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Is the Youth Aware of E-scooter Use Regulations? Evidence from the Region of Sicily

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ABSTRACT: Micromobility became a trend over the last few years in many European cities, but also worldwide. This trend emerged after the appearance of many e-scooter sharing services, which mainly operated in a dockless way, i.e. without fixed stations. Shared e-scooters were initially recognized as an ideal transport mode for first/last-mile trips, that could be perfectly combined with other modes and mainly public transport. However, the excessive use of shared e-scooters created also several issues in the cities. These issues are mainly associated with traffic safety and public space invasion. The main cause for these issues was that the cities were not adequately prepared for the appearance of this new transportation mode, and no appropriate regulations were established. Yet, this need has already led to the establishment of regulations in many European cities, including Italian ones. Despite the existence of regulations, it is still unclear if the users follow the rules, but also if the users are aware of the rules. In order to shed some light in this issue, a questionnaire survey was carried out in the region of Sicily. The survey focused on the youth, i.e. people aged between 18 and 26 years old. The selection of the specific age group was made because users of this age could be more vulnerable and disobedient, but also because the youth is the one that was mainly attracted by e-scooters based on previous studies. Finally, 302 responses were collected. Initial results show that some of the regulations are well known between the youth; yet, there are other regulations that are not clear yet. The results lay the foundation for forming appropriate campaigns for raising awareness among students and young adults regarding the micromobility regulations and the appropriate use of e-scooters in general. Such campaigns are considered essential for efficiently integrating micromobility in recent transportation systems.

KEYWORDS: Micromobility; e-scooters; regulations; awareness

1. INTRODUCTION

Electric bicycles and scooters are the most widespread means of shared transport among those that are part of the "electric micromobility" category (Fazio et al., 2021; Badia & Jenelius, 2023).

They offer a good solution for short and medium-distance trips in urban areas as the sole mode of transport (sometimes combined with walking) or combined for medium and long distances with public transport (Hosseinzadeh et al 2021).

Several works in the literature have analyzed economic and social development and changes in city models by referring to sustainable mobility (Raptopoulou et al., 2020; Brezovec and Hampl, 2021) and electric scooters (Kubik, 2022; Popova and Zagulova, 2022).

Several studies in the literature have analyzed specific segments of the population such as university students (Nikiforiadis et al., 2023b; Campisi et al., 2021d) and the propensity to purchase, rent or share such vehicles (Campisi et al., 2021a). Others have analyzed attitudes towards modal choice in urban areas by considering one or more previous experiences with scooters (Kostereli et al., 2020). Lockdowns, restrictions, new more agile and flexible working methods, smart working, are all elements that have significantly changed our habits, not only at work, but also when traveling (Fearnley, N. 2020; Basbas et al., 2020; Campisi et al., 2022c; Elbaz et al., 2022).

The evolution of urban models related to the concept of smartness (Popova & Zagulova,2022;) and proximity (Papas et al., 2023; Abdelfattah et al., 2022; Basbas et al., 2023; Caballini et al., 2023) include within it the use of electrical services and infrastructures aimed not only at reducing environmental impacts but also at geolocalized control and in general at the use shared use of electric vehicles (Ramadevi and Balamurugan, 2022; Silva et al., 2022, Ciftci et al., 2022; Campisi et al., 2022a).

Since their first introduction, electric scooters, whether private or shared, have attracted the interest of more and more people looking for new, more agile, comfortable and sustainable ways to get around the city (D'andreagiovanni et al., 2022; Nikiforiadis et al., 2021; Nikiforadis et al., 2023a). Since 2020, various research works have highlighted the benefits and critical issues of the use of electric bicycles and scooters.

In particular, some research works have highlighted the lack of study of the factors that can influence the propensity to use mobility, such as socio-demographic characteristics and public opinion in general (Campisi et al., 2020a). Other studies have instead highlighted the perception of sustainability and therefore the green vision of using electric scooters (Campisi et al., 2021c).

Still other studies have analyzed the critical issues related to infrastructures (della Mura et al.,2022) and types of widespread service (Carrese et al., 2021).

Among the main benefits we highlight the aspects linked to sustainability and the consequent reduction in the use of private motor vehicles for short distances (Weschke et al.,2022).

In agreement with Çakır (2023), other advantages have been highlighted such as ease of use in urban areas, avoiding long queues on the road and therefore also parking problems.

