A Decade of Micromobility Injuries in Europe: Demographic and Temporal Trends

Introduction

Micromobility has emerged as a prominent mode of transport across urban environments in Europe, offering flexibility, sustainability, and affordability. However, the safety implications of increased micromobility use—particularly concerning injury severity and contributing factors—remain under-explored. This study provides a descriptive statistical overview of micromobility-related injuries in Europe from 2013 to 2023, focusing on annual trends in injury types and the influence of user demographics, environmental conditions, and contextual elements. The objective is to inform safer urban mobility policies through a better understanding of injury patterns.

Methodology

We used standardized traffic accident data from a multi-country European database covering 2013–2023. Data were aggregated from annual Excel files and filtered to include only micromobility users—specifically pedal cycle and moped users. Injury outcomes were categorized as fatalities, serious injuries, and slight injuries. Descriptive statistics were calculated for each year.

Descriptive statistics were computed per year to provide a foundational overview of injury severity trends (see Table 1). Across the 11-year period, the average number of slightly injured micromobility users showed a steady increase—from **2.18 in 2013** to **2.46 in 2023**—indicating either increased usage or greater exposure to risk over time. Serious injuries fluctuated, peaking in 2018 and 2020, possibly due to shifts in behavior or external events like COVID-19. Fatal injuries declined modestly over time, indicating safety improvements. High standard deviations for slight injuries suggest variability in risk. Annual sample sizes ranged from ~59,500 to ~69,000, ensuring robust comparability.

