Determinants of Micromobility Adoption in University Campuses: Preliminary Findings from a Small-Scale City in Italy

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Abstract. University campuses are ideal environments for promoting sustainable urban mobility. However, the adoption of active and electric micromobility faces socio-demographic and behavioral barriers. This study investigates and compares the propensity of a university community to adopt e-bikes, e-scooters, and traditional bicycles as alternatives to private cars. Based on a travel survey conducted at the University of Cassino (Italy), three Ordered Logit models have been calibrated, characterized by a McFadden/Pseudo R^2 of 0.0947, 0.1118, 0.1039. Explanatory variables include socio-demographics, university status, attendance, and current travel habits. Results show that off-campus students exhibit the highest propensity to adopt all three modes, whereas habitual car drivers reveal some resistances. A significant gender gap emerges, with females less likely to adopt micromobility, particularly traditional bicycles. Comparing the transport modes, e-bikes prove to be the most inclusive option: they overcome the physical fatigue barrier for extra-urban commuters and the age barrier (>45 years) that significantly limits e-scooter and traditional bike usage. Conversely, e-scooters show strong potential for last-mile connectivity among combined public transit users.

Keywords: Sustainable Mobility · Smart Mobility · Safety

1 Introduction

The recent growth of micromobility transport mode solutions in cities (such as bike, e-scooter, and e-bike) has raised some safety concerns among all road users. Study users preferences and propensity towards micromobility could be a fundamental step to promote and address policies to foster sustainable mobility, but at the same ensure adequate safety levels for these users [1–4].

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Micromobility users make their trip for different reasons, but it is essential to determine the contributing factors to understand how to change and pursue the modal split towards these sustainable transport modes. An emerging trend in literature it is expressed by the study of micromobility of university students [5, 6], that are one of the main category to use such type of transport mode. From an online survey conducted in Sweden [7], it emerges that high income, held a driving license, car and e-bike ownership, and public transit subscription are the main determinants toward the use of e-scooters. Users with inclination towards more sustainable transport mode, registered an higher e-scooter propensity than others. Although micromobility transport mode belongs to the same category, scholars have found conflict between bike and e-scooter share: for instance Yang et al. [8] have shown that the use of bike decrease in e-scooter sharing areas by 10.2%. Regarding the crash frequency of e-scooters, the number of crashes increase in area shared with pedestrian and cyclists, near to schools facilities and in areas with larger Black, Asian and Minority Ethnic population [9]. Regarding e-bike, some studies in Netherland found that women use more e-bike than men, but differences are narrow for elderly [10], while e-bike ownership decrease the adoption of muscular bike, and then, marginally, the use of car and public transit. It has also been found that built environment at destination work location rathern than the residential location play a crucial role: for instance the presence of road with bike lanes, major trunk road, and the presence in the neighborhoods are associated with increased levels of e-bike use [11]. In another work conducted in China [12], it has been highlighted that e-bike adoption in Henan Province is influenced mainly by socio-demographic factors (such as family size and occupation) and economic savings, the main motivation for use. Unexpectedly, environmental concerns show a negative impact on utilization. Furthermore, the presence of adequate infrastructure (cycle lane and charging stations) is crucial to promoting a more widespread and sustainable use of e-bikes. However, these spatial interactions and infrastructural gaps fundamentally shape the safety landscape, as the competition for urban space and the lack of dedicated paths directly correlate with specific crash dynamics and increased risk levels.

As it emerges from recent study [13] safety may exert positive influence on micromobility choices. In a comparative study on e-scooters users and non users [14], it has been found that non users of e-scooter tend to assume more safe behaviours than systematic users, and to perceive safety in a different manner than the e-scooter users. Among micromobility transport mode, it is worth mentioning e-bike. According to Guo et al. [15], the main determinants related to e-bike crash severity are age, gender, e-bike behavior, license plate, bicycle type, location, and speed limits. Some other authors found that, for e-bike commuting, the main factor related to the choice is weather conditions [16].

