

Critical Factors of Safe Micromobility in Greece

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Introduction

- Over the past decade, **e-scooters** have become a **sustainable urban transport solution** tackling congestion, pollution and parking issues with affordability, flexibility and low environmental impact.
- **Increased adoption** reveals risks due to poor infrastructure, lack of regulations and behaviors like speeding, distraction, alcohol use and low helmet compliance (~5% in Greece).



Data Overview

- **Data** were drawn from the 3rd edition of the international E-Survey of Road Users' Attitudes (ESRA3), conducted in 2023 across 39 countries on five continents (North America, South America, Asia, Europe, Oceania).
- **ESRA3** placed particular emphasis on vulnerable road users (motorcyclists, cyclists, pedestrians, e-scooter users) and introduced new questions regarding infrastructure and e-scooter use.
- The **total ESRA3 sample** from Greece includes 978 road users (52% male, 48% female – average age: 46 years).
- The **survey sample** includes 63 respondents from Greece who reported using e-scooters.

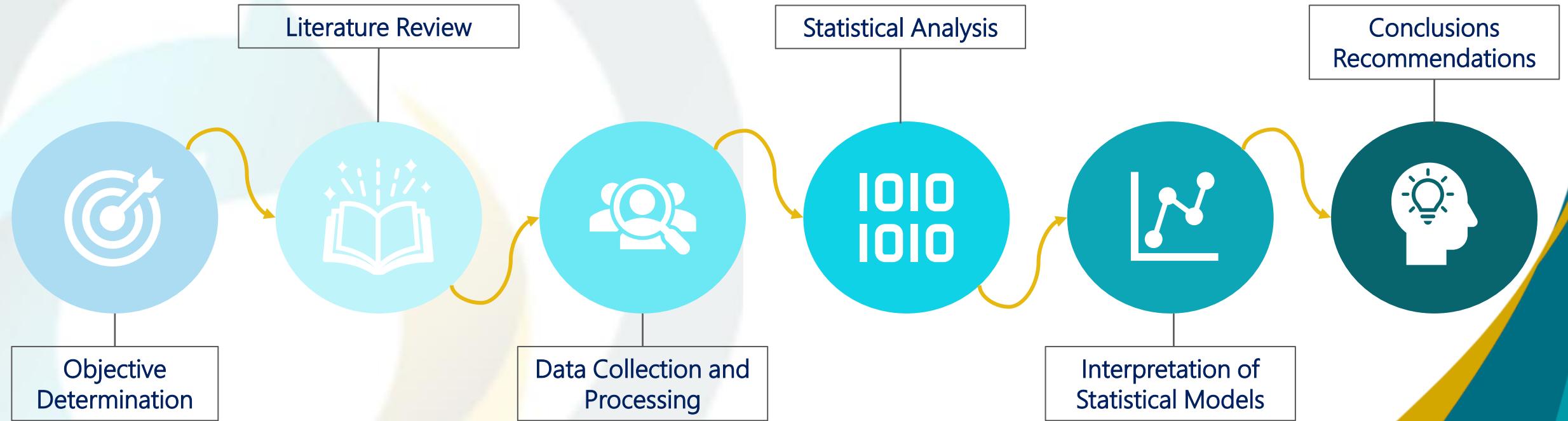


Objectives

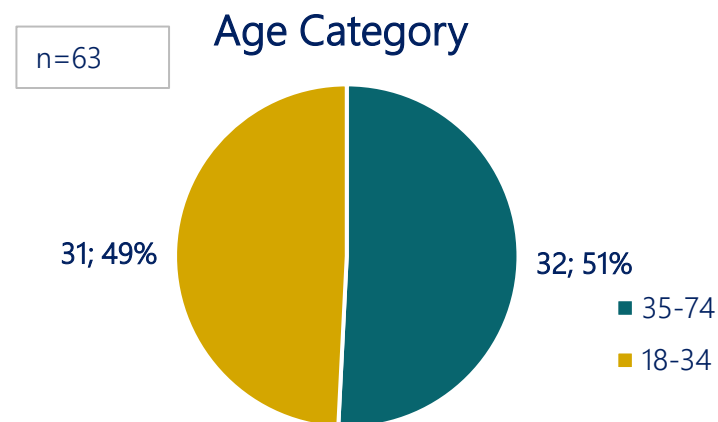
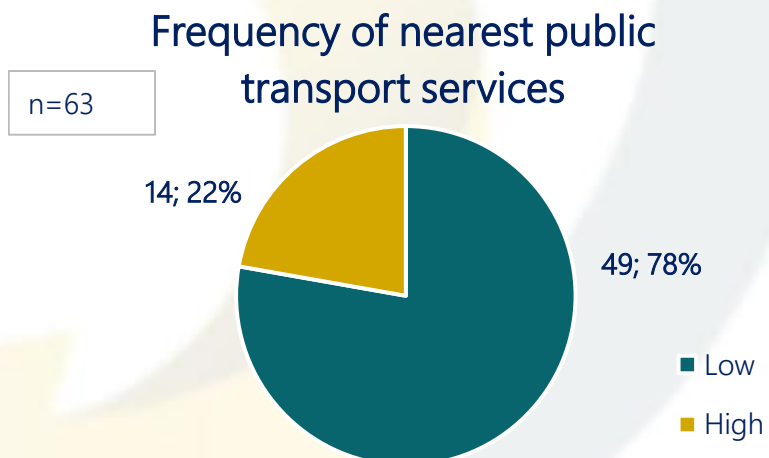
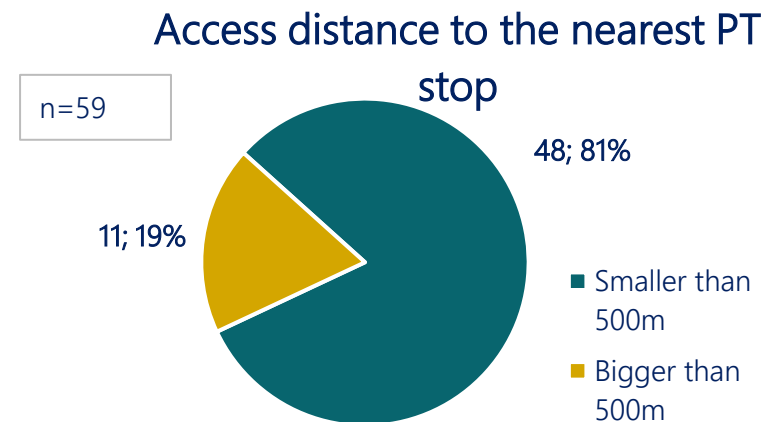
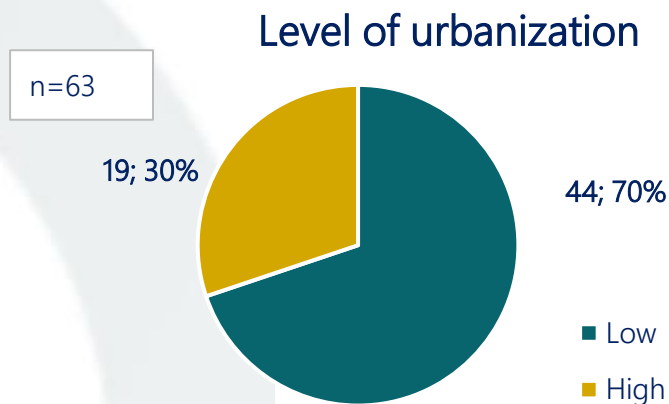
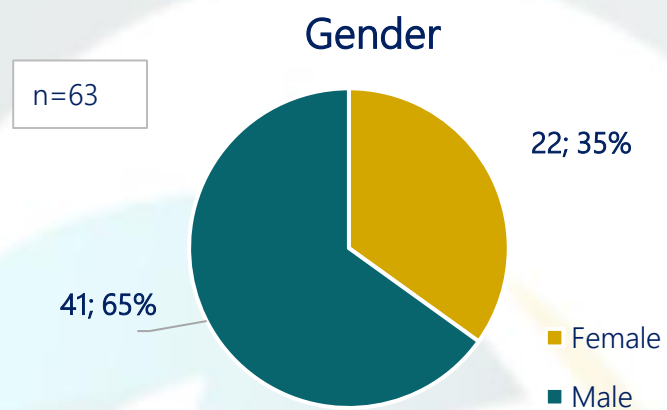
- Identify and analyze the **demographic, behavioral,** and **contextual factors** influencing the safety practices of e-scooter users in Greece.
- Provide robust insights into the **self-reported behaviors** and **attitudes** of e-scooter users in Greece.



