Comparison of moped, scooter and motorcycle crash risk and crash severity

Ross Blackman and Narelle Haworth

Centre for Accident Research & Road Safety - Queensland

CARRS-Q is a joint venture initiative of the Motor Accident Insurance Commission and Queensland University of Technology

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Outline

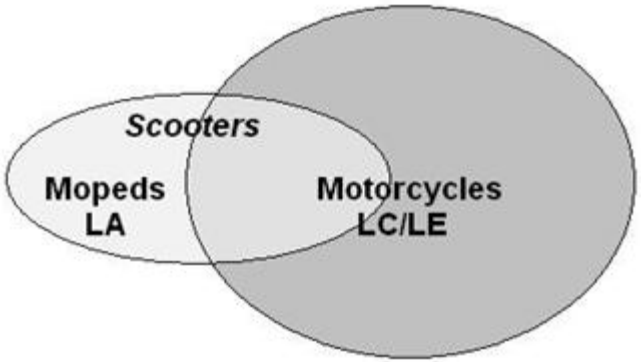
- Presentation based on publication
  - ***Comparison of moped, scooter and motorcycle crash risk and crash severity***
  - *Accident Analysis & Prevention, 57*(2013), 1-9.
- Background
- Study methods
- Results
- Implications

Powered Two-Wheelers (PTWs)

ADR Category

- Motorcycle →  → LC
- Scooter →  → **Over 50cc** LC
- Moped → **Up to 50cc** LA

No motorcycle licence required for moped in QLD



Current knowledge (1)

- PTW riders - vulnerable road users
  - High crash/injury risk
  - Lack of protection from injury
- <5% of registered motor vehicles (QLD) (DTMR 2009)
- 20% of road user fatalities (QLD) (DTMR 2010)
- 70% PTW sales increase in 5 years (AUS) (FCAI 2008)
- Mopeds and scooters highest sales growth
- ~1/3 of new moped & scooter sales in QLD (Haworth 2008)

Current knowledge (2)

- Key PTW principles apply to mopeds/scooters
- Risk factors (Greig, Haworth & Wishart 2008)

Risk factor	Moped	Motorcycle
Inexperience/lack of recent experience	√√	√
Risk taking	?	√
Driver failure to see PTWs	√	√
Instability & braking difficulties	√?	√
Road surface & environmental hazards	√?	√
Vulnerability to injury	√?	√

Current knowledge (3)

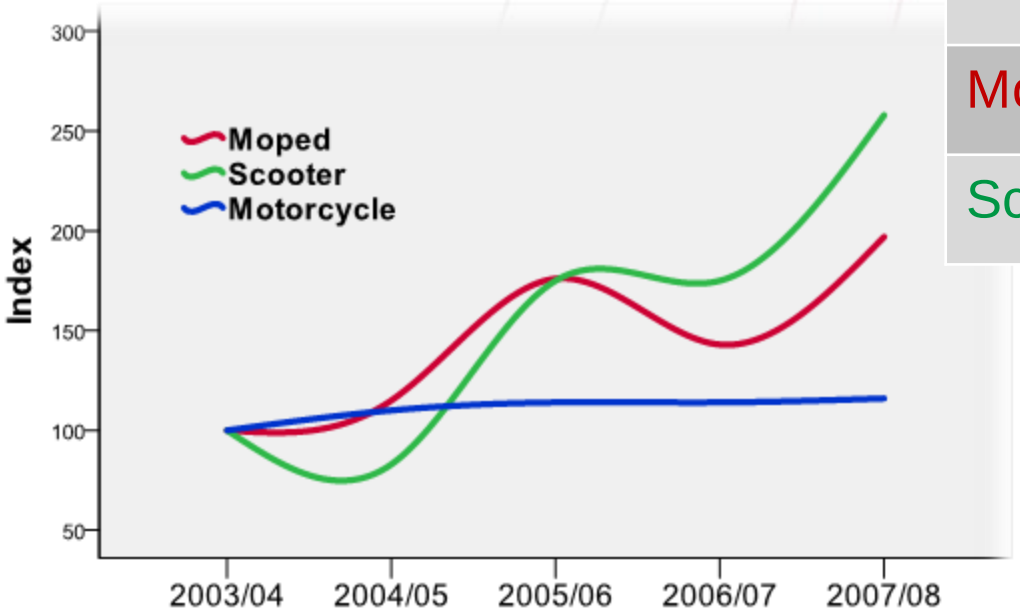
- Most research on mopeds & scooters from Europe
- Differences between Australia & elsewhere – context
- Effectiveness of rider training programs unclear
- Previous Australian research shows
  - Increase in moped crashes in QLD (Haworth 2008)
  - More commuting than recreational use (Harrison & Christie 2003)
  - Crash severity similar to motorcycles (Haworth 2008)
  - Less use of protective clothing (de Rome 2006; Christie 2008)
- No specific comparisons of moped and scooter crashes