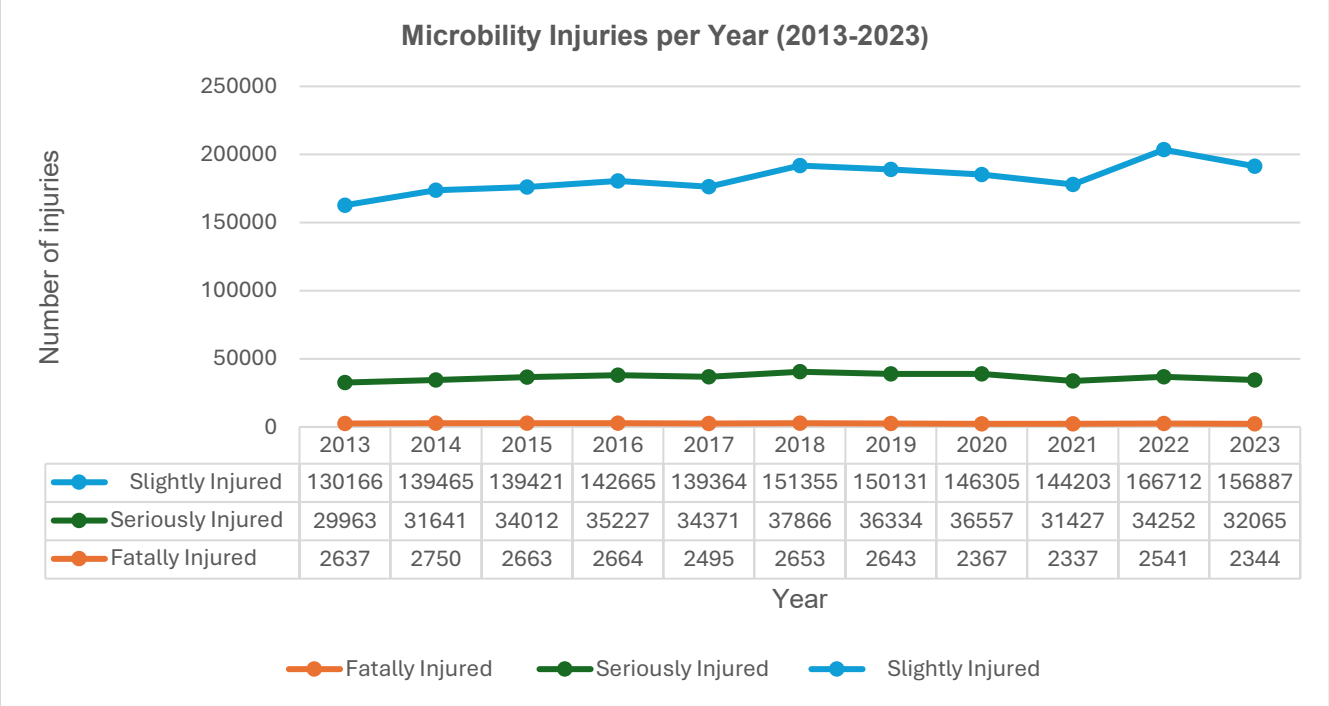
Table 1: *Descriptive statistics*

	Fatally Injured (at 30 days)			Seriously Injured (as reported)			Slightly Injured		
	count	mean	std	count	mean	std	count	mean	std
2013	59585	0.044256	0.217612	59585	0.502861	1.382454	59585	2.184543	6.694528
2014	62925	0.043699	0.216224	62925	0.502837	1.395826	62925	2.216369	6.621391
2015	64382	0.041362	0.209246	64382	0.528284	1.402601	64382	2.165528	6.69747
2016	65578	0.040623	0.209558	65578	0.537177	1.435043	65578	2.175501	6.941288
2017	63979	0.038997	0.207087	63979	0.537223	1.406834	63979	2.178277	6.824956
2018	67073	0.039554	0.207866	67073	0.564549	1.511174	67073	2.256571	7.421118
2019	67300	0.039272	0.210541	67300	0.539881	1.441984	67300	2.230773	6.987314
2020	63738	0.037136	0.20248	63738	0.573551	1.58047	63738	2.295412	7.138796
2021	65120	0.035888	0.198705	65120	0.482601	1.406331	65120	2.21442	6.569726

2022	69077	0.036785	0.200452	69077	0.495852	1.462188	69077	2.413423	7.498842
2023	63859	0.036706	0.201468	63859	0.502122	1.413607	63859	2.456772	7.735683

Results

Between 2013 and 2023, the number of micromobility-related injuries followed a gradually increasing trend, particularly for slight injuries. As shown in **Figure 1**, slight injuries were by far the most frequent outcome throughout the period, exceeding 150,000 annually in recent years. Serious injuries displayed more fluctuation, while fatalities remained below 3,000 per year, indicating relatively stable but persistent risk. The years 2018 and 2022 saw notable increases across all severity levels.



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Slightly Injured	130166	139465	139421	142665	139364	151355	150131	146305	144203	166712	156887
Seriously Injured	29963	31641	34012	35227	34371	37866	36334	36557	31427	34252	32065
Fatally Injured	2637	2750	2663	2664	2495	2653	2643	2367	2337	2541	2344

Figure 1: *Micromobility Injuries per Year*

Year-on-year percentage changes further reveal the volatility in injury trends (Figure 2). The period from 2018 to 2023 was particularly dynamic, with a marked decline in 2020—likely due to COVID-19 restrictions—followed by a sharp rebound in 2022. While serious and slight injuries generally followed similar trends, fatalities showed more erratic behavior, with alternating increases and decreases suggesting complex interactions between usage levels, safety measures, and contextual factors.