Methodology

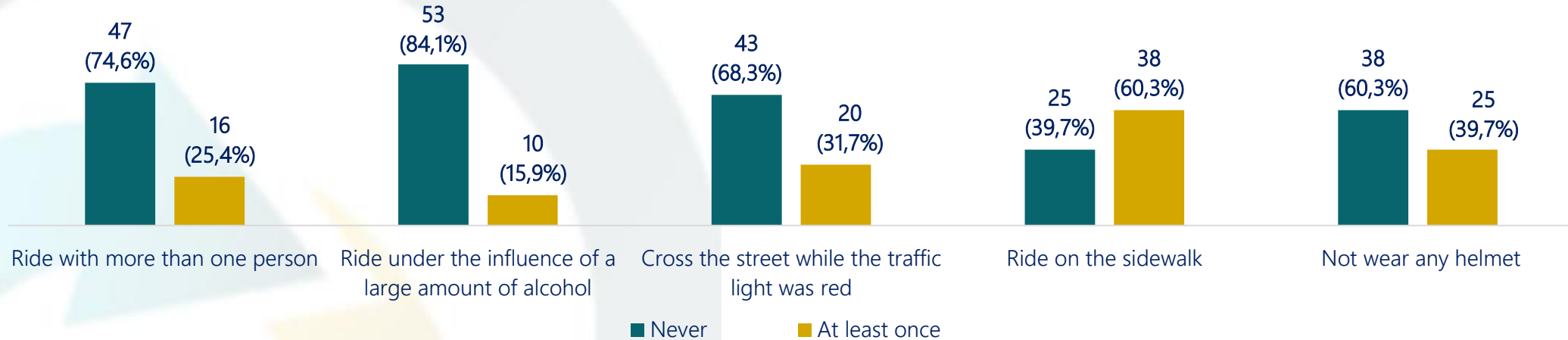


Descriptive Analysis of the Sample

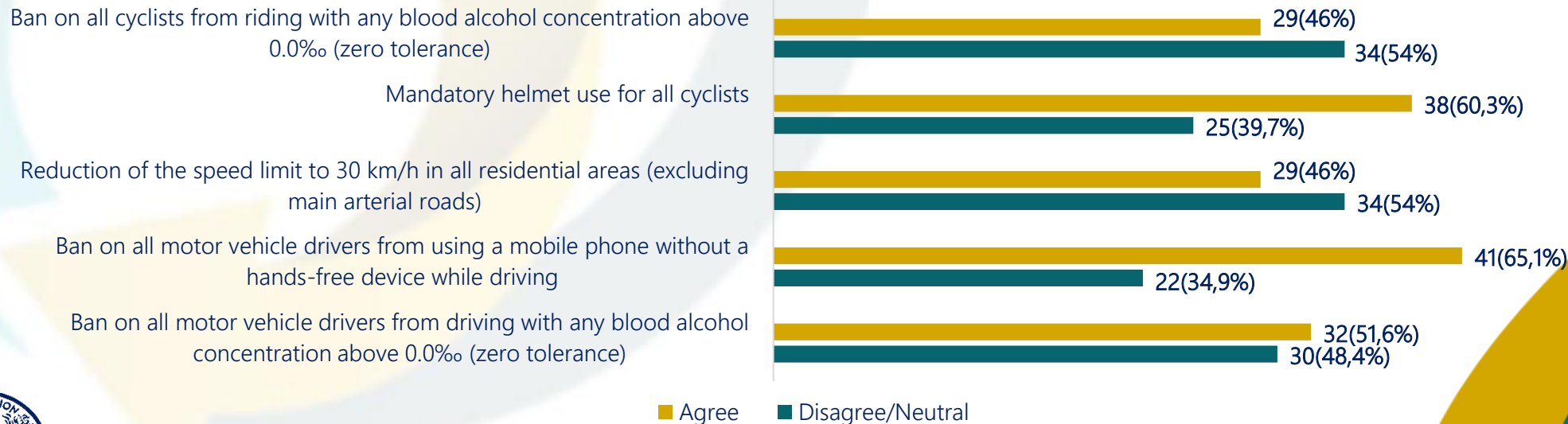


Descriptive Analysis of the Sample

In the past 30 days, how frequently as an electric scooter user did you...?



As an e-scooter user, do you agree or disagree with the mandatory...



Statistical analysis

9 Binary Logistic Regression Models

Discrete Dependent Variable. Possible Values: 0 or 1

Discrete Independent Variable

$$Y = \text{logit}(P) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k$$



Statistical Tests

1. Logical explanation of the signs of β
2. Statistical significance > 95% (and > 90%)
3. R^2 value as close as possible to one
4. Hosmer-Lemeshow: Significance > 0.05 (and > 0.1)



Summary of Model Results

Dependent Variable	Ride with more than one person			Riding under the influence of alcohol			Red light violation			Riding on the sidewalk			Riding without a helmet			Pedestrians under the influence of alcohol			Mobile phone use by pedestrians			Driving at inappropriate speed			Mobile phone use by drivers		
Independent variables	B	sig	Exp(B)	B	sig	Exp(B)	B	sig	Exp(B)	B	sig	Exp(B)	B	sig	Exp(B)	B	sig	Exp(B)	B	sig	Exp(B)	B	sig	Exp(B)	B	sig	Exp(B)
Gender Ref. category: Man Woman	-	-	-	-	-	-	-1.277	.062	.279	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Age group Ref. category: 18-34 years old 35-74 years old	-1.496	.006	.224	-1.679	.013	.187	-	-	-	-	-	-	-	-	-	-1.157	.049	.314	-	-	-	-	-	-	-	-	
Education_2 Ref. category: University degree- Postgraduate or higher degree Primary-Secondary education	-	-	-	-1.415	.068	.243	-	-	-	-	-	-	-	-	-	-2.020	.049	.133	-1.529	.055	.217	-	-	-	-	-	