Methods

- Crash & registration data analysis
- Data supplied by Department of Transport & Main Roads
- PTWs on register, 2001 - 2009
  - Mopeds and motorcycles separated by ADR category (LA or LC)
  - Scooters not separated from motorcycles (both LC)
- Merged crash & registration data
  - Reported PTW crashes, July 2003 – June 2008
  - PTW type identified by make & model details
  - Unknown PTW types excluded

Crash numbers

- 7,347 crashes July 2003 – June 2008 (excluding unknown types)



PTW	N	%
Motorcycle	6711	91.3
Moped	541	7.4
Scooter	95	1.3

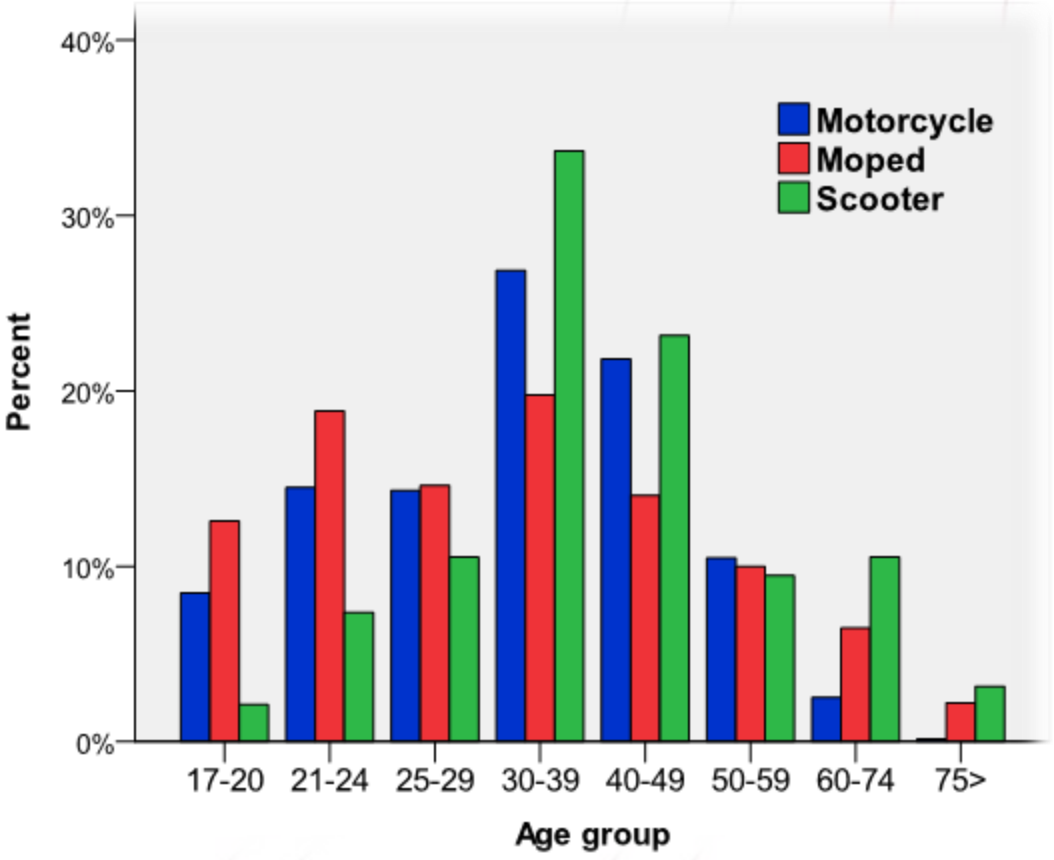
Crash rates

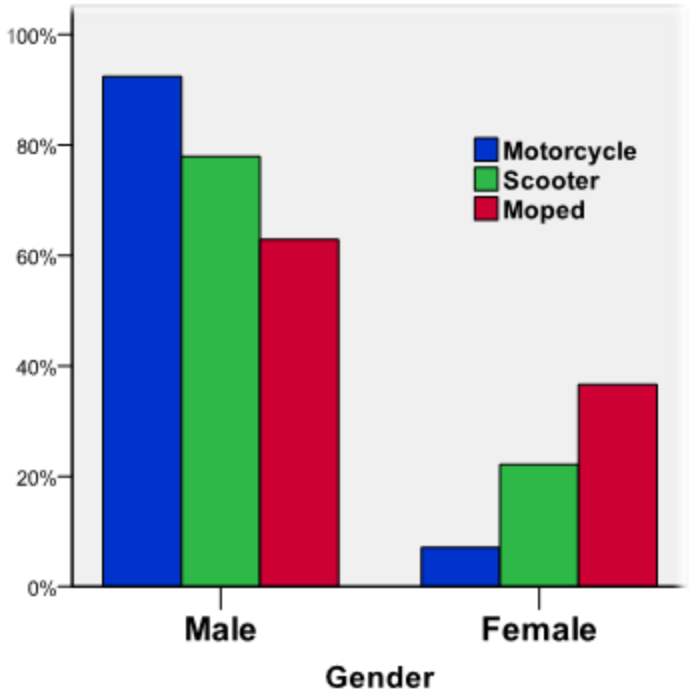
- Crash rate per 10,000 registration years – 5 year average
  - Motorcycles **125** (includes scooters)
  - Mopeds **133**

