution of injury severity by role in the road traffic accident and exposure indicators of the 40,312 injured participants (data from 4 Greek Hospitals for years 1996-2003)

	Pedestrians		Car Drivers		Car Passengers		Motorcycle Drivers		Motorcycle Passengers	
	Severe Injury N=1257 N(%)	Slight Injury N=5589 N(%)	Severe Injury N=731 N(%)	Slight Injury N=5191 N(%)	Severe Injury N=608 N(%)	Slight Injury N=4655 N(%)	Severe Injury N=2708 N(%)	Slight Injury N=15518 N(%)	Severe Injury N=472 N(%)	Slight Injury N=3583 N(%)
Use of seat belt										
Yes	N/A	N/A	187 (25.6)	1855 (35.7)	113 (18.6)	941 (20.2)	N/A	N/A	N/A	N/A
No			544 (74.4)	3336 (64.3)	495 (81.4)	3714 (79.8)				
Use of helmet										
Yes	N/A	N/A	N/A	N/A	N/A	N/A	604 (22.3)	5815 (27.3)	36 (7.6)	340 (9.5)
No							2104 (77.7)	15518 (72.7)	436 (92.4)	3243 (90.5)
Use of alcohol										
No	1237 (98.4)	5537 (99.1)	612 (83.7)	4816 (92.8)	567 (93.3)	4552 (97.8)	2407 (88.9)	20413 (95.7)	442 (93.6)	3486 (97.3)
Yes	20 (1.6)	52 (0.9)	119 (16.3)	375 (7.2)	41 (6.7)	103 (2.2)	301 (11.1)	920 (4.3)	30 (6.4)	97 (2.7)
Speeding										
No	1256 (99.9)	5585 (99.9)	656 (89.7)	4955 (95.4)	546 (89.8)	4460 (95.8)	2569 (94.9)	20648 (96.8)	444 (94.1)	3442 (96.1)
Yes	1(0.1)	4 (0.1)	75 (10.3)	236 (4.6)	62 (10.2)	195 (4.2)	139 (5.1)	685 (3.2)	28 (5.9)	141 (3.9)
Road slipperiness										
No	1221 (97.1)	5422 (97.0)	627 (85.8)	4527 (87.2)	519 (85.4)	4118 (88.5)	2464 (91.0)	18623 (87.3)	437 (92.6)	3220 (89.9)
Yes	36 (2.9)	167 (3.0)	104 (14.2)	664 (12.8)	89 (14.6)	537 (11.5)	244 (9.0)	2710 (12.7)	35 (7.4)	363 (10.1)
Lighting										
Day Time	1066 (84.8)	4890 (87.5)	554 (75.8)	4183 (80.6)	456 (75.0)	3737 (80.3)	2052 (75.8)	17896 (83.9)	333 (70.6)	2952 (82.4)
Other	191 (15.2)	699 (12.5)	177 (24.2)	1008 (19.4)	152 (25.0)	918 (19.7)	656 (24.2)	3437 (16.1)	139 (29.5)	631 (17.6)
Road condition										
Normal	1219 (97.0)	5380 (96.3)	677 (92.6)	4758 (91.7)	561 (92.3)	4353 (93.5)	2380 (87.9)	16886 (79.2)	416 (88.1)	2903 (81.0)
Other	38 (3.0)	209 (3.7)	54 (7.4)	433 (8.3)	47 (7.7)	302 (6.5)	328 (12.1)	4447 (20.9)	56 (11.9)	680 (19.0)
Season										
Winter	264 (21.0)	1117 (20.0)	171 (23.4)	1244 (24.0)	129 (21.2)	1035 (22.2)	487 (18.0)	3720 (17.4)	71 (15.0)	481 (13.4)
Spring	307 (24.4)	1571 (28.1)	180 (24.6)	1379 (26.6)	143 (23.5)	1191 (25.6)	604 (22.3)	4990 (23.4)	96 (20.3)	741 (20.7)
Summer	346 (27.5)	1441 (25.8)	198 (27.1)	1349 (26.0)	198 (32.6)	1303 (28.0)	875 (32.3)	7128 (33.4)	186 (39.4)	1449 (40.4)
Autumn	340 (27.0)	1460 (26.1)	182 (24.9)	1219 (23.5)	138 (22.7)	1126 (24.2)	742 (27.4)	5495 (25.8)	119 (25.2)	912 (25.5)

b. Results based on the composite indicator

Work done so far mostly went into the establishment of a questionnaire that can represent risky behavior profile as an indicator in a reasonably efficient way. The next step of this task was to further investigate whether the above indicator usefully apply to individuals who are involved in RTIs. To achieve this, we applied the questionnaire in a group of 978 University students of Greek and Italian Universities. The aim was to assess the impact of risk-taking behavior on RTA involvement and evaluate the questionnaire potential to be used as a tool for inexpensive electronic injury surveillance.

