E-scooters: What do they mean for the safety of cyclists?

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ABSTRACT

The popularity of e-scooters is on the rise in Austria, as in many other countries, and e-scooters are now being increasingly used as a mode of transport above all in urban areas. Since 1 June 2019, e-scooter riders in Austria have been subject to the same road traffic regulations as cyclists. However, since the e-scooter trend is still very new, there is currently only limited data and/or research findings available on the road safety of e-scooter riders themselves or the potential effects of the increased use of e-scooters on the safety of other road users, in particular cyclists and pedestrians. In 2019, KFV therefore conducted an extensive study of e-scooters to analyse existing data (e.g. on accidents), collect new data (e.g. on the behaviour of e-scooter riders and attitudes towards e-scooters) and develop proposals for corresponding road safety measures. In spring 2021, KFV once more carried out road traffic observations of e-scooter riders to get up-to-date data. Results show that the current regulation requiring e-scooter riders to use cycle paths and lanes should be supported since the differences in speed between e-scooters and bicycles are generally far lower than those between e-scooters and pedestrians. Rising traffic volumes, speeds and speed differences on cycle paths and lanes must be taken into consideration in bicycle traffic planning and the definition of regulations. Generally, there is a need for awareness-raising among e-scooter riders and other road users and KFV recommends the definition and introduction of more specific regulations for e-scooters (e.g. on brakes).

Keywords: e-scooters, legal regulations, accident statistics, behaviour and knowledge of e-scooter riders, measures.

1 INTRODUCTION

E-scooters are becoming an increasingly popular mode of transport in many cities and countries around the globe, and Austria is not different. Around 30,000 e-scooters were sold in Austria in 2019, and this figure is forecast to continue to rise in the coming years. In addition, e-scooters are also widely available for hire in a growing number of cities across the country (e.g. Vienna, Linz, Innsbruck, Klagenfurt).

The increase in the use of e-scooters raises new issues for road safety. To expand the available knowledge and to get more data on road safety for e-scooters in Austria, the Austrian Road Safety Board (KFV) carried out an extensive study of e-scooters in 2019. The aims of this study were to examine the current regulations for e-scooters, analyse available accident statistics and gather new data on the behaviour and knowledge of e-scooter riders. This new data allows to answer the question: What should be done from a traffic safety perspective to safely integrate e-scooters into the traffic system. The new data and findings were then used to develop measures to improve road safety both for e-scooter riders and other road users alike (in particular cyclists and pedestrians). In spring 2021, KFV once more carried out real traffic observations of e-scooter riders to get up-to-date data.

New regulations for e-scooters came into force in Austria on 1 June 2019. Since that date, the regulations applicable to bicycles have been applied essentially to e-scooters as well. E-scooters must be ridden on cycle paths or lanes when these are available (exception: cycle paths that are not subject to use), otherwise they must be ridden on the road. Riding an e-scooter on a pavement is prohibited (except for some individual cases). As far as equipment is concerned, regulations for e-scooters differ in some respects (e.g. brakes, horn) to those for bicycles. In Austria, the maximum speed limit for e-scooters is 25 km/h.

2 METHOD

Legal regulations were studied by analysing the applicable legal texts.

Two data sources were used to identify accidents involving e-scooters, namely the KFV Injury Database (KFV-IDB) and media reports. The KFV-IDB is based on interviews with accident victims in hospitals and

is maintained by KFV. Media reports on e-scooter accidents were identified through a search in the APA-Onlinemanager, an information and research platform maintained by the Austria Press Agency (APA). The results of this search were compared with those from searches in the online editions of selected media publications and a general Google search. The accident analysis for both data sources covered the period from 2015 to 05/2021.

Attitudes and behaviour of the general public towards e-scooters were measured in an Austria-wide survey of 501 e-scooter users and 598 non-e-scooter users in June 2019. The survey was carried out both online (nationwide) by a market and opinion research company (commissioned by KFV) and offline (at randomly selected sites in Vienna) using trained interviewers. No significant differences in the results of the online and on-site surveys were identified.

The behaviour (e.g. speed, use of cycle paths/lanes) of around 1,500 e-scooter riders in actual road traffic was observed over a three-month period from June to August 2019. In spring 2021, up-to-date data concerning the behaviour of more than 700 e-scooter riders was collected. The observations were conducted in person (i.e. not using video recordings) at selected sites by trained observers. The speeds travelled by e-scooters were measured using handheld radar speed guns (point measurements). The observations were carried out on different days of the week (Monday to Friday) and at different times of the day (between 7 am and 7 pm).

Brake tests (270 test rides) were carried out in the period from November 2019 to January 2020 on a test circuit in Vienna using five typical e-scooter models and one typical trekking bicycle. The e-scooter models selected for the tests were equipped with different brake systems: hand-lever operated brakes, electric hand brakes (operated like the throttle), foot-operated brakes or a combination thereof.

