



How do pedestrians interact with electric and non-electric vehicles

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BACKGROUND

Previous research in Great Britain and Norway shows that:

- Collisions with pedestrians in urban environments were over two and a half times as likely with EVs and HEVs as with ICE vehicles (2013-2017).
- 31.5% of EV crashes involve bikes and pedestrians, but this proportion is only 20.3% for ICE vehicles (2011-2018).

Data used for these studies collected before introduction of Acoustic Vehicle Alerting System, mandated in Europe for new EVs / HEVs from 1st July 2021.

RESEARCH QUESTION

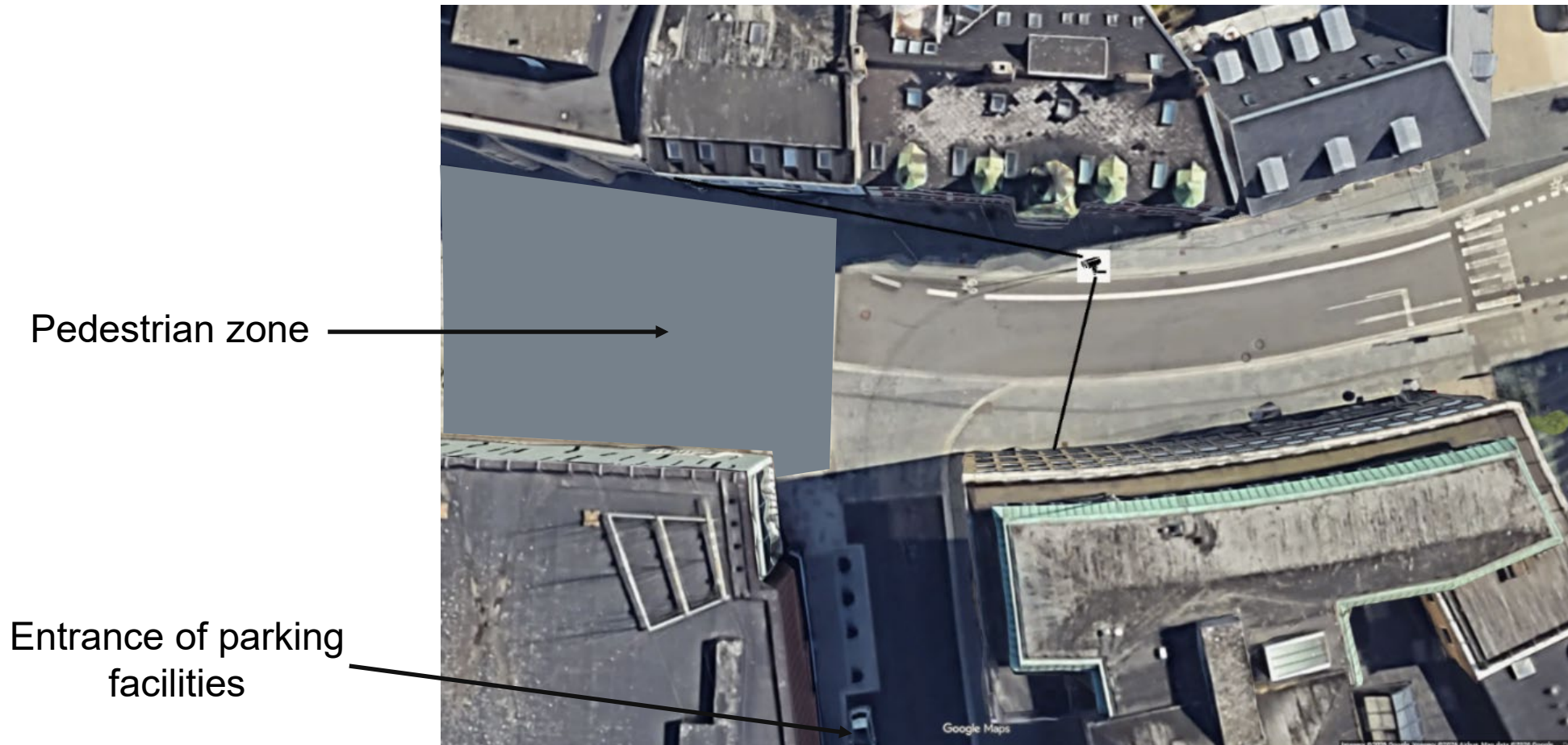
Hypotheses: Higher crash rates with EVs / HEVs compared to ICE vehicles in urban environment could be explained by pedestrians relying on sound for crossing the road (e.g., crossing without looking at vehicles).