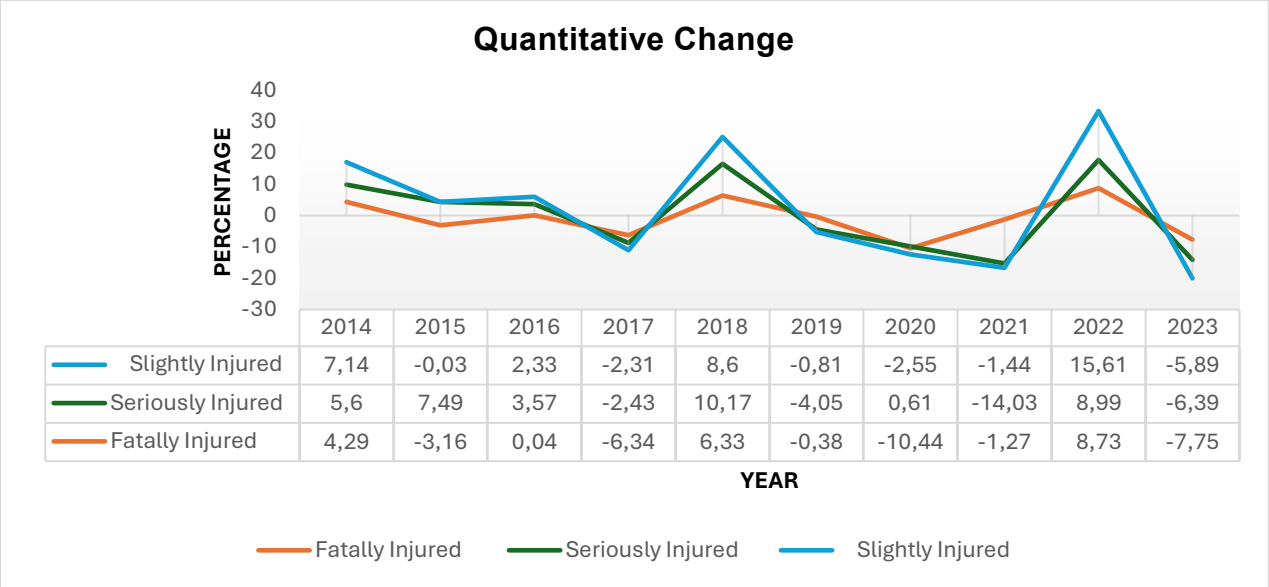


Figure 2: *Quantitative Change per Year*

Figures 3–5 illustrate the distribution of injuries across age groups (15–24, 25–49, 50–64, 65+), separately for each severity category: fatal, serious, and slight injuries. Analysis by age group showed that individuals aged 25–49 consistently accounted for the highest number of injuries across all severity levels, while those aged 65+ had the highest fatality rates despite lower total involvement, highlighting their vulnerability. A notable rise in slight injuries was observed in 2022, particularly among middle-aged and older adults.