As shown in a study conducted in UK [17], the authors discuss the benefits of cycling for individuals and society but also highlight the disproportionately high rates of road traffic injuries and fatalities sustained by cyclists. According to Meuleners et al. [18], 93% of all cyclist crashes occurred on local government-controlled roads, rather than state roads. According to the authors, this is expected since cyclists tend to prefer traveling on smaller roads with less traffic. Other scholars [19] identify the characteristics of older cyclists and explore which of these characteristics are associated with self-reported cycling crashes. More than 800 cyclists aged over 65 completed a questionnaire that

covered demographics, bicycle specifications, and personal characteristics. Firstly, with every passing year, the chance of falling increased by 7.3%. Secondly, if cyclists had mental impairments, the chance of falling increased by a factor of 2.5. Thirdly, if cyclists were less than entirely confident, the likelihood of falling increased by a factor of 1.8. Finally, older cyclists living in rural areas were 2.1 times more likely to fall than those residing in urban areas. The study concludes that demographic, cy-cling, and personal factors contribute to an increased risk of self-reported falls among older cyclists. It was also observed that male cyclists, with an average age of 49, were most frequently involved in fractures [20]. High-energy fractures were most common in the acetabulum (100%), pelvis (84.2%), vertebra (75%), and tibia (70.3%) among cyclists. Finally, it was found that single bicycle crashes and collisions with other bicycles were significantly less likely to result in high-energy fractures compared to collisions with a car. A database of 2269 geo-located crashes in Madrid (involving at least one bike) was used to link each crash to a set of infrastructure and traffic variables [21]. This allowed the researchers to compare bike road safety between different districts in Madrid and model the severity of bike crashes using binary logit regression. The study also found that most serious crashes occurred at intersections between avenues and roads with a level of protection 1. It is important to note that, according to the authors, at intersections, cycling infrastructure is no longer protected (even if it is level 1), and the risk of a serious crash is higher.

In this paper, three Ordered Logit Models have been proposed to highlight the most important determinant related to university student propensity towards micromobility mode of transport. The innovative aspect that is proposed in this paper is to analyse university student propensity in campuses in a small city located in Italy, with the aim of highlighting the most important contributing factors to micromobility propensity and safety perceptions. Investigating a medium-small urban context is essential to fill a gap in the literature, which traditionally focuses on metropolitan areas [21] characterized by extensive mass transit networks. In smaller realities, the ‘last-mile’ problem often encompasses the entire commute, and the high dependency on private cars is exacerbated by the lack of public transport. Furthermore, in these contexts, the interaction between micromobility and traditional traffic occurs on high-speed arterial roads rather than protected urban roads, making the study of propensity factors crucial for local policy-making.

The whole paper will be structured in this way: after the introductory Section with evidence from literature, a Sect. 2 on the methodological aspect will be proposed, and then the case study in Sect. 3; then the results in Sect. 4 will be shown, and in the following Sect. 5, a brief discussion will be reported; finally, a Sect. 6 with overall conclusions.

2 Methodology

The response variable that needs to be predicted is the propensity of a user to move with a specific transport mode. Since this variable in the survey follows an ordered nature, an Ordered Logit Model has been calibrated to evaluate propensity toward sustainable transport micro mobility models. The simplest Discrete Choice Model is the Logit Model (Eq. 1):

$$p(X) = \frac{e^{\beta_0 + \sum \beta_i X_i}}{1 + e^{\beta_0 + \sum \beta_i X_i}} \tag{1}$$

Where:

- p(X) is the predicted probability;
- xi are the independent variable or features;
- β0…βi are the regression coefficients of the model.

Ordered Logit Models, such as Logit Models, belong to the family of Discrete Choice Models. For each user j, the propensity Y_i can be expressed as (Eq.2):

$$Y_i^* = x_i'\beta + \varepsilon_i \tag{2}$$

Where:
$Y_i^*$is the propensity;
x_i is the vector of independent variables;
β is the vector of coefficients;
ε_i is the error term.
If the number of outcomes is *j*, the model selects *j-1* thresholds $\tau_1 \ldots \tau_{J-1}$ (Eq. 3):

$$Y_i = j \quad \text{se} \quad \tau_{j-1} < Y_i^* \leq \tau_j \tag{3}$$

The probability that a user *i* chooses the category *j* is described by Eq. 4:

$$P(Y_i = j) = F\left(\tau_j - x_i'\beta\right) - F\left(\tau_{j-1} - x_i'\beta\right) \tag{4}$$