3 RESULTS

In 2020, around 1,300 e-scooter riders in Austria suffered severe injuries from e-scooter accidents that required hospital treatment (Source: KFV-IDB)[1]. This figure does not include e-scooters accident victims who suffered less severe injuries and were either treated by a general practitioner or did not require medical treatment. Given the lack of unequivocal data in the official accident statistics (no separate category for e-scooter accidents) and the assumed high number of unreported incidents (as it is the case for bicycles), the precise number of e-scooter accidents and/or accident victims cannot be determined. However, the available data on e-scooter accidents (n=133) indicate some trends. Most injured e-scooter riders are male. E-scooter accident victims tend to be younger (under 40 years of age). E-scooter accidents occur mainly on road infrastructure for pedestrians (27 %) or cyclists (22 %), followed by road lanes shared with motor vehicles (37 %). The majority are single-vehicle accidents (64 %) that are usually the fault of the e-scooter riders themselves. The main causes of e-scooter accidents are misjudgement, lack of due care and attention, distraction or misconduct (e.g. riding on the pavement).

The survey of 501 e-scooter users and 598 non-e-scooter users in June 2019 shows that neither group has adequate knowledge of road traffic regulations that apply to e-scooters. One in two of the e-scooter users surveyed (54 %) consider e-scooters to be either very dangerous or fairly dangerous for cyclists. This figure is even higher among non-e-scooter users (63 %). The survey participants see particular potential for conflicts and accidents involving e-scooters and vulnerable road users (cyclists and pedestrians). They name lack of due care and attention/distraction, disregard for traffic regulations, violations of the right of way, excessive speed and insufficient safety distances as the primary causes of such conflicts and (near-)accidents.

The measurements of speeds travelled by e-scooters at 22 different locations except intersections (e.g. cycle paths, cycle lanes, road, pedestrian zones, pavements) across Vienna show that e-scooter riders

[1] In comparison, around 34,100 cyclists required hospital treatment for severe injuries sustained in road accidents in the same period.

(n=909) travel at an average speed of 15.1 km/h. The highest speed measured was 31 km/h. 15 % of the e-scooters measured were travelling at a speed of above 20 km/h. E-scooters are ridden at similar speeds on cycleways (cycle paths, cycle lanes, multipurpose lanes) and roads (around 15 to 17 km/h). While e-scooter users clearly reduced speed when riding illegally on pavements, they still ride too fast (on average 10 km/h) for mixed traffic with pedestrians. Both, e-scooter users (n=221) and cyclists (n=396), significantly exceed the legally permitted speed limit of 10 km/h when approaching a cyclist crossing without traffic lights (average speed for e-scooters: 15.4 km/h, for cyclists 17.2 km/h, about 5 metres before the intersection).

The observations of 667 e-scooter riders in Vienna regarding their use of road infrastructure revealed that 15 % of them ride on the pavement (2019: 34 %). If a cycle path is available, 88 % of the 335 observed e-scooter riders use the cycle path; the others drive on the pavement (9 %, 2019: 23 %) or the road (3 %, 2019: 4 %). If a cycle or shared traffic lane is available, 91 % (2019: 48 %) of the 206 observed e-scooter riders use this infrastructure, but almost one in ten e-scooter rider drives on the pavement (9 %, 2019: 46 %).

The results of the e-scooter-braking tests reveal large differences in braking decelerations for the different e-scooter models and bicycle tested. The mean braking deceleration on the flat when coming to a complete stop from a speed of 15 km/h ranged from 1.4 m/s² (worst-performing model) to 5.4 m/s² (best-performing model). Only one of five e-scooter models tested exceeded the minimum braking deceleration of 4 m/s² required for bicycles in Austria (which does not apply to e-scooters). The trekking bike tested had an average braking deceleration of 6.6 m/s². The braking deceleration on a slope (5 % gradient) was around 20 to 30 % lower than on the flat.

4 DISCUSSION

The large number of single-vehicle e-scooter accidents and reported potential for conflicts between e-scooter riders and cyclists or pedestrians indicate a need for greater awareness-raising for road safety among e-scooter riders and other road users.

The current regulation requiring e-scooter riders to use cycle paths and lanes should be supported since the differences in speed between e-scooters and bicycles are generally far lower than those between e-scooters and pedestrians.

It can be assumed that the growing numbers of e-scooters and e-bikes will raise traffic volumes, speeds and speed differences on cycle paths and lanes. This will have consequences from an infrastructure perspective (e.g. a need for greater visibility ranges at crossings and junctions, wider paths/lanes) and for other forms of traffic (e.g. a rise in the difference in speed between pedestrians and cyclists) and must be taken into consideration in bicycle traffic planning and for the definition of regulations. The provision of adequate – and adequately sized – cycle paths and lanes will also encourage adherence to the traffic regulations and reduce the need for e-scooter users to ride on pavements.

The results of the e-scooter braking tests indicate that the current provisions for e-scooter brakes in Austria (e-scooters must have an effective braking system) are not sufficient. KFV recommends the definition and introduction of more specific regulations for e-scooter brakes (a minimum required braking deceleration, two brake operating devices, at least one of which can be operated without electric assistance).

5 CONCLUSIONS

The increasing use of e-scooters, accompanying rise in accident numbers and limited availability of research findings on the behaviour of e-scooter riders on the roads all underscore the need to address this new mode of transport from a road safety perspective. The survey of e-scooter and non-e-scooter users, observation of the behaviour of e-scooter users on the roads and measurement of e-scooter speeds and braking distances carried out for the purposes of this study provide extensive new insights into this topic. The next step is to discuss regulatory, infrastructure, awareness-raising and education measures in expert groups and implement selected measures as soon as possible. The KFV film “dos and don’ts for e-scooter riders” (download: https://www.youtube.com/watch?v=H8IOsvK6HtI) informs about important rules regarding e-scooters.