Cycling Accident Risks

Accidents involving cyclists

The risk of accidents is a major hurdle for cycling; if people feel particularly unsafe, they will cycle less.

Official accident statistics show the numbers and trends of accidents involving cyclists and provide information in the context of reported accidents. In order to better understand the circumstances of the accident, however, an analysis of the individual accident files is often needed in accident research that looks into what causes accidents and ways to prevent them. Some of the experiences are presented in short form below.

In 2010, the number of cyclists involved in accidents in Germany was 65,573, including 381 fatal casualties and 12,143 seriously injured cyclists. Especially older people using the bicycle are exposed to greater risk. Those 65 and older accounted for more than half (52%) of cyclist fatalities. The numbers of accidents involving cyclists have not varied much over recent years despite the strong increase in cycling levels in Germany. This is also an international experience: In countries/cities where there are many cyclists on the roads, the accident risk for the individual cyclist is lower than in countries/cities with lower cycling volumes. With more cyclists on the roads, it seems that motorists pay more attention to them.

The long-term development of cycling and cyclist fatalities in the Netherlands clearly shows that the risk for cyclists increases as motorised traffic volumes increase. Cycling safety was then increased through the continuous expansion of the cycle networks since the 1970s, which made cycling much safer and at the same time caused cycling levels to rise.

However, the increase in road safety was not matched by similar cycling safety gains in Germany in recent years. Accidents involving cyclists are still part and parcel of the transport system.

Causes of accidents

A study on the 'cycling capital' Münster in Germany looked closer at what causes accidents and found that about 60% of cycling accidents in the city of Münster are turning, crossing or entering accidents. These types

Safety by visibility – re-designed interestion in Hannover

Contents

Safe crossing of a one side, two directions cycleway at side road (Arnhem, Netherlands)

of accidents also account for the majority of injuries resulting from cycling accidents: 44% of accidents with severe injuries and 42% of accidents with minor injuries were entering or crossing accidents; turning accidents account for 19% of accidents resulting in severe injuries and 23% of accidents with minor personal injuries. Cycling accidents are caused by cyclists as well as other road users. In Münster, 51% of cycling accidents were caused by motorists; 46% were caused by cyclists and 3% by pedestrians.

Accidents caused by car drivers are mainly due to drivers ignoring right of way (34% of accidents), turning errors (28%), and errors when joining moving traffic (10%). Accidents caused by cyclists are, however, mainly due to cyclist errors (19%), ignoring right of way (18%), insufficient clearance (15%) and drinking (12%). In general, key factors are the behaviour of road users, the infrastructure, and the technology (of both bikes and cars). There is no conclusive data on the role of different experience levels of cyclists of different ages.

The National Cycling Plan 2020 from the German government also identifies behaviour that can lead to accidents: "Further supposedly trivial offences such as speeding or parking on cycle paths can pose serious risks to road users." (NRVP 2020, p. 30)

In almost all accidents speed is relevant in one way or the other; driving at lower speeds usually allows for braking or avoiding movements to prevent collisions. The higher the driving speeds (especially of motor vehicles) the more serious are the injuries caused by accidents. The risks posed by high driving speeds are increased where visibility is obstructed, especially through parked cars. This is critical in particular before side road junctions. The visibility splay, free from parking cars, is often not long enough in order to avoid conflicts between right-turning motor vehicles and bicycles going straight ahead. Stationary motor-vehicle traffic may obstruct visibility and thus pose risks to road users crossing the carriageway as well as to cyclists on lanes inside car parking. Good intervisibility between motorists and cyclists normally provides for good safety conditions.

One-sided accidents

Accident statistics derived from data collected by the police do not offer appropriate data on cycling because it can be assumed that a large number of cycling accidents is not reported if, apart from the cyclist, no other road users are involved. The study on cycling accidents in the city of Münster therefore collected data on all injured cyclists treated in the accident and emergency unit of a Münster hospital and compared this figure to the number of accidents reported to the police. It turned out that almost 70% of cycling accidents had not become known to the police.

The number injured in accidents treated not in a hospital but in a doctor's surgery were not accounted for, which is to say that the real number of accidents could even be higher. A similar study conducted in Switzerland shows that only about one out of eight accidents is reported to the police.