3 Case Study

The research was conducted in the city of Cassino, an Italian municipality situated in the southern area of Lazio, within the province of Frosinone. It is the second most populous city in the province (as of 01/01/2022 it recorded approximately 35,235 residents, compared to 43,830 in the city of Frosinone), with a population density of 422 inhabitants per square kilometer [22]. The municipal territory covers 83.42 km^2 and lies at an average elevation of 40 m above sea level, excluding the mountainous areas included within its administrative boundaries, below which the main urban settlement is located. The present-day urban structure is the outcome of historical transformations, particularly the complete reconstruction undertaken after World War II due to the extensive damage caused by wartime bombings. The central urban area hosts key administrative and public services, including the courthouse, city hall, university facilities, schools of various levels, the hospital, cultural institutions, and numerous commercial establishments, especially along Corso della Repubblica, Viale Dante, and Via Enrico De Nicola.

The concentration of such diverse services and activity hubs generates significant vehicular traffic throughout different times of the day, leading to issues associated with the sustainability of the local transportation system. The University of Cassino and Southern Lazio is one of the Universities located in Central Italy, with several academic centres in the cities of Frosinone, Atina, Gaeta, and Cassino. The main Campuses are located in the Municipality of Cassino, and in particular the Faculties of Economics, Law, Literature, Social Sciences and Health in the Folcara Area, and in the City Centre the Departments of Engineering (see Fig. 1). In Table 1 the main questions in the survey have been reported.

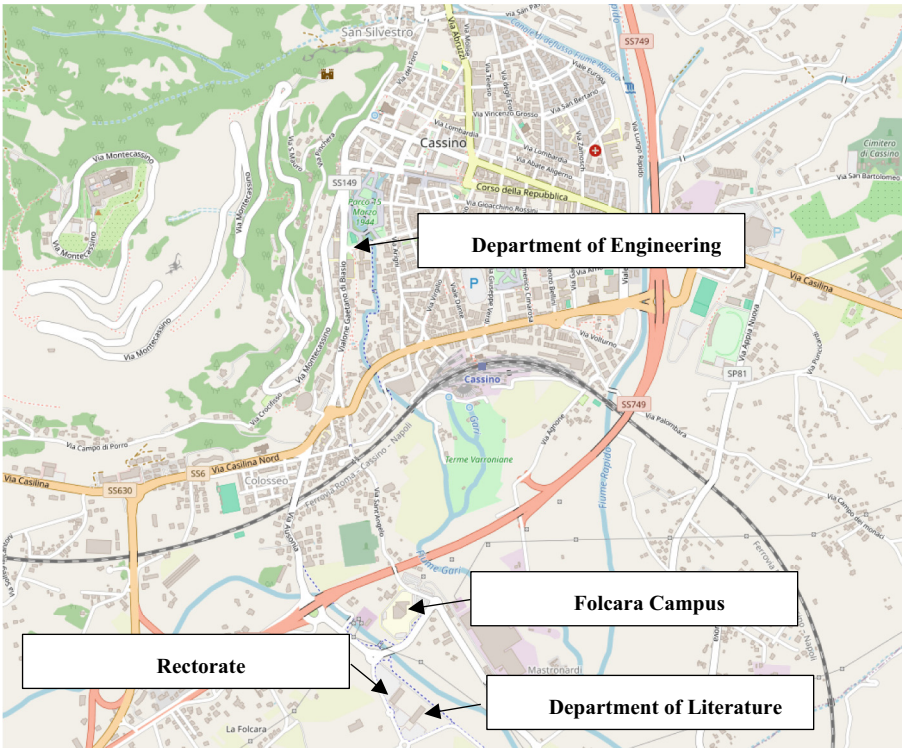

Fig. 1. Location of the Main Campuses in the City of Cassino. Source: Open Street Map [23].

Table 1. Structure of the survey.