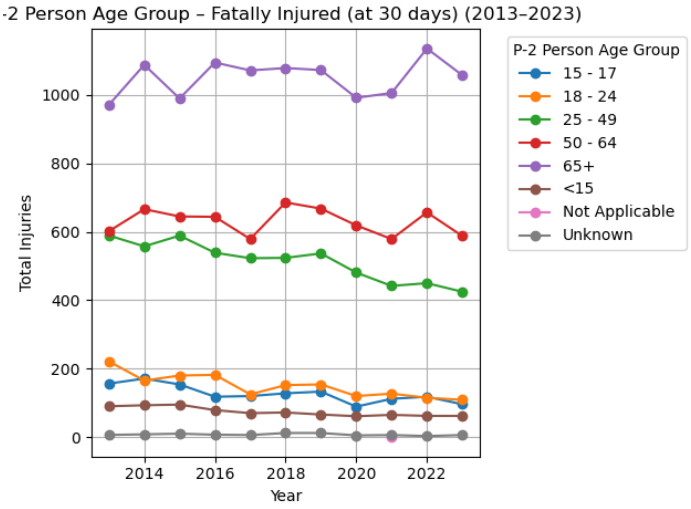


Figure 3: *Fatal injuries by Age Group factor*

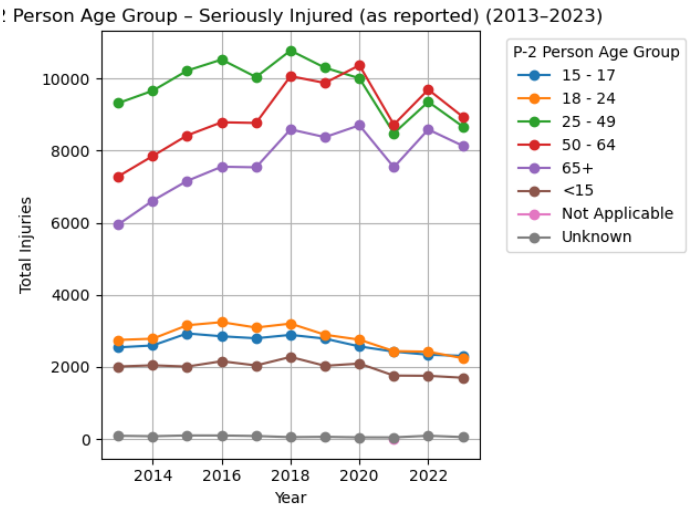


Figure 4: *Serious injuries by Age Group factor*

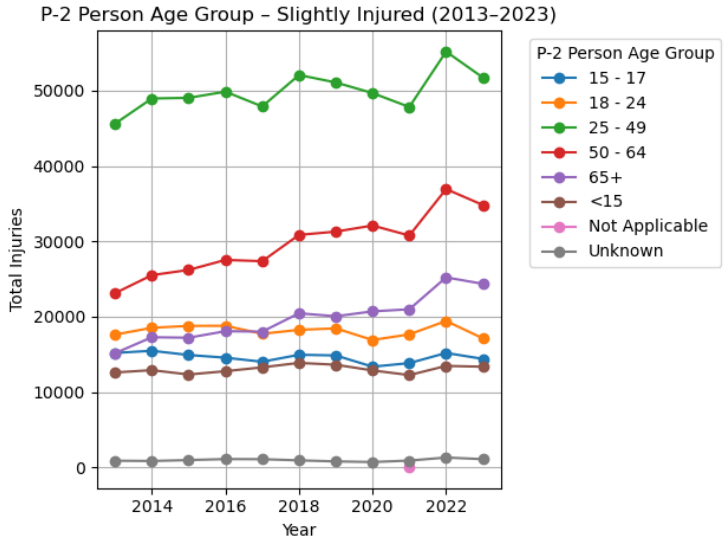


Figure 5: *Slight injuries by Age Group factor*

For the remaining factors, injuries across all severity levels were aggregated to identify broader patterns of risk exposure.

As shown in Figure 6, male users consistently accounted for the majority of micromobility injuries throughout the 11-year period. This overrepresentation is particularly pronounced in the working-age groups, suggesting targeted interventions may be needed.

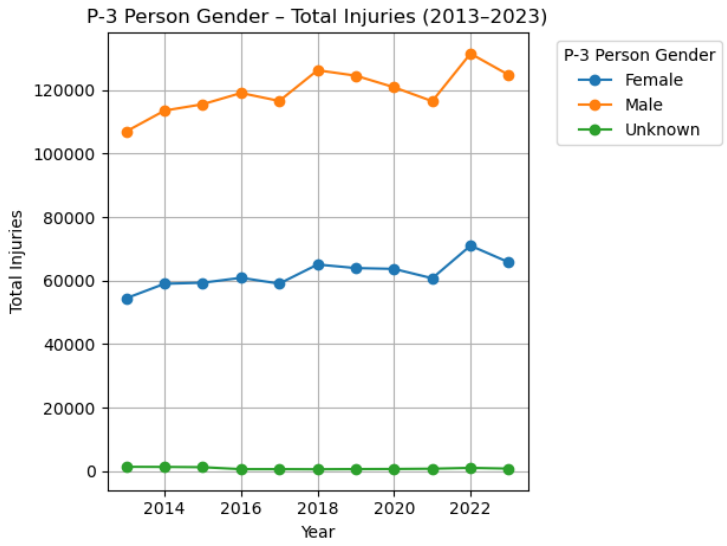


Figure 6: *Total injuries by Gender*

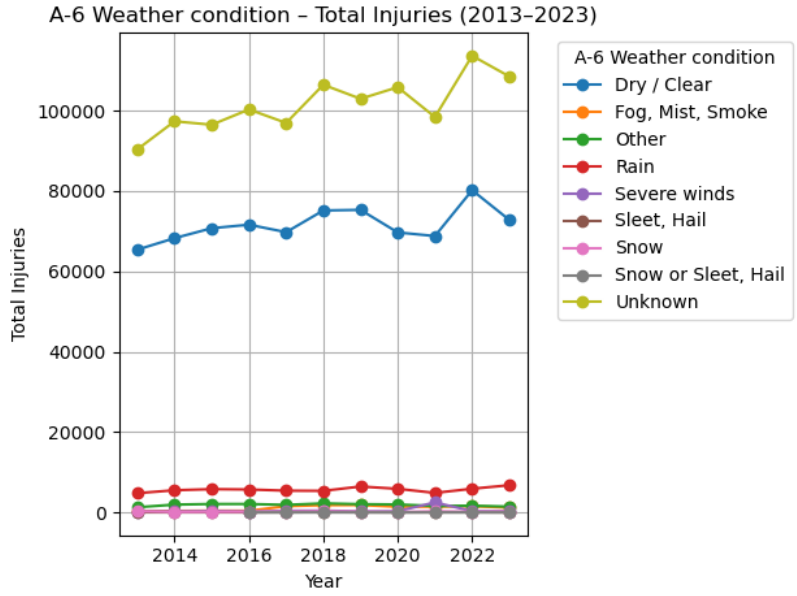
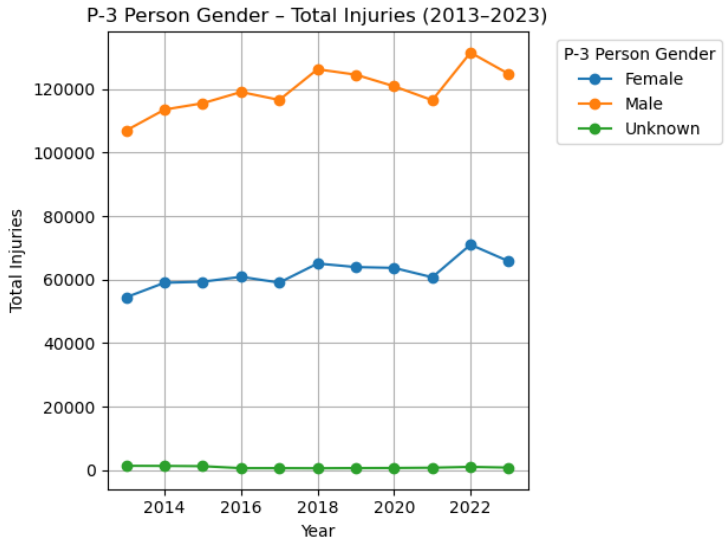