Between 2020 and 2021 in Europe and Italy there were fewer commuters and fewer kilometers traveled on average due to the recent pandemic. Alongside this, there have also been changes in the habit of using public transport for urban travel, with a decline due to the need to avoid closed and crowded places (Yao et al., 2022; Myftiu et al., 2024).

In particular, it is necessary to reiterate that a series of psycho-social factors have influenced modal choices in urban areas and therefore the possible urban planning and mobility strategies to be implemented in the short, medium and long term (Campisi et al., 2020b). This has been examined in different COVID-19 pandemic phases (Dias et al., 2021; Campisi et al., 2022b; Campisi et al., 2021b; Aaditya and Rahul, 2021). Several studies have in fact highlighted a reduction in the use of public and shared transport and a greater choice of modes such as walking and cycling.

Similarly, the use of e-scooters has been perceived as one of the possible transportation solutions with a greater likelihood of respecting social distancing (Abdullah et al., 2021; Das et al., 2021). This is due both to respect for social distancing and the fear of possible contagion, and to the reduction in travel during the various pre- and post-pandemic periods that characterized the period 2020-2022 (Campisi et al., 2022b).

In the European context, the growth of electric mobility has not been homogeneous.

This is due to the lack of regulations, infrastructure and services as well as the diffusion of services by managers in European cities.

In Italy there has been a lack of homogeneity in the diffusion of the aforementioned services, even from region to region

Another deficiency that has been recorded in recent years is related to the absence of these services in the main Mobility as a Service (MaaS) digital platforms.

The high diffusion of electric scooters in the urban context has raised a series of issues related to their use in heavily pedestrian areas. Numerous standards have been developed in Europe in recent years.

In Italy the regulatory framework on electric scooters is recently established and in some cases is still lacking.

The problem is not only the presence/absence of norms but also the perception and respect of the latter regulations by young people. Starting from this concept, this research work has preliminarily analyzed the Sicilian context in order to understand the degree of knowledge of the legislation on electric scooters by a sample of users aged between 18-26 years.

The data was acquired through an anonymous online questionnaire and the results highlight the main critical issues that could be discussed in the next regional and national technical tables for the improvement of sector regulations, for the monitoring and control activities of compliance with these regulations and finally for better training and information of users.

2. BACKGROUND

The growing use of scooters in urban centers has been followed by an exponential increase in accidents involving these means of transport. A very serious and dangerous situation, therefore, which has pushed the authorities to intervene to review the regulations on this type of vehicle (Das et al., 2024; Kwon et al., 2024). As with cars or scooters, which are also much bulkier, one of the problems is not only the high speed that some users maintain while driving, but also the way in which they are parked once they have reached their destination. Haste, simple carelessness or lack of civic sense often lead to seeing vehicles abandoned in the middle of the road, lying on the sidewalk, sometimes obstructing traffic (Hemphill et al., 2022). The regulations in the various European contexts relating to micromobility are very heterogeneous and define in most European countries the speed of use, the areas of use and prohibition and the use of lights and possible limitations (EVZ, 2024)

In the Italian context, the regulations for the protection of road safety have been developed only in recent years starting from 2019 by making changes to the Highway Code.

Some regulatory aspects concern the approval of electric scooters, others concern the use in urban areas in the absence of other traffic components such as cars and pedestrians.

The recent Italian legislation of 2023 provides for registration, insurance and helmet use obligations.

In Italy, the circulation of scooters is permitted only in urban centers, on roads with a speed limit not exceeding 50 km/h. Pedestrian areas, cycle paths and extra-urban cycle paths are excluded. Driving in the wrong direction and on sidewalks is expressly prohibited.

Scooters must proceed in a row and the driver must keep both arms free, except to signal turning maneuvers. The law emphasizes that parking electric scooters is only permitted in specifically identified areas. Furthermore, the law prohibits parking on sidewalks.

All companies that offer sharing services are required to ask users for a photo at the end of the rental period to indicate where the scooter was left.

The other rules that apply to bicycles, motorcycles and cars, in general all means of transport provided for by the Highway Code, also apply to electric scooters. It is also prohibited to leave scooters in parking lots reserved for other vehicles.

Some Italian municipalities can identify spaces dedicated to parking, with rental services that can only be activated with a resolution of the municipal council, subject to mandatory insurance and regulation of parking and circulation in urban areas.

At a technical level, scooters must comply with the construction specifications established by the Ministry of Infrastructure and Transport.