Survey Questions
General Information
• Campus where you attend classes
• Gender
• Enrollment status
• Working student
• Type of course you are attending
• Type of class attendance
• During the periods in which you attend the university, do you rent accommodation in Cassino or in nearby municipalities? (Non-resident student)
• Age
• Frequency of attendance at university campuses (in-person activities)
Usual mode of transport to get to the university:
• By car (as a passenger)
• By car (as a passenger)
• By car/motorbike + train + bus
• By bus + electric scooter
• By bus + train
• By suburban bus
• By urban bus
• By bicycle + bus
• By bicycle + train
• By e-bike / regular bicycle / electric scooter or similar vehicles
• By metro
• By motorbike/scooter
• By carpooling system (BlaBlaCar or similar)
• By train
• By train + bus
• By train + electric scooter
• Using multiple modes of transport different from those listed above
• On foot (select this option only if the entire journey is made on foot)
• Usual ARRIVAL time from the university during the week. Please answer based on a “typical” week during the current semester teaching period
• Usual DEPARTURE time from the university during the week. Please answer based on a “typical” week during the current semester teaching period
Would you be willing to use, as an alternative to private car/motorbike:
• Shared electric scooters?
• Carpooling (shared travel with other colleagues in one of their cars)?
• Car sharing (using a vehicle provided by a third party, paying for the service)?
• Scooter sharing?
• Public transport?
• E-bike?
• Regular bicycle?
• Campus where you attend classes
• Gender
• Enrollment status
• Working student
• Type of course you are attending
• Type of class attendance

4 Results

4.1 Descriptive Statistical Analysis

The data collection was carried out through an online survey distributed between January and May 2025. The survey link was disseminated via official university student website. A total of 10,990 raw entries were initially recorded. However, a significant attrition rate has been observed: 4,280 participants (38.9% of the total) have been classified as 'non-responders' as they abandoned the questionnaire after the initial socio-demographic section. To ensure the statistical robustness and integrity of the Ordered Logit Models, these incomplete records have been excluded. The final valid sample consisted of 6,710 respondents who completed all mandatory sections. Considering an university population of 10,990 (equal to the number of participant because the survey has been administered to the whole student population) students and staff, the survey achieved a high response rate of 61.1%, providing a solid and representative database for the estimation of the behavioral determinants of micromobility.

As first step to have an overview of transportation habits and propensity in the University Campuses, a descriptive statistical analysis has been conducted. The results show that there is a great proportion of in-site students. It is worth noting that there is a great number of not responding students to the survey, as it is possible to see in Table 1. More than 50% of students is over 30, while there is a constant distribution among other class age. It also emerges that 56% of students are women and the 50% are correctly enrolled at the University. A great proportion of students is also a full-time worker (42%) and is following a Bachelor Degree. Students that use car to make their trip are the 23.66%, with a high level of attendance (27.21%). The minority of responders is willing to use micro mobility transport mode, as it possible to see from Table 2.

By investigating current habitual usage of micro mobility among Italian and Foreign Students (see Fig. 2), the 44.80% of foreign students use e-scoters, while Italians 10.48%. The same patter is also registered for bike and e-bike (45.57 for foreign students, 10.63 for Italian students). Regarding the propensity, it is worth highlighting those foreign students are more willing to use micromobility mode of transport compared to Italian students (see Fig. 3).

Table 2. Results of Statistical Analysis.

Variable	Response	Number [–-]	Frequency [%]
Off-site Students	Yes	1843	16.77
	No	6680	60.79
	Not Responding	2467	22.45
Age	< 19 years	242	2,2
	19-21 years	1593	14,49
	22-25 years	1676	15,25
	25-30 years	1580	14,38

(*continued*)

Table 2. (*continued*)

