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A method for identifying aggressive driving by using naturalistic driving data

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A method for identifying aggressi using naturalistic

Jordanka Kovaceva, Chalmers University Of
Irene Isaksson Hellman, If P&

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Agenda

- Aim
- Data
- Method
- Results
- Conclusions

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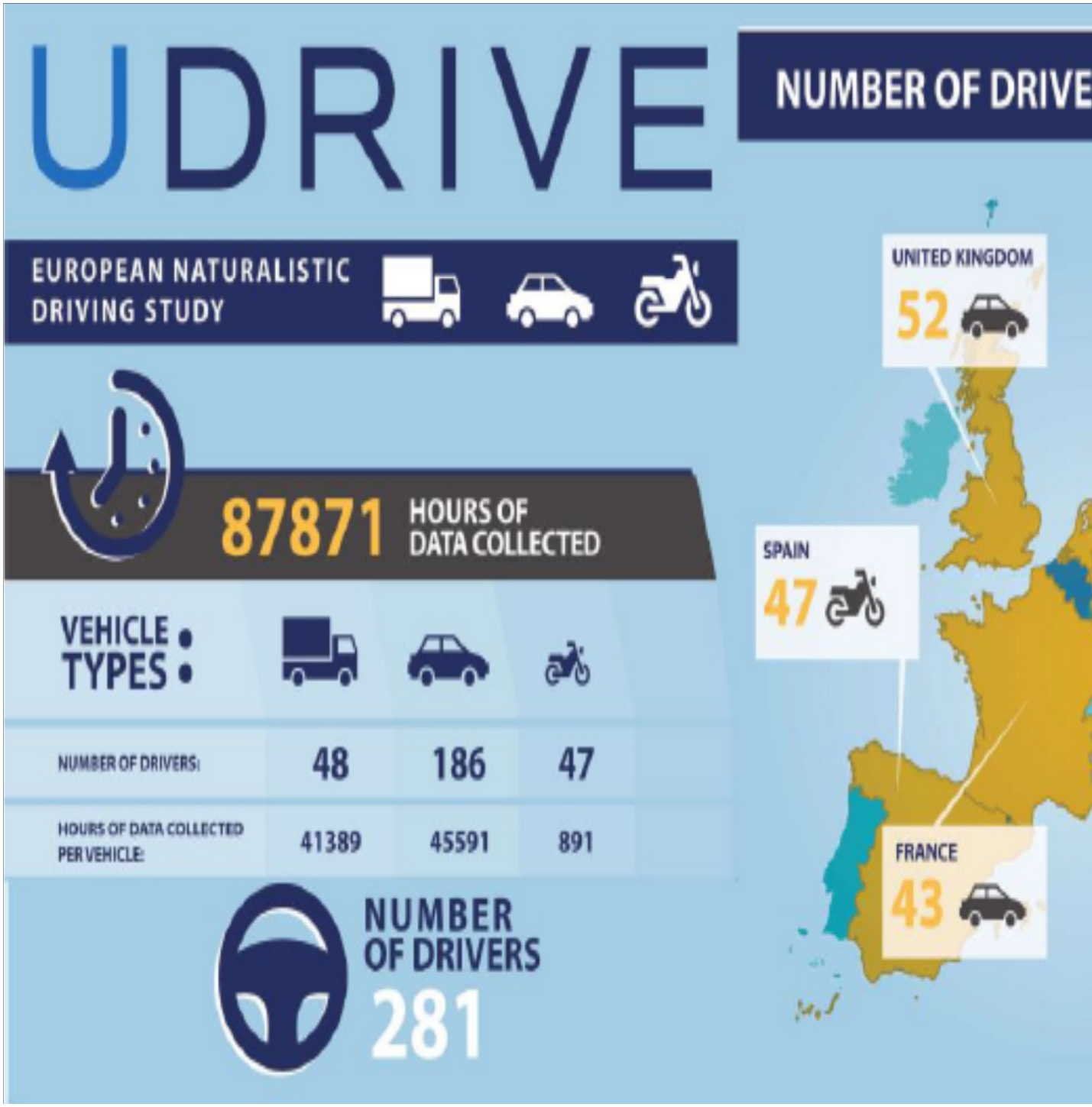
Aim

- Identify metrics that can categorize driver behavior with higher crash risk
- Aggressive driving in car-following situations
- Investigate effects of drivers characteristics on the metrics


UDRIVE
NUMBER OF DRIVE
EUROPEAN NATURALISTIC DRIVING STUDY
UNITED KINGDOM
52
SPAIN
47
FRANCE
43
87871 HOURS OF DATA COLLECTED
VEHICLE TYPES:
NUMBER OF DRIVERS:
48
186
47
HOURS OF DATA COLLECTED PER VEHICLE:
41389
45591
891
NUMBER OF DRIVERS
281