Multiple logistic derived ORs and 95% Confidence Intervals (CIs) for reported involvement in a RTA are presented in Table 6. As expected, male gender and younger age were statistically significantly associated with RTA involvement, whereas being an Italian medical student appears to confine a higher risk of being involved in a RTA. It is worth noting, however, that an increment in the 8-point scale risky behavior score by one degree, was found to increase the risk for reporting road traffic involvement by 35% (OR=1.35, $p<0.001$), whereas driving after drinking (OR=2.55, $p=0.001$), riding with a drunk driver (OR=2.19, $p=0.03$) and smoking (OR=1.95, $p=0.01$) significantly multiplied the risk; surprisingly, a null association with helmet use was noted.

Provision of an estimation tool for the assessment of risky behaviors affecting road traffic involvement, as well as cross-country comparison of the practices that different university student populations tend to adopt, constitute the major strengths of this study. Although, as a rule, a degree of cautiousness is required when interpreting self-reporting data, results from the present study are validated by existing knowledge, thus ensure the efficacy of the current questionnaire as a simple, quick and inexpensive tool, which could enable educators to collect reliable data and generate appropriate educational feedback to university students by targeting specific unhealthy behaviors or a cluster of risk-taking behaviors.

Table 6: Multiple logistic regression derived odds ratios (ORs) and 95% Confidence Interval (95% CIs) for RC involvement among 978 participants by demographic and risk-taking behavior variables

Variable	Category or Increment	ORs	95% CIs	p-value
Gender	female	reference		
	male	1.65	1.02 – 2.66	0.04
Age	2 years older	0.69	0.47 – 1.01	0.06
Country of residence and faculty	Italian medical	reference		
	Italian non- medical	0.60	0.28 – 1.31	0.20
	Greek medical	0.65	0.33 – 1.26	0.20
<hr/>				
Additional, alternatively introduced variables				
Use of seat belt	yes	reference		
	no	1.87	0.98 – 3.57	0.06
Use of helmet	yes	reference		
	no	1.04	0.54 – 2.02	0.91
Use of mobile phone when driving	no	reference		
	yes	1.46	0.89 – 2.39	0.13
Driving after drinking	no	reference		
	yes	2.55	1.53 – 4.26	0.001
Riding with a drunk driver	no	reference		
	yes	2.19	1.08 – 4.45	0.03
Fascinated by high speed	no	reference		
	yes	1.55	0.96 – 2.52	0.07
Binge drinking	no	reference		
	yes	1.68	0.98 – 2.88	0.06
Smoking	no	reference		
	yes	1.95	1.18 – 3.22	0.01
Risky behavior score	+1 degree	1.35	1.17 – 1.55	0.0001

VI. CONCLUSIONS

This survey, which is a part of the APOLLO program “Strategies and best practices for the reduction of injuries”, aimed to provide useful information on exposure indicators for RTAs. To this end, a systematic literature review was first conducted in order to identify and evaluate the prevalence of five exposure indicators (seat belt use, helmet use, speeding, alcohol intake and mobile phone use in the occurrence of RTAs) on the basis of specific criteria, and then two statistical methodologies were developed targeting to develop a systematic way of monitoring indicators for motor vehicle injuries.

Although the present study provides useful information on exposure indicators for RTAs that can facilitate implementation of preventive interventions, it also contains some limitations that should be kept in mind. First, the studies that were identified and included in the present survey resulted from a systematic literature review, which focused only upon five exposure indicators. This means that future surveys should include more indicators in order future implementers to have a more complete picture. Moreover, a serious limitation of the study is that it was not feasible to identify a suitable database for collecting data on RTIs. Therefore we could not test in practice the overall validity of the proposed statistical framework.

Based on this survey, it appears that there is a gap in EU countries regarding data collection on exposure indicators for RTAs. Not all EU member states have adequate systems for collecting data on RTAs and this is reflected in government policies. It is needed, in fact, to establish collaboration with governmental and non-governmental organizations on a EU basis trying to create early warning systems that can identify exposure indicators. To this end, there should be a uniform requirement for a minimum data set across the EU countries with routinely availability of standard RTIs indicators. Such an effort would provide a useful insight for the aetiology and epidemiology of RTIs and would further allow the design and execution of analytic studies with validity safeguards. Collaboration

between EU member states is required in order to develop, implement and evaluate effective and efficient prevention strategies for RTAs.

To this end, the developed questionnaire and the suggested composite indicator provide, at minimal cost, reliable risk-taking and injury involvement information, which is needed both for personal risk assessment as well as surveillance purposes. Its validation and subsequent implementation in other settings could contribute to the need for development of electronic information systems across EU countries.

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