Variable	Response	Number [−-]	Frequency [%]
	30-35 years	1341	12,2
	35-45 years	2430	22,11
	> 45 years	1790	16,29
	Not Responding	338	3,08
Gender	Female	6254	56,91
	Male	4512	41,06
	Not Responding	224	2.04
Career	Not completed all exams	1272	11,57
	Current Student	5581	50,78
	Only final exam left	645	5,87
	Not Responding	3492	31,77
Working Status	Full Time Working Student	4713	42,88
	Part Time Working Student	2049	18,64
	Only Student	3508	31,92
	Not Responding	720	6,55
Course	Master	2824	25,7
	Bachelor	3119	28,38
	Single Cycle Degree	866	7,88
	Not Responding	4181	38,04
Department	Folcara Campus	5619	51,13
	Department of Engineering	1556	14,16
	Departement of Literature	692	6,3
	Frosinone Campus	458	4,17
	Not Responding	2665	24,25
Attendance	High (3-5 days)	2990	27,21
	Medium (1-2 days)	1799	16,37
	Low (< 1day)	2308	21
	Not Responding	3893	35,42
Transport Mode	Car Driver	2600	23,66
	Car Passenger	244	2,22
	Bus	1137	10,35
	Train	1804	16,41
	Micromobility	110	1,00
	Pedestrian	406	3,69

(*continued*)

Table 2. (*continued*)

Variable	Response	Number [−-]	Frequency [%]
	Powerd-.two Wheeler	130	1,18
	Not Responding	4559	41,48
E-scooter Propensity	Definitely no	3064	27,88
	Unsure	1182	10,76
	Probably no	897	8,16
	Probably yes	800	7,28
	Definitely yes	582	5,3
	Not Responding	4465	40,63
E-bike Propensity	Definitely no	2774	25,24
	Unsure	1105	10,05
	Probably no	1029	9,36
	Probably yes	913	8,31
	Definitely yes	809	7,36
	Not Responding	4360	39,67
Bike Propensity	Definitely no	2928	26,64
	Unsure	1144	10,41
	Probably no	1038	9,44
	Probably yes	841	7,65
	Definitely yes	659	6
	Not Responding	4380	39,85

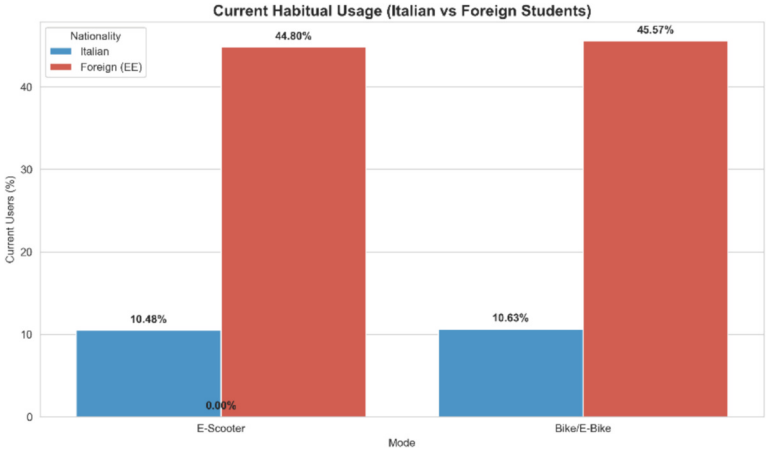

Fig. 2. Current Habitual Usage of micromobility among students.

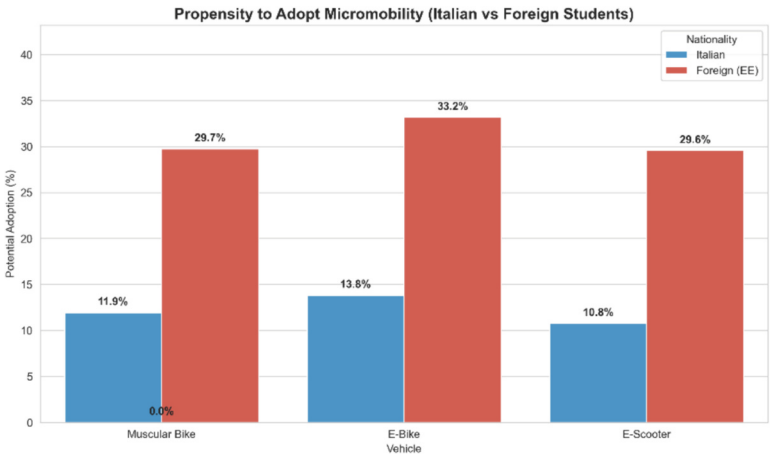

Fig. 3. Micromobility Propensity among students.