Research question: Are pedestrians less likely to look towards EVs/HEVs than towards internal combustion engines vehicles, when they cross the road?

Study type: Behavioural study using video data.

METHODS

Data collection in Aalborg (intersection of Nytorv and Braskensgade)



Base map from Google Maps (© Google)

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METHODS

Data collection details:

- Video collected with GoPro Hero 12 Black action camera on light pole at a height of 2.60 meters.
- 5 days of data collection during August and September 2025, approximately 10:00-14:00.

Final dataset: ≈ 20 hours of recordings (resolution 3840×2160 ; 29.97 frames per second).



METHODS



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Guidelines for coding an event (interaction during crossing):

1. Either pedestrian(s) or vehicle yielded.
2. Vehicle or pedestrian(s) not yielded to another vehicle or pedestrian immediately before the interaction.
3. Neither pedestrian(s) nor vehicle had already started crossing when the other road user (i.e. vehicle or pedestrian) appeared in the video frame.
4. Only passenger vehicles and vans included. Trucks excluded due to obstruction of camera view.

METHODS

Annotated variables:

- Vehicle propulsion type.
- Road user yielding (pedestrian vs. vehicle).
- Glances to vehicles (yes / no).
- Glances to phone (yes / no).
- Headset use (yes / no).

Analysis: odds ratio (OR) + binary logistic regression.

RESULTS

Overview of the data:

106 interactions found and coded:

- 75 non-electric vehicles.
- 22 fully electric vehicles.
- 5 plug-in hybrids.
- 4 conventional hybrid vehicles.

RESULTS

OR calculation

		<i>Pedestrian looking towards approaching vehicles</i>		
		Yes	No	Row total
<i>Vehicle propulsion</i>	Electric	20 (<i>a</i>)	11 (<i>b</i>)	31
	Non-electric	58 (<i>c</i>)	17 (<i>d</i>)	75
	Column total	78	28	106

$$OR = \frac{a/c}{b/d} = \frac{a \cdot d}{b \cdot c}$$

$$OR = 0.53, 95\% \text{ CI } [0.21, 1.33]$$

RESULTS

Binary logistic regression (main effects)

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2$$

Predictor	Coefficient (β)	Std. Error	z	p	95% CI
Intercept	1.486	0.310	4.796	<0.001	[0.878, 2.093]
Headset in use / talking on the phone	-1.276	0.525	-2.431	0.015	[-2.304, -0.247]
Electric / hybrid vehicle	-0.527	0.484	-1.089	0.276	[-1.474, 0.421]

Model $\chi^2(2) = 3.80$, $p = 0.022$; Pseudo $R^2 = 0.062$; $N = 106$.

RESULTS

Binary logistic regression (main effects)

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2$$

Predictor	Coefficient (β)	Std. Error	z	p	95% CI
Intercept	1.553	0.332	4.681	<0.001	[0.903, 2.204]
Headset in use	-1.553	0.666	-2.333	0.020	[-2.859, -0.248]
Electric / hybrid vehicle	-0.727	0.562	-1.294	0.196	[-1.828, 0.374]
Headset in use / talking on the phone × propulsion	0.727	1.072	0.678	0.498	[-1.374, 2.827]

Model $\chi^2(3) = 4.03$, $p = 0.045$; Pseudo- $R^2 = 0.066$; $N = 106$.

CONCLUSIONS

Main results:

- 20 hours of video data collected and manually reviewed.
- 106 interactions between vehicles and pedestrians extracted.
- Propulsion type did not affect pedestrians' likelihood of looking at vehicles.
- Use of a headset predicted reduced visual interaction with vehicles.

Limitations:

- Data collected only in a specific perpendicular-crossing-path scenario.
- Limited number of cases observed.

ACKNOWLEDGMENTS



*Overskud
til hinanden
i trafikken*

THANKS FOR YOUR ATTENTION