To summarize the limitations of use of Italian scooters, it is possible to observe Table 1

It is evident that in Italy as in other European contexts there are no safety courses or driving courses or even a license to use mopeds therefore it is necessary to underline that users must acquire information by self-learning or by reading the main press and social channels.

Some information campaigns have been launched on road safety in urban areas in schools in order to educate the new generations on the concept of road safety and respect for vulnerable road users.

In Italy in 2023 there was an increase in the number of accidents involving scooters with almost 3200 injured and 21 deaths. The Automobile Italian Club (ACI, 2022) and the National Institute of Statistics Italy (ISTAT, 2023) have estimated that the main causes of accidents in Italy are respectively distraction, failure to respect precedence/traffic lights and speed. A high exposure to mortality risk was also recorded for drivers of bicycles and electric scooters involved in accidents with cars or isolated vehicles. Motorized two-wheelers record a high number of accidents in collision with cars, light commercial vehicles and isolated vehicles. Pedestrians present a greater risk than other users, when they collide with cars and industrial vehicles.

Further underlining this information gap is a 2021 nationwide study on the responsible use of electric scooters, starting with the administration of a short five-question survey. This nationwide study revealed a bleak picture of electric scooters among young people, despite them having become the most popular means of transportation among young people after the bicycle, adding to private vehicles and shared electric scooters. The questions released nationwide by a study conducted by the state police on 6,000 secondary school students, aged between 14 and 19, and the picture that emerged is far from reassuring. were the following:

Parameters	Description and limitation
Speed	(generally) speed limit of less than 20 km/h. (pedestrian areas) the speed limit is set at 6 km/h.
Handling Areas	The rules on electric scooters impose certain restrictions on circulation in certain areas. Specifically, electric scooters may circulate on urban roads where there is a speed limit of up to 50 km/h, in pedestrian areas (subject to a speed limit for scooters of 6 km/h), and on mixed pedestrian-cycling routes. On the other hand, driving on pavements or on the wrong side of the road is prohibited.
Parking	It is forbidden to park the electric scooter on pavements or in areas where the scooter may obstruct traffic or the passage of pedestrians and other vehicles (gates, doorways, private roads).
Vehicle Equipment	The current rules indicate that the electric scooter must be equipped with front and rear lights, brake warning devices and turn indicators. Specifically, the law indicates that all electric scooters on the market must have arrows and front and rear brake indicators as of 1 July 2022, while electric scooters already in circulation and purchased previously will have to be adapted to the new regulations by 1 January 2024. In addition, the dual brake obligation is already in force on all electric scooters placed on the market as of 1 July 2022, while for models prior to that date, the obligation will come into force as of 1 January 2024.
User minimum age	Any person of at least 14 years of age may ride an electric scooter
Obligations	Helmets are only compulsory for those under 18 years of age, while for those over 18, use is recommended, but not compulsory. The current rules on electric scooters do not impose any obligation to have a driving licence or liability insurance. Only the driver of the scooter is allowed to use them. Electric scooters cannot be modified, under penalty of loss of warranty by the manufacturer. In addition, the law provides for confiscation of the scooter and penalties ranging from EUR 100 to EUR 400 in the case of a rigged scooter, with modified motor power or speed regulator.

Table 1. Details related to Italian regulations of e-scooter and relative users

1. What is the maximum speed allowed by law for electric scooters on urban roads?
   Only 41.49% of respondents answered 25 km/h, the correct speed at the time of the survey.
2. However, it should be noted that from November 10, 2021, the maximum permitted speed has been lowered to 20 km/h (new rules on electric scooters from November 10, 2021). 402 children (7.38%) answered 5 km/h, 805 (14.77%) 10 km/h, 1403 (25.74%) answered 15 km/h and 579 children (10.62%) said 30 km/h. Ironic in hindsight that 20 km/h was not even mentioned in the survey.How fast can you go in pedestrian areas? Only 26.35% of children answered correctly, namely 6 km/h, 30.79% said that you could not go and 21.14% said 5 km/h.
3. The confusion is therefore maximum on the permitted speeds, but even worse on the age limits: only 18.33% of the interviewees know that you have to be at least 14 years old to ride an electric scooter on the road; 27.93% answered 18 years old, while 42.5% said 10 years old
4. Almost everyone, however, knows that it is not mandatory to ride in pairs, even if they could still do so: 84.33% answered that it is actually not possible to ride in pairs, while 15.33% said yes.
5. Finally, we come to the helmet: how many students know that between the ages of 14 and 17 it is mandatory to wear a helmet?75.82% correctly answered yes, while 24.18% said no.