4.2 Model Results

In Table 3, Table 4, and Table 5 the main results have been reported for the three OLM, respectively. All the analyses have been performed with R software. It is worth noting that all missing data have been deleted for the analysis. As it emerges from Table 3, students over 45 years are more likely to adopt a Muscular Bike to make their home-to-study trips, while female students are more adverse than male student to use this transport mode. From the analysis of contributing factors, on site students that live in the city are more willing to use bike to reach the campuses and different department. From the analysis of actual transport habits, it clearly emerges that student that drive car to reach the university or use an intercity bus, are less likely to use muscular bikes. On the contrary, students that complete their trips with other micro mobility modes of transport, or with powered two-wheeler, or on foot, are more prone to switch to muscular bike. A great propensity toward bike has also been shown by high attendance students involved in Master Degree courses that reach the Department of Engineering.

Regarding the e-bike propensity (Table 4), there are factors in common with those previously recorded. Off-site students, who use other micromobility devices, or scooters, who can also move on foot, or who regularly attend engineering school and master's courses, are more likely to use e-bikes, while female students or those who drive to attend classes are less likely (as also shown for bike). Other factors emerge that differ from those previously identified. For example, student workers are much more likely to use e-bikes, or they use trains as the primary mode of transportation (factors different from those governing the propensity to travel for bicycles).

Analyzing the results of the e-scooter models (Table 5), what emerges is that, as in the case of bicycles, the propensity factors are those of being out-of-town students, users who use micromobility vehicles, or two-wheeled vehicles, and who regularly attend university. Aversion factors are gender, age, car use.

A notable finding is the significant propensity of Full-time working students towards e-bikes (Estimates = 0.168, $p < 0.05$), a trend that remains non-significant for both e-scooters and muscular bikes. This preference can be attributed to practical determinants related to time-efficiency and physical effort management.

Working students often face tighter schedules, necessitating a reliable and fast mode of transport that minimizes travel time between the workplace and the University. Unlike muscular bikes, e-bikes allow for higher average speeds and the ability to cover longer distances or inclines without the physical exertion. Furthermore, while e-scooters are effective for 'last-mile' distances, the e-bike offers a more robust solution for home-study commuting, providing a level of reliability and speed that aligns with the needs of students.

A resume and a comparison of the most important variable related to each micromobility transport mode are reported in Table 5.

Table 3. OLM Results for Muscular Bike (McFadden Pseudo $R^2 = 0.1039$). Variable: the predictor or factor being analyzed. Baseline is the reference category used for comparison; Estimates are the estimated effect (coefficient) of the variable; Std. Error is the standard error of the estimate (measure of uncertainty); P > |z| is p-value testing the statistical significance of the estimate.

Variable	Baseline	Estimates	Std. Error	P > |z|
Age_19_21_years	Age_Under_19_years	0,031383591	0,198592358	0,874433
Age_22_25_years	"	0,255784208	0,201093928	0,203385962
Age_25_30_years	"	0,253081824	0,211737732	0,231985126
Age_30_35_years	"	0,284338496	0,223969074	0,204247263
Age_35_45_years	"	0,084688935	0,224365765	0,705832336
Age_Over_45_years	"	−0,466955098	0,233805471	0,045804013
Gender_Female	Gender_Male	-0,443335634	0,069725138	2,03955E-10
Off-site_Student	On-site_Student	0,987911356	0,081330814	5,96351E-34
Part_time_working_Student	Full_time_Student	0,093119011	0,084084251	0,268099896
Full_time_working_Student	"	0,137822469	0,084462775	0,102731323
Transport_Mode_Car_Passenger	Others	-0,003758258	0,074961489	0,960014134
Transport_Mode_Car_Driver	"	-0,287828675	0,073035456	8,11614E-05
Transport_Mode_Intercity_Bus	"	-0,268879482	0,090822067	0,003071319
Transport_Mode_Urban_Bus	"	0,091635465	0,095811699	0,338864088
Transport_Mode_Micromobility	"	0,356941676	0,133395218	0,007454653
Transport_Mode_Powered_Two_wheeler	"	0,493355377	0,135002292	0,000257762
Transport_Mode_Train	"	0,105672411	0,092400246	0,25277389
Transport_Mode_Pedestrian	"	0,266424925	0,081928327	0,001146255
Low_attendance_1/2_days	Not_attending	-0,0468	0,0899	0,6028
High_attendance_3/5_days	"	0,3140	0,0865	0,0003
Departement_of_Engineering	Campus	0,2181	0,0834	0,0089
Departement_of_Literature	"	0,2019	0,1102	0,0669
Master	Bachelor	0,2568	0,0833	0,0020
Single_Cycle_Degree	"	-0,0837	0,1129	0,4584