UDRIVE

European Naturalistic Driving Study

Questionaries' data

- Driver Behaviour Questionaries‘ (DBQ)
  - 19 items assessing the prevalence of errors an violations in the driver’s everyday behaviors
  - High score = more reported aggressive driving
- Arnett Inventory of Sensation Seeking (AISS)
  - 20 items assessing the risk-taking and sensatio seeking nature of a driver’s personality
  - High score = drivers seek out highly novel or hi intensity experiences

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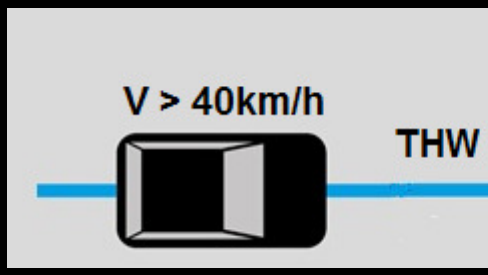
Method



-Vehicle sensor (V, a)
-Mobile eye (range)
-Map data (road type)

-Motorway
-No CC

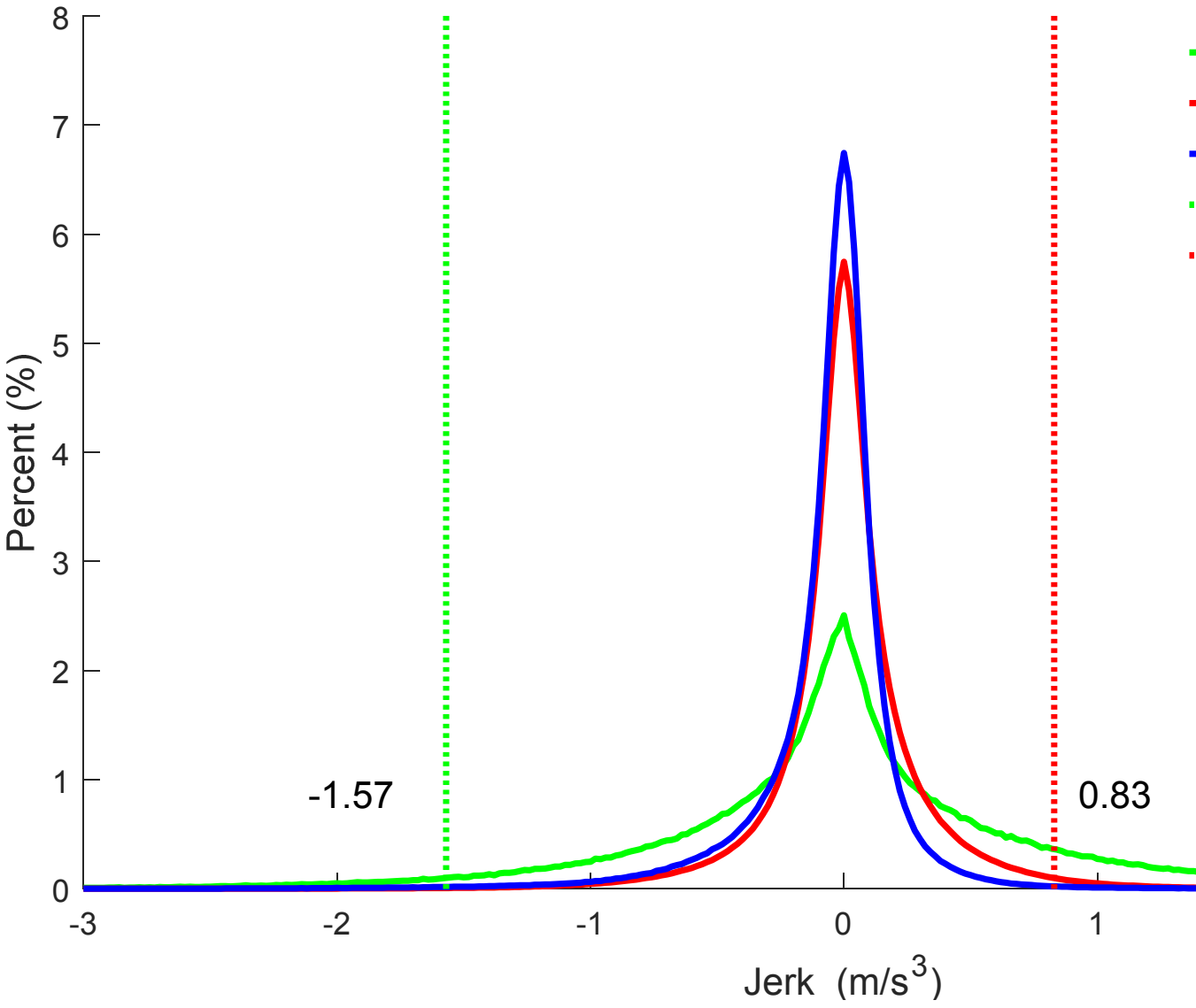
Database → Derive measures → Select scenario → Compute metrics