Figure 7: *Total injuries by Weather Conditions*

Figure 7 presents total injuries under various weather conditions. While most injuries occurred under unknown weather conditions—likely reflecting higher exposure—adverse

weather was associated with a disproportionately higher share of severe outcomes.



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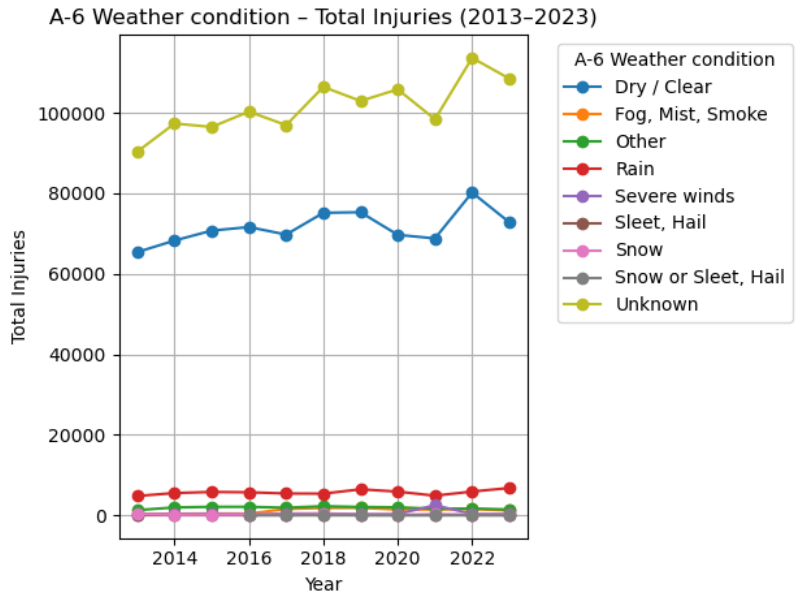

Figure 7: *Total injuries by Weather Conditions*

Injuries varied notably by weekday (Figure 8), with peaks observed on weekdays, likely due to commuting-related travel. Weekend patterns suggest potential links to leisure use and different user behavior.

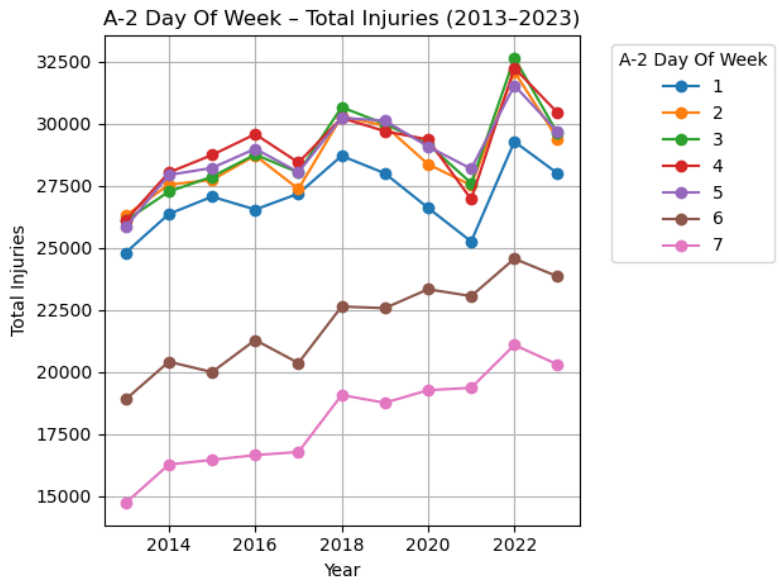

Figure 8: *Total Injuries by Day of the Week*

Figure 9 shows the distribution of injuries by lighting conditions. Daylight accounted for the majority of incidents, but injuries during poor lighting conditions were often more severe.