Table 4. OLM Results for e-bike (McFadden Pseudo $R^2 = 0.0947$).

Variable	Baseline	Estimates	Std. Error	P > |z|
Age_19_21_years	Age_Under_19_years	0,006258254	0,190237621	0,973756694
Age_22_25_years	“	0,249902547	0,192779905	0,194868653
Age_25_30_years	“	0,295202327	0,20286118	0,145615623
Age_30_35_years	“	0,291608175	0,215720573	0,1764436
Age_35_45_years	“	0,062184598	0,215175458	0,772585322
Age_Over_45_years	“	−0,408323123	0,223861099	0,068151749
Gender_Female	Gender_Male	-0,385634306	0,067675686	1,2103E-08
Off-site_Student	On-site_Student	0,934963519	0,080468445	3,29945E-31
Part_time_working_Student	Full_time_Student	0,134052577	0,081797968	0,101249655
Full_time_working_Student	“	0,168628041	0,082712589	0,0414777
Transport_Mode_Car_Passenger	Others	-0,012114786	0,072850286	0,867923204
Transport_Mode_Car_Driver	“	-0,328037146	0,071093969	3,94736E-06
Transport_Mode_Intercity_Bus	“	-0,162847774	0,086984116	0,061185121
Transport_Mode_Urban_Bus	“	0,050229311	0,093067311	0,589397394
Transport_Mode_Micromobility	“	0,518308175	0,133117488	9,87616E-05
Transport_Mode_Powered_Two_wheeler	“	0,441095012	0,132839456	0,000898525
Transport_Mode_Train	“	0,217032118	0,090031332	0,015925049
Transport_Mode_Pedestrian	“	0,209629792	0,080280999	0,009022496
Low_attendance_1/2_days	Not_attending	-0,076978775	0,087196063	0,377331386
High_attendance_3/5_days	“	0,311772402	0,084067908	0,000208426
Departement_of_Engineering	Campus	0,247145438	0,081861208	0,002535446
Departement_of_Literature	“	0,181543326	0,10742598	0,091039673
Master	Bachelor	0,231195587	0,081090233	0,004356958
Single_Cycle_Degree	“	-0,099968235	0,108972278	0,358947171

Table 5. OLM Results for e-scooter (McFadden Pseudo $R^2 = 0.1118$).

Variable	Baseline	Estimates	Std. Error	P > |z|
Age_19_21_years	Age_Under_19_years	0,001460066	0,195324784	0,994035815
Age_22_25_years	“	0,199589912	0,198392179	0,314397676
Age_25_30_years	“	0,241600595	0,209134924	0,247993009
Age_30_35_years	“	0,265890305	0,222456349	0,231990502
Age_35_45_years	“	−0,036280097	0,222033841	0,870204327
Age_Over_45_years	“	-0,47683254	0,232852622	0,040580889
Gender_Female	Gender_Male	-0,354326513	0,071244689	6,57974E-07
Off-site_Student	On-site_Student	0,930954809	0,083177423	4,44255E-29
Part_time_working_Student	Full_time_Student	0,231255537	0,085404162	0,006773525
Full_time_working_Student	“	0,149349125	0,086183238	0,083108924
Transport_Mode_Car_Passenger	Others	0,020650618	0,076982498	0,788506261
Transport_Mode_Car_Driver	“	-0,391149783	0,074896458	1,76485E-07
Transport_Mode_Intercity_Bus	“	-0,160821572	0,091816993	0,079852119