-Longitudinal jerk
-THW

$$\% \, tailgating = \frac{THW}{TH}$$

negative jerk
positive jerk

Method



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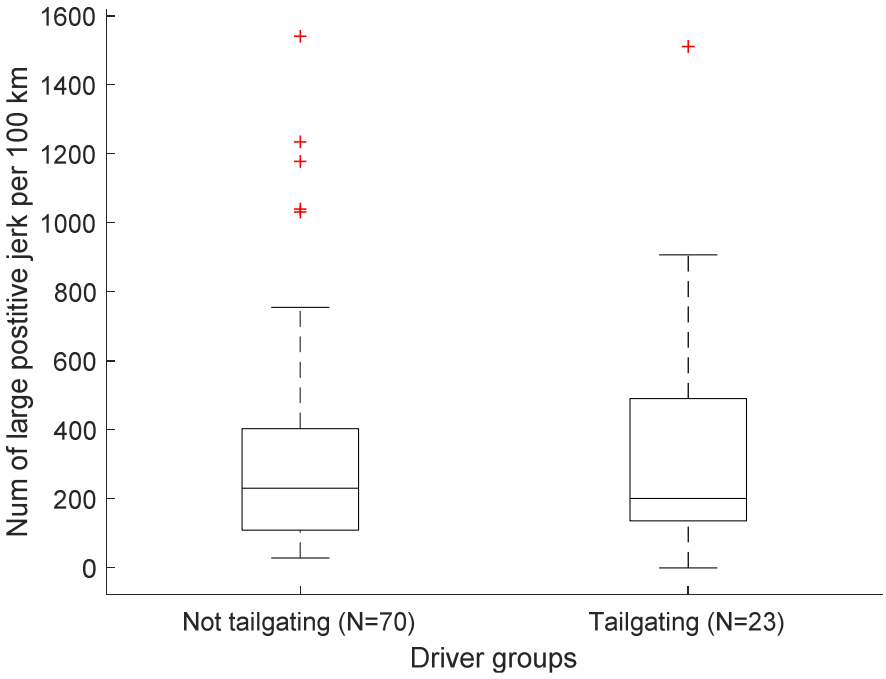
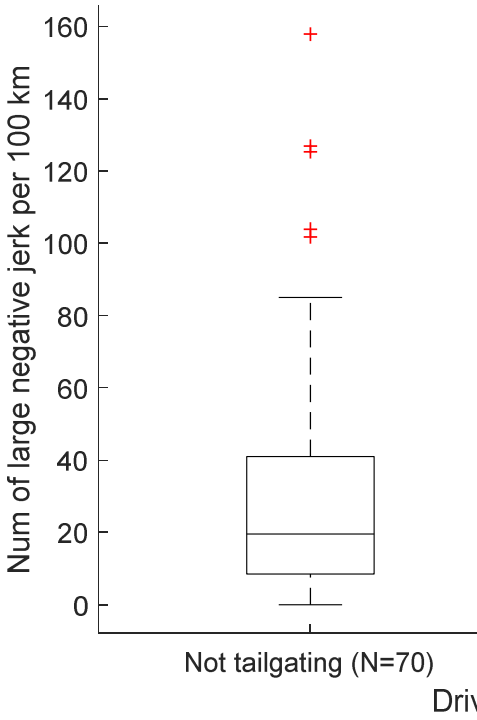
Results

- Total segments of car-following: 126098
- Distance: 72705 km
- Duration: 758.2 hours
- 93 drivers
  - 50 males and 43 females