Urbanization Ref. category: High Low	-	-	-	-	-	-	1.683	.050	5.380	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Public transport frequency Ref. category: High Low	-	-	-	-	-	-	-	-	-	-	-	-	1.077	.070	2.936	-	-	-	-	-	-	-	-	-	-	-	
Priority_rule_acceptability Ref. category: Acceptable Unacceptable/Neutral	-1.621	.012	.198	-1.640	.065	.194	-	-	-	-2.260	.001	.104	-1.764	.011	.171	-1.454	.051	.234	-	-	-	-	-	-	-	-	
Driving_after_some_alcohol Ref. category: Acceptable Unacceptable/Neutral	-	-	-	-	-	-	-	-	-	-	-	-	-1.490	.031	.225	-	-	-	-2.211	.003	.110	-	-	-	-	-	
Area_alcohol_overlimit_ acceptability Ref. category: Acceptable Unacceptable/Neutral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.014	.042	20.362	-3.445	.024	.032	-2.683	.092	.068
Area_handheld_phone_use_acceptability Ref. category: Acceptable Unacceptable/Neutral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-2.878	.030	.056	-	-	-	-3.205	.055	.041
Area_message_reading_ acceptability Ref. category: Acceptable Unacceptable/Neutral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-3.393	.029	.034	-	-	-
Perceived_car_accident_ speeding Ref. category: Frequent Rare	1.210	.031	3.353	-	-	-	1.971	.088	7.180	-	-	-	1.299	.077	3.666	-	-	-	-	-	-	-	-	-	-	-	-
Perceived_car_accident_ inattention Ref. category: Frequent Rare	-	-	-	-	-	-	-	-	-	2.405	.017	11.081	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perceived_car_accident_ fatigue Ref. category: Frequent Rare	-	-	-	-	-	-	-2.175	.066	.114	-2.122	.032	.120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Discussion (1/5)