(*continued*)

Table 5. (*continued*)

Variable	Baseline	Estimates	Std. Error	P > |z|
Transport_Mode_Urban_Bus	“	-0,069795874	0,099851111	0,484552359
Transport_Mode_Micromobility	“	0,575417015	0,13740722	2,81825E-05
Transport_Mode_Powered_Two_wheeler	“	0,440444815	0,13637626	0,001239507
Transport_Mode_Train	“	-0,045474091	0,096128886	0,636175121
Transport_Mode_Pedestrian	“	0,065124012	0,085074402	0,443976966
Low_attendance_1/2_days	Not_attending	-0,056377455	0,091986662	0,539950871
High_attendance_3/5_days	“	0,288457745	0,088276028	0,001084332
Departement_of_Engineering	Campus	0,11242313	0,085600013	0,189063652
Departement_of_Literature	“	-0,05373288	0,116093406	0,643477774
Master	Bachelor	0,166653728	0,085630595	0,051631471
Single_Cycle_Degree	“	-0,093765963	0,116340361	0,420264501

Table 6. Resume of the significant Variables from the OLM.

Variable	Variable	E-bike	E-scooter	Muscular Bike
Student Status	Off Site Student	Propensity	Propensity	Propensity
	Full Time Working Student	Propensity	Not Significant	Not Significant
Sociodemographic Characteristics	Gender Female	Disutility	Disutility	Disutility
	Age Over 45 years	Not Significant	Disutility	Disutility
Transport Mode	Car Driver	Disutility	Disutility	Disutility
	Train	Propensity	Not Significant	Not Significant
	Intercity Bus	Not Significant	Not Significant	Disutility
	Pedestrian	Propensity	Not Significant	Propensity
Campus Habits	High Attendance	Propensity	Propensity	Propensity
	Engineering Department	Propensity	Not Significant	Propensity

5 Discussions and Conclusions

In this paper analysis on University Students towards micromobility have been reported. A survey has been conducted among the Student of University of Cassino and Southern Lazio. Then a statistical analysis has been carried out alongside with the calibration of three choice models with OLM to highlight the most important contributing factors related to micromobility propensity. Comparative analysis of OLM models highlights distinct propensities for the three modes of micromobility transport. The main driver is off-site student status, which shows the highest and statistically significant propensity for each mode considered. On the contrary, resistance is observed from regular car

drivers, for whom the transition to micromobility represents the most complex modal challenge. A marked gender gap emerges: female users show a lower propensity than male ones, with a greater criticality for conventional bicycles. It emerges that there is the need to guarantee continuity and geometric protection to cycling routes, especially to overcome the modal resistance found in female users. Regarding age variables, the e-bike stands out as the only vehicle capable of neutralizing the effect of age, proving attractive even for the over-45 age group, who instead significantly reject the use of scooters and traditional bikes. Finally, the e-bike and scooter show strong synergy with public transport, highlighting themselves as ideal solutions for the last mile.

From Table 6 it can be seen that the e-bike is the transport mode with the highest degree of propensity. Unlike the conventional bike, it does not suffer from the aversion of suburban commuters and, unlike the scooter, is not penalized by age. The adoption of the muscle bike presents an obstacle for the female gender and the suburban bus. This suggests that physical fatigue, or perceived safety and distance are barriers to the conventional bike. The electric scooter has fewer significant variables than the e-bike. It is not influenced by department or work, but is heavily driven by off-site attendance and frequent attendance. This identifies it as a mode for students living in Cassino to move quickly between home, cafeteria, and classrooms, but it loses effectiveness as soon as the movement becomes more complex or the user is older.

One of the main limitations of the study is the a quite high presence of missing values and not responding student. In future work this could be solved by providing a more stable method to administer survey to students, but also to try to implement more advanced discrete choice models to evaluate propensity towards micro mobility in University Campuses.

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