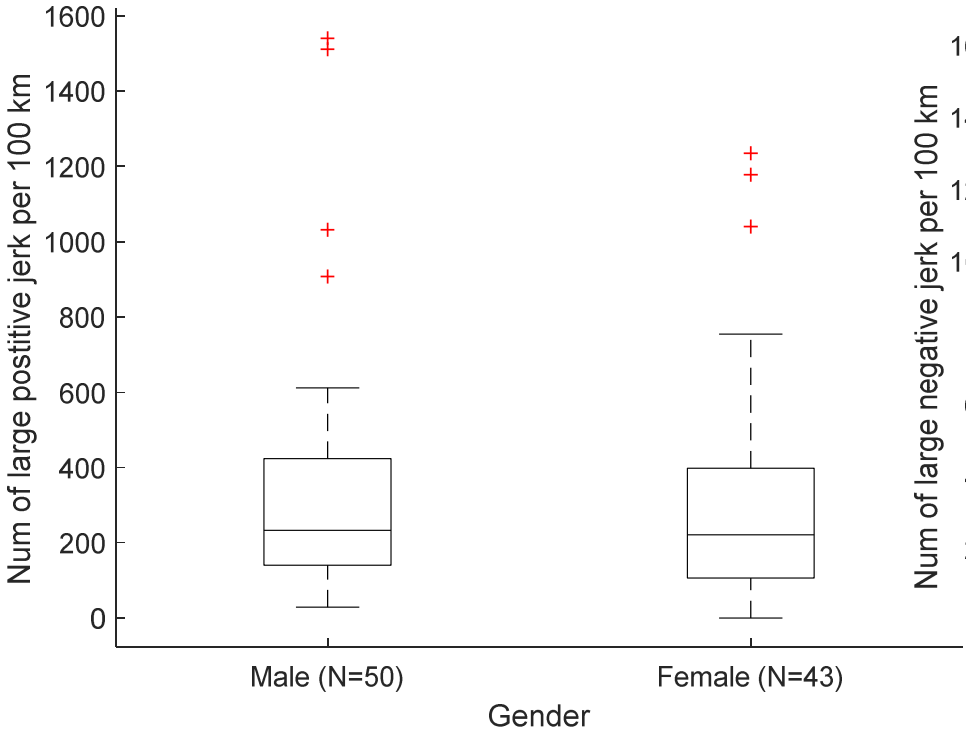
Jerk and tailgating

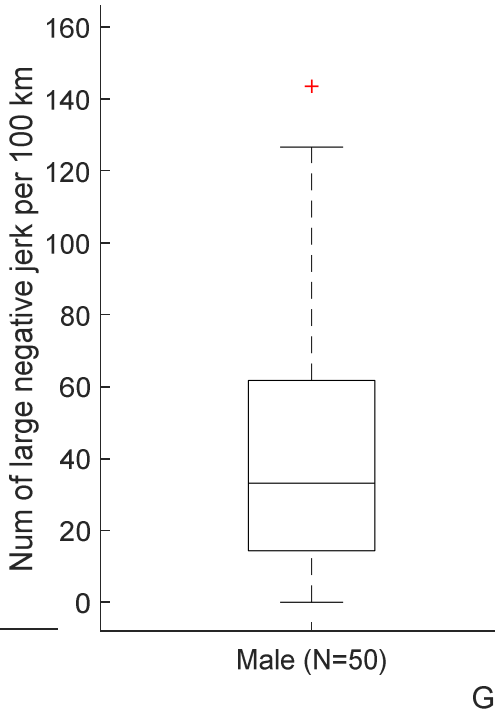




K-W: $\chi^2(1) = 0.1605, p = 0.6886$ $\chi^2(1) = 8.37$

Jerk and gender





K-W: $\chi^2(1) = 0.8128$, $p = 0.3673$ $\chi^2(1) = 6.04$

Jerk and country

- Positive jerk

  K-W χ^2 (4) = 20 **p = 0.00049**

- Negative jerk

  K-W χ^2 (4) = 19.51 **p = 0.00062**

Results

AISS

- Low AISS group (AISS <= 45)
- High AISS group (AISS > 45)

- Tailgate:
  - Fisher exact **p = 0.0139**
- Positive jerk:
  - K-W: $\chi^2(1) = 0.2435$, $p = 0.6216$
- Negative jerk:
  - K-W: $\chi^2(1) = 1.5286$, $p = 0.2163$

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DBQ

- Low DBQ group (1-3)
- High DBQ group (4-5)

- Tailgate:
  - Fisher exact p = 0.8604
- Positive jerk:
  - K-W: $\chi^2(1) = 2.8062$, p = 0.0939
- Negative jerk:
  - K-W: $\chi^2(1) = 1.6015$, p = 0.2057

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Conclusion

- Aggressive drivers are associated with significantly
  frequency of using large **negative** jerk
- Drivers from different countries have significantly d
  frequency in using both **positive** and **negative** jerk
- Male drivers have significantly higher frequency of
  negative jerk compared to female drivers
- Higher sensation-seeking drivers are more prone t

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Thank you