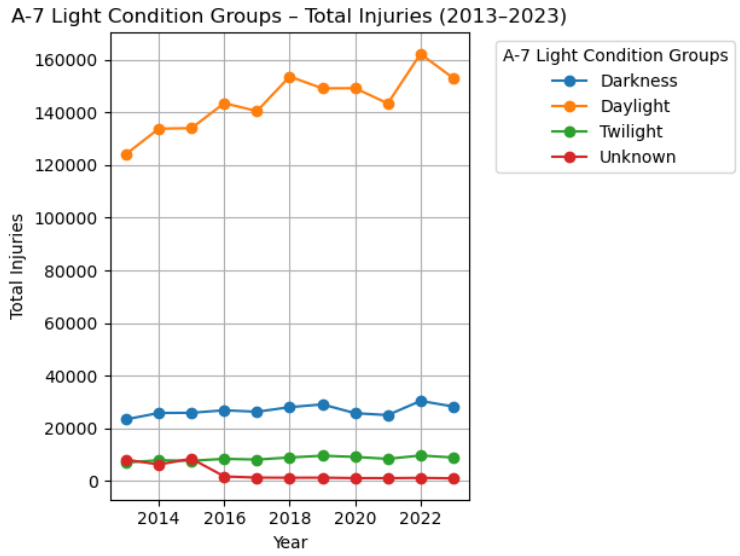

Figure 9: *Total Injuries by Weather Condition Groups*

As depicted in Figure 10, the majority of micromobility-related injuries occurred in urban areas. However, rural areas, despite fewer overall cases, were disproportionately associated with fatal outcomes.

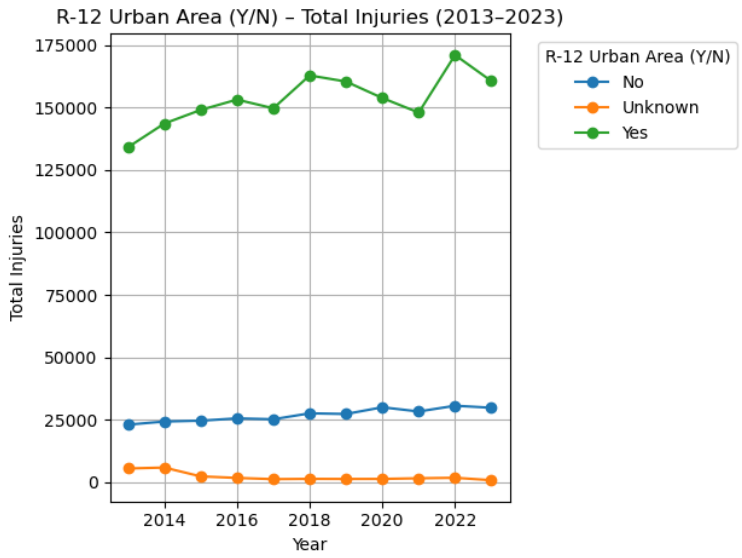

Figure 10: *Total Injuries by Location Type (Urban/Rural, 2013–2023)*

Discussion

The increasing injury counts reflect higher micromobility adoption, while demographic patterns indicate a need for targeted safety interventions, particularly for males and younger users. The stable impact of environmental factors like weather and lighting suggests some adaptation, but the surge in serious injuries post-2020 indicates areas for improvement, such as helmet use and enforcement.

Temporal shifts in behavior—driven by policy, pandemic effects, or commuting trends—are crucial to understanding injury volatility. The data suggest differentiated strategies may be needed based on location, age group, and usage context.

Conclusion

Micromobility-related injuries in Europe have evolved over the past decade, with increasing prevalence influenced by user demographics and environmental conditions. The findings support the need for tailored safety policies, particularly for urban, male, and middle-aged users. Future research will focus on predictive models and cross-modal comparisons to further enhance urban mobility safety.