European Commission

Power two wheelers 2018

Summary

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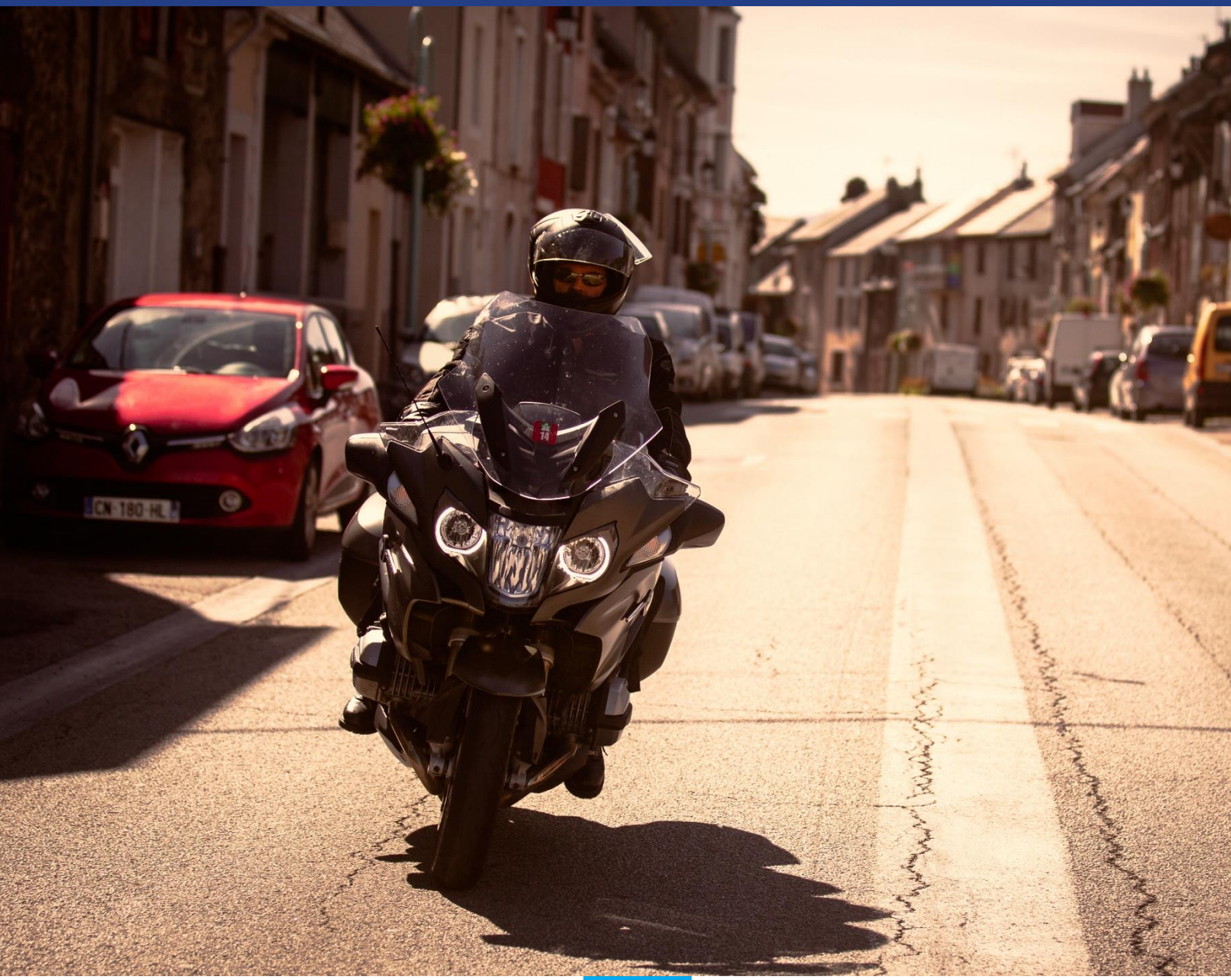

Transport

Power Two Wheelers - Summary

What is the problem?

Power Two Wheelers (PTWs) are an economical means of transport, offering increased mobility in traffic congestion and are popular in urban commuting. In addition, riding a PTW gives a special sensation, attractive to many riders. On the other hand, riding a PTW is much more dangerous than using any other motor vehicle. The number of motorcyclists' deaths per 100,000 registered motorcycles in the EU is more than 2 times higher compared to car occupant deaths per 100.000 registered cars.

How big is the problem?

Risk exposure: The fleet of PTWs in Europe is estimated at 37 million vehicles in 2011, of which about 70% were motorcycles and 30% were mopeds. In almost all European countries the number of motorcycles is increasing, with the increase being larger for older motorcycle riders. On the other hand, in most countries the number of mopeds is decreasing, although at different rates, or has stabilised.

Risk of fatal injury: In 2015 in the EU, 11 motorcyclists' deaths per 100.000 registered motorcycles were observed, compared to 5 car occupant deaths per 100.000 registered cars.

Size of accident injury problem: In 2015, 3.952 riders (drivers and passengers) of motorcycles and 714 riders of mopeds were killed in the EU countries. PTW rider fatalities accounted for 18% of the total number of road deaths in the EU countries in 2015.