- Users of e-scooters are mainly **young men** with a **high educational level**.
- Most users live in **small areas** with **easy access** to public transport but **infrequent** service.
- Despite **responsible driving** (they do not carry other passengers), many **do not always comply** with safety measures (non-use of helmets, signal/traffic light violation).
- The majority of users **support the enforcement** of road safety measures (mandatory use of helmets, mobile phone prohibition without a dedicated headset).



Discussion (2/5)

- Users aged **35–74** demonstrate **greater responsibility** regarding road safety compared to younger users (18–34 years old). They are less likely to engage in risky behaviors, such as carrying extra passengers or driving under the influence of alcohol.
- Users who recognize **speeding** and **inattention** as major **risk factors** for accidents are more likely to **follow** basic safety **rules**, such as wearing a helmet and obeying traffic signals. On the other hand, those who underestimate these risks tend to adopt more relaxed and potentially dangerous behaviors.
- **Female users** generally adopt more **responsible and conservative** road safety behaviors, such as avoiding red light violations, indicating an overall more cautious attitude.



Discussion (3/5)

- Users who **do not expect priority** to be given to pedestrians or cyclists tend to adopt **safer practices** for their own protection, such as avoiding carrying passengers and refraining from driving under the influence of alcohol. They also **frequently wear helmets**, as they recognize that the lack of priority may expose them to greater risk.
- Users with a **basic level** of education appear to be **more cautious**, especially regarding driving under the influence of alcohol, **compared** to those with higher **academic qualifications**.
- Users living in areas with **limited public transport** services **tend not to use helmets**, possibly due to greater familiarity with daily scooter use.



Discussion (4/5)

- Users aged 35–74 are **68.6% less likely** to find it acceptable for pedestrians to walk under the influence of alcohol compared to younger users (18–34 years old), indicating **increased caution with age**.
- Users who do not expect priority to be given to pedestrians or cyclists are **76.6% less likely** to consider walking under the influence of alcohol acceptable, as they acknowledge the risks associated with **impaired ability**. This attitude may be linked to their **frequent use of sidewalks**, making them more aware of potential dangers.



Discussion (5/5)

- Users from areas where driving under the influence of alcohol and mobile phone use are deemed unacceptable are **96.8% less likely to accept** speeding and **95.9% less likely to accept** mobile phone use while driving.
- Users who **disagree** with driving under the influence of alcohol are **89% less likely to accept** mobile phone use by pedestrians, reflecting a **higher awareness** of the risks associated with distraction.
- Users **tend to distinguish between risks for drivers and pedestrians**. Specifically, users from areas with a strict stance on driving under the influence are **94.4% less likely to accept** mobile phone use by drivers, but only **20.4% less likely to accept** it by pedestrians.



Recommendations

- **Significant gaps** in e-scooter safety can be addressed through legislation, infrastructure and education.
- **Stricter enforcement and immediate penalties** are needed for helmet non-use, red-light violations and riding under the influence.
- **Dedicated infrastructure** (e.g., protected lanes) reduces sidewalk use and pedestrian conflicts.
- **Education** should focus on traffic rules, risk perception, and safe practices.
- **Awareness campaigns** should target all road users.
- **Incentives** like helmet discounts or safety training benefits can promote safer behavior.
- Rewarding participation in safety campaigns helps build a **culture of compliance**.



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