- Crash rate per million VKT – 5 year average
  - Motorcycles **1.70** (includes scooters)
  - Mopeds **6.33**
  - Based on self-report survey data (n = 2975)

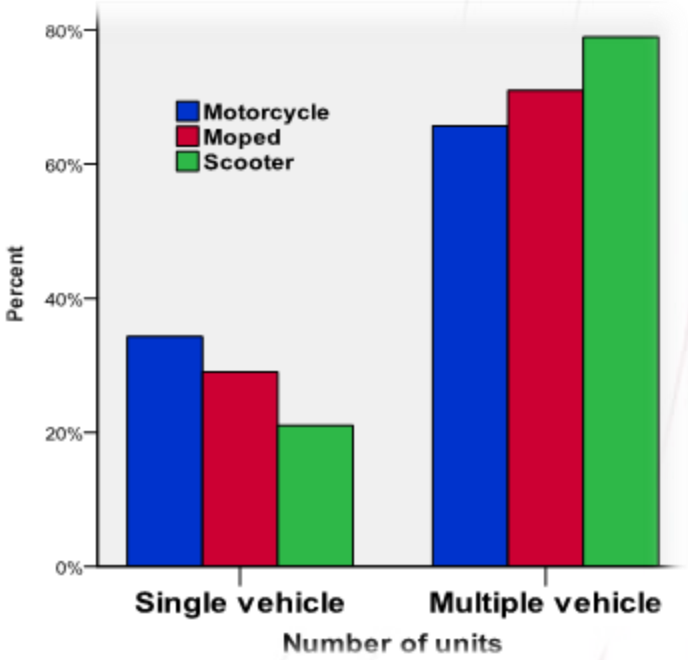
Rider characteristics

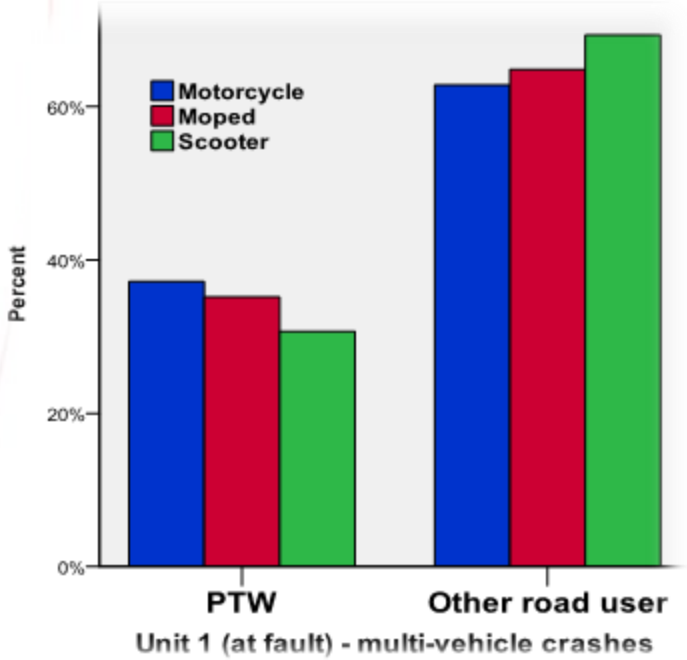
- Age & Gender





Contributing factors



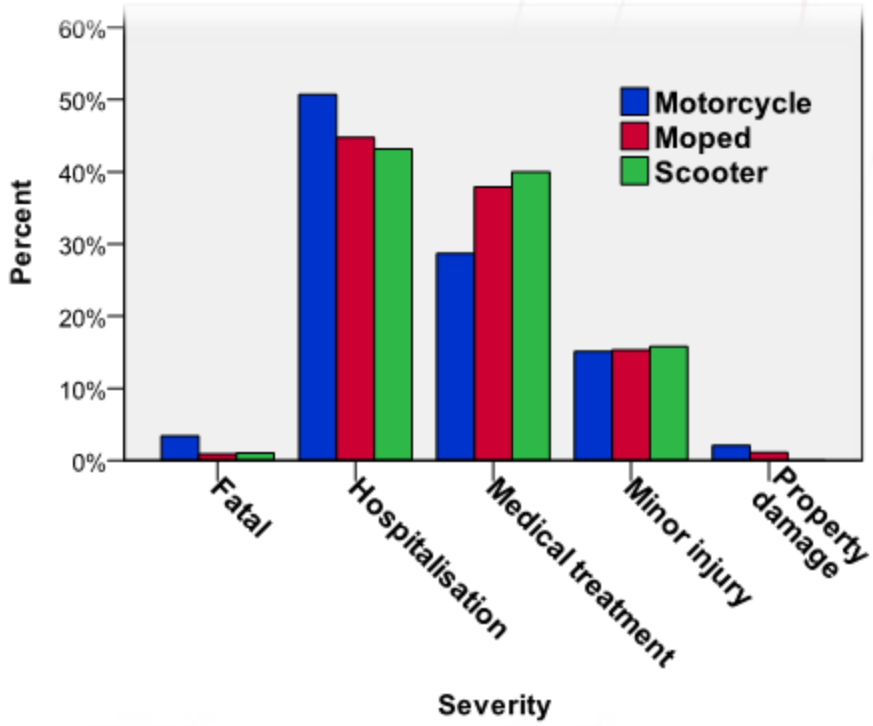


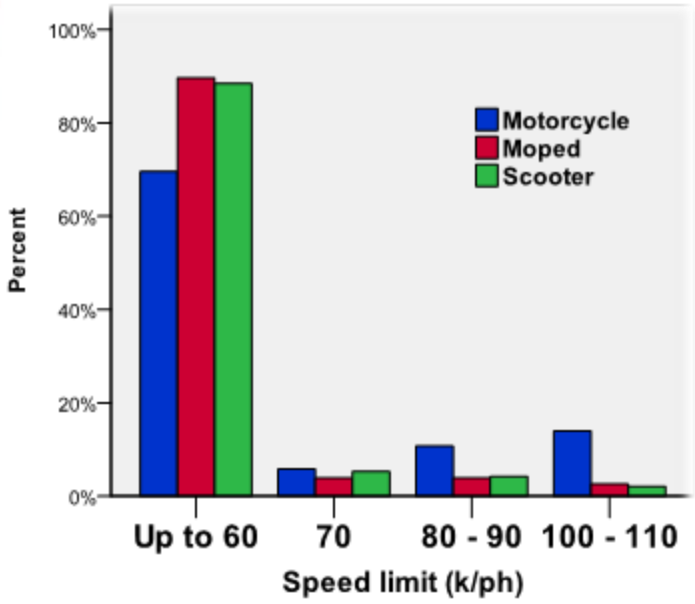
Main contributing circumstances

- Motorcycles: Inattention, road conditions, speed, violations
- Mopeds: Inattention, violations, road conditions, inexperience
- Scooters: Inattention, violations
- Other road users: Violations, inattention, inexperience

Crash severity & speed zone

- Statistically significant difference in crash severity
- ~90% of moped & scooter crashes in speed zones to 60 km/h





Analysis of severity by PTW type

- Ordered probit regression model

- Explanatory variables
  - PTW type
  - Speed zone
  - Horizontal alignment
  - Day of week
  - Time of day
  - Single/multi-vehicle

Analysis of severity by PTW type

- Severity outcomes not a function of PTW type per se

- Mopeds
  - more severe in 90+ zones & at night

- Scooters
  - More severe in 70 zones & on weekends

- Motorcycles
  - More severe in 80+ zones, on curves, weekends, night & in single vehicle crashes

Main findings

- Compared to motorcycles
  - Mopeds higher crash risk
  - Moped and scooter crashes less severe
  - Less risk-taking on mopeds and scooters
  - Moped rider skills inferior?
- Severity outcomes related to usage patterns
  - Moped limited performance limits usage
- Crash rates declined for all PTWs

Potential measures to improve safety

- Licensing and training
  - Demonstrated competency
  - Demonstrated theoretical knowledge
  - Compulsory or optional training
  - PTW licence for moped riders
- Education campaigns
- Increase homogeneity of travel speeds
- Infrastructure treatments
- Regulation on minimal level of clothing while riding

Potential topics for further research

- Effectiveness of rider training programs & licensing systems
- Reliable exposure data for Queensland moped & scooter use
- Feasibility of increasing homogeneity of travel speeds
- Potential of education & awareness campaigns for other road users
- Travel mode choice among moped, scooter & motorcycle riders
- Potential impact on industry of moped rider PTW licence

Questions?

ross.blackman@qut.edu.au