This survey on a regional scale aims to highlight the trend of regulatory knowledge and compliance in a context where there is a high accident rate in urban areas.

This research focused the dissemination of the national questionnaire in a context such as Sicily where there has been a general increase in road accidents in urban areas and where many young people under the age of 35 often use scooters without respecting or knowing the rules.

A social survey campaign was conducted between November 2023 and January 2024 among university students in order to understand whether the results are in line with national trends.

Starting from this, a survey involving 302 students aged between 18 and 26 was carried out and distributed in Sicily, collecting data in line with the general trend illustrated in the following paragraph.

3. RESULTS

This study involves a questionnaire designed to acquire information regarding the use, the awareness of regulations and the opinion of the respondents regarding the e-scooters. The main purpose of the questionnaire is to examine if university students in Sicily use the e-scooter for commuting and if they are aware of the rules that were established in Italy for regulating e-scooters.

The total sample of the survey is 302 respondents, whereof 102 are men, 174 are women and 26 selected the "other" category. Since the survey was distributed among university students, all respondents are aged between 18 and 26 years old. The 43% of the examined sample responded that they own an e-scooter and the 69% responded that they use shared e-scooters twice a week or more often.

The results that are presented in Tables 2 and 3 indicate that university students, despite that they use shared e-scooters, they are not well-informed about the existing regulations regarding speed limits. More specifically, the respondents were asked about the maximum allowed speed for e-scooters both in streets and pedestrian areas; the question was set as multiple choice, with three different choices. With regards to the maximum allowed speed in streets, the majority believes that it is equal to 25 km/h, while the Italian regulations set the 20 km/h as maximum speed. Moreover, with regards to the maximum allowed speed in pedestrian areas, it is important to be mentioned that only the 21% of the respondents identified the correct question, which is 6 km/h. These findings indicate the need for raising awareness among the youth or/and implementing technologies that inform users at real-time about the speed limit depending on the area or the type of infrastructure that is being used by the rider.

Speed (km/h)	Frequency	Relative frequency
20	113	37.42%
25	189	62.58%
30	0	0%
Total	302	100%

Table 2. E-scooter maximum allowed speed

Speed (km/h)	Frequency	Relative frequency
4	38	12.58%
5	200	66.23%
6	64	21.19%
Total	302	100%

Table 3. E-scooter maximum permitted speed in pedestrian areas

Furthermore, respondents were asked to answer about the maximum allowed number of people that can ride an e-scooter. Based on the results of Table 4, more than the 87% of the respondents correctly believe that only one person is allowed.

E-scooter maximum permitted persons	Frequency	Relative frequency
1	265	87.75%
2	37	12.25%
Total	302	100%

Table 4. Maximum permitted persons in an e-scooter

The next question is referring to the minimum age that someone is permitted by the Italian regulations to ride an electric scooter. As shown in Table 5, sample's responses indicate that the exact age permitted to ride an e-scooter is not clearly known to the public, while the correct answer (14 years old) concentrates only the 35.43% of the responses. Interestingly, 22.19% of the respondents believe that the use of e-scooters is also allowed for people up to 12 years old, which can lead in risky situations, since in many cases e-scooter users interact with other road user types (including motorized vehicles) and as such awareness of traffic regulations and increased diligence are required.

E-scooter minimum age limit permitted	Frequency	Relative frequency	Cumulative Relative Frequency
10	12	3.97%	12.25%
12	55	18.21%	22.19%
14	107	35.43%	57.62%
16	112	37.09%	94.70%
18	16	5.30%	100%
Total	302	100%	

Table 5. Minimum age limit for e-scooter riding

Another important aspect of micro-mobility regulations is related with the use of protective helmets; the Italian regulations require the use of helmet for people aged under 18. The vast majority of the sample (86.75%) is aware of this requirement, as shown in Table 6.