What does science say?

PTW accident characteristics

Studies of moped and motorcycle accidents report large proportions of collisions with a car driver who should have waited for the PTW, indicating problems with the perception of PTWs. These problems are both physical due to the small size of the PTW and psychological: the presence and behaviour of PTWs is not expected by car drivers and sometimes not given enough attention by them. Some PTW riders contribute to the problems by speeding and driving aggressively.

PTW injury mechanisms

In-depth studies of PTW accidents show that injuries to the legs are frequent, but injuries to the head are more severe even though wearing a helmet. However, head injuries would be much more frequent if helmets were not worn. Collisions between the front of the PTW and the side of a car are frequent, with many riders falling before the collision as well as many riders departing from the PTW during the collision. Injuries from single vehicle accidents are more severe when hitting a fixed object, often a guard rail. More injuries result from hitting the rail post than from impact with the rail itself.

Accident rates of various PTW groups

The study of accident rates between PTW groups reveals that mopeds have higher accident rates than motorcycles, but lower fatality rates. Young PTW riders have much higher accident rates than older ones, and sports motorcycles have higher accident rates than other types of motorcycle, with a large number of single vehicle accidents.

Role of road design and maintenance in PTW accidents

The role of road design and maintenance in PTW accidents may vary between countries. In an Australian in-depth accident study, in 15% of the cases road factors had contributed to the

accident (road surface defects, lack of visibility etc.). In a US study, roadway defects were reported in 30% of all cases. Poor road surface was related to considerable adverse consequences on skid resistance and thus on braking and cornering of PTWs.

What are the solutions?

Measures for the safety of PTWs focus on either accident prevention or increased protection from injuries. It should however be noted that, even if these measures were used to their full potential, injury rates of PTW riders will still be much higher than for car occupants. Such measures are:

Accident prevention:

- Learning, testing and licensing: Promising interventions in the learning, testing and licensing system are: Graduated Licensing, training in hazard perception and responding and voluntary advanced rider training programs.
- Braking a PTW: Loss of control during braking is often observed in PTW accidents. The installation of ABS systems is mandatory for all new motorcycles over 125cc in the EU from 1 January 2016.
- Daytime Running Lights, allow for a better perception of a PTW by other drivers.
- Enforcement
- Promotional campaigns, focusing on the use of helmets, daytime running lights, avoidance of aggressive riding and attention from car drivers to PTWs.
- Road environment: Particular problems in view of PTW safety are speed inhibitors in urban areas with different types of road surface, speed humps, lane narrowing, the use of raised lane markings and lane dividers, as well as poor maintenance and temporary road repairs.
- E-safety: Work on e-safety systems has mainly been directed at cars and lorries, but the potential to improve motorcycle safety through ITS is now being explored.

Increased protection from injuries:

- Helmets: Helmets are very effective in preventing or reducing the severity of injuries to the head; an average reduction of 72% has been estimated by relevant studies.
- Protective clothing: The use of gloves, boots and motorcycle suit has been estimated to reduce the probability of minor injury in an accident by 33-50%
- Leg protection: Crash bars may prevent injuries from direct contact in collisions of the side of the PTW with a car/object.
- Airbags: Experiments with air bags show that the speed of the PTW rider who departs from the PTW during a frontal collision can be considerably reduced.
- Guard rails: Existing guard rails have not been designed for collisions by PTWs and may cause severe injuries to their riders. Fitting energy absorbing material over the rail posts or installing additional rails to prevent PTW riders from sliding under the rail are considered effective in preventing injuries to the riders and in controlling the trajectory of the motorcycle in an accident.

Notes

1. Country abbreviations

	Belgium	BE		Italy	IT		Romania	RO
	Bulgaria	BG		Cyprus	CY		Slovenia	SI
	Czech Republic	CZ		Latvia	LV		Slovakia	SK
	Denmark	DK		Lithuania	LT		Finland	FI
	Germany	DE		Luxembourg	LU		Sweden	SE
	Estonia	EE		Hungary	HU		United Kingdom	UK
	Ireland	IE		Malta	MT			
	Greece	EL		Netherlands	NL		Iceland	IS
	Spain	ES		Austria	AT		Liechtenstein	LI
	France	FR		Poland	PL		Norway	NO
	Croatia	HR		Portugal	PT		Switzerland	CH

2. This 2018 edition of Traffic Safety Synthesis on Powered Two Wheelers updates the previous versions produced within the EU co-funded research projects SafetyNet (2008) and DaCoTA (2012). This Synthesis on Powered Two Wheelers was originally written in 2008 by Piet Noordzij, SWOV and then updated in 2012 by George Yannis, NTUA and in 2015 by Pierre Van Elslande, IFSTTAR.

3. All Traffic Safety Syntheses of the European Road Safety Observatory have been peer reviewed by the Scientific Editorial Board composed by: George Yannis, NTUA (chair), Robert Bauer, KFV, Christophe Nicodème, ERF, Klaus Machata, KFV, Eleonora Papadimitriou, NTUA, Pete Thomas, Un.Loughborough.

4. Disclaimer

5. Please refer to this Report as follows:

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