Obligatory use of helmet	Frequency	Relative frequency
Have knowledge	262	86.75%
Do not have knowledge	40	13.25%
Total	302	100%

Table 6. Knowledge of obligatory use of helmet between 14-17 years old

Except of the questions that are related with the awareness of regulations, a set of questions regarding how university students face the e-scooters was included. These questions assist in better understanding the attitude and the way of usage of an e-scooter by the respondents. The results that are presented in Table 7 show that a very large percentage of the respondents consider the e-scooter as a means of transport that can be used for commuting purposes, while only the 3.31% of the sample think that e-scooters are only suitable for leisure purposes. This finding further increases the need for enhancing awareness of regulations, since in case of commuting trips e-scooter riders rarely have the possibility of making de-tours for selecting safer routes and they have to use routes close to the shortest one, which probably requires greater interaction with motorized traffic.

E-scooter use	Frequency	Relative frequency
Leisure	10	3.31%
Means of transport	241	79.80%
Other	51	16.89%
Total	302	100%

Table 7. Purpose of e-scooter usage

Additionally, as presented in Table 8, most of the respondents believe that e-scooter riding is an enjoyable activity. More analytically, the 69.21% agree with the above-mentioned fact and only the 1.99% do not consider the usage of an e-scooter as an enjoyable activity.

E-scooter riding is enjoyable	Frequency	Relative frequency	Cumulative Relative Frequency
Strongly disagree	0	0.00%	0.00%
Disagree	6	1.99%	1.99%
Neither agree nor disagree	46	15.23%	17.22%
Agree	209	69.21%	84.44%
Strongly agree	41	13.58%	100%
Total	302	100%	

Table 8. E-scooter riding is enjoyable

However, in many cases the e-scooter riding is considered as a dangerous activity. Based on the results presented in Table 9 it seems that university students in Sicily agree with this opinion. More specifically, only the 11.92% of the sample strongly disagrees or disagrees with the statement that e-scooter riding is dangerous, while there is a 42.72% that either agrees or strongly agrees. The responses show that the youth has to a large extend the understanding that e-scooter riding can be a dangerous activity that could probably lead to an accident.

E-scooter riding is dangerous	Frequency	Relative frequency	Cumulative Relative Frequency
Strongly disagree	4	1.32%	1.32%
Disagree	32	10.60%	11.92%
Neither agree nor disagree	107	45.36%	57.28%
Agree	96	31.79%	89.07%
Strongly agree	13	10.93%	100%
Total	302	100%	

Table 9. E-scooter riding is dangerous

Finally, as presented in Table 10, almost 50% of the sample agrees or strongly agrees that e-scooters are a sustainable

means of transport. This is the only question of the questionnaire that the sample seems to be divided.

E-scooter use is sustainable	Frequency	Relative frequency	Cumulative Relative Frequency
Strongly disagree	1	0.33%	0.33%
Disagree	21	6.95%	7.28%
Neither agree nor disagree	135	44.70%	51.99%
Agree	118	39.07%	91.06%
Strongly agree	27	8.94%	100%
Total	302	100%	

Table 10. E-scooter use is sustainable

4. CONCLUSION

Electric transport systems and in particular micro-mobility are the subject of continuous public debate as they require regulatory evolution and at the same time a series of user training and information actions to promote their correct use with greater safety. Not only the Italian context but also the regional one underlines an information gap on the construction limits concerning maximum speed and travel speed, especially in urban areas. As far as the minimum age of the scooter driver is concerned, Sicily had a higher percentage of correct answers than the national case. Finally, similar percentages were found for the awareness of riding scooters alone and the obligation to wear a helmet.

The results of the surveys still show a lack of knowledge of the regulations, and it is therefore necessary to implement a series of educational and informative measures, but also sanctions, to make young people realize that electric scooters are not toys but real vehicles, which must be ridden with knowledge of the basic rules of the road and what they can and cannot do on board.

One of the main problems is the idea that scooters are not means of transport but objects or toys. In addition, it is necessary to emphasize a growing, certainly distorted view that will have to be changed with time: electric scooters can actively and concretely reduce traffic on our roads, and they are good for the environment because they do not pollute and have negligible running costs, since they do not run on petrol or diesel. They can be used to go to school or work at zero cost, but the risk is that this great little revolution will be completely compromised by an atrocious misunderstanding, with scooters being mistaken for toys to pass the time with.

Even the real scenarios of our Italian cities underline the fact that there are still many overage users who do not use electric scooters properly. It is equally true, however, that many of our cities are at the mercy of hordes of young people who take the matter underhand, riding on the pavements with electric scooters, going in twos and not paying attention to the maximum speed allowed in pedestrian areas.

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