Visual contrast at bollard to prevent one-sided accidents (cologne region)

Bollards that are to prevent cars from driving or parking on the pavement pose a significant risk because cyclists often do not see them, especially when they are in a group of cyclists. The Dutch cities of Zwolle and Amersfoort therefore have created websites where people can report bollards that are redundant (e.g. www.zwolle.nl/fietspalen). They received 3500 suggestions for the

Sources

FGSV (2010): ERA – Empfehlungen für Radverkehrsanlagen, Köln (German)

BMVBS (2012): Nationaler Radverkehrsplan (NRVP) 2020, Berlin (German)

Alrutz, D., Bohle, W. u.a., (2009): Unfallrisiko und Regelakzeptanz von Fahrradfahrern. BASt-Berichte Nr. V 184, Bergisch Gladbach (German)

Statistisches Bundesamt (2011): Zweiradunfälle im Straßenverkehr, Wiesbaden (German)

removal and 500 for the relocation of bollards. Amersfoort took immediate response by taking 90 bollards off the cycle paths after winter road maintenance.

Right turning HGVs

Collisions between right-turning HGVs and bicycles going straight ahead are very severe. Due to the HGVs' so-called blind spot, cyclists passing the vehicle are often not seen by the drivers. This type of accidents is relatively rare and not confined to certain spots; but they account for a large percentage of cyclist fatalities.

There is much discussion about additional mirrors, electronic warning systems and underrun protection for heavy goods vehicles; but it is unclear whether warning systems and mirrors are effective for turning movements given the flood of information HGV drivers have to handle. The provision of advanced stop lines of up to 3 metres for cycling traffic may help avoid these conflicts by creating advanced stop lines reservoirs visible to HGV drivers. Raising the awareness of cyclists, especially among children, for this accident risk is a crucial element of road safety education.

Brussels: Transformation of a four lane main street to a two lane street with cycle lane by new road markings

Safety risks arising from infrastructure and road behaviour

A safe infrastructure is one of the key elements that must be provided if cycling is to be safe. Against the backdrop of decades of accident and transport research, there is a broad consensus about the basic features of safe cycle facilities in Germany, which is documented in the road traffic regulations (Straßenverkehrsordnung, StVO) and the Recommendations for Cycle Facilities (Empfehlungen für Radverkehrsanlagen, ERA) of the Road and Transport Research Association (FGSV), and is more and more implemented.

A comprehensive study conducted by the Federal Highway Research Institute (Bundesanstalt für Straßenwesen, BASt) looked at the road behaviour of close to 39,000 cyclists in about 100 representative stretches of road and studied various types of cycling facilities in terms of their safety. About 1000 trips were done to record rules violations and dangers. Face-to-face and telephone interviews were conducted to further assess cyclists' knowledge and acceptance of regulations as well as their attitudes. This provided a good overview of the impacts of safe and unsafe infrastructure in conjunction with cyclists' behaviour (acceptance of rules). The data generated by the study allow for a more detailed comparison of different cycle facilities in terms of their safety than in the past.

Bicycle box for safe turning left (Offenburg)

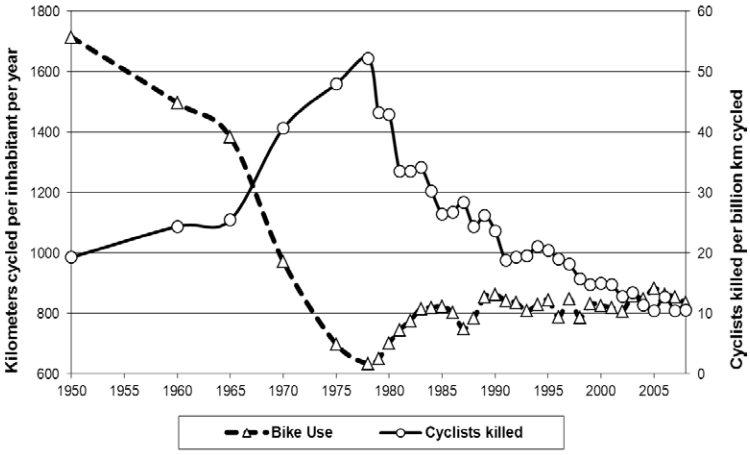
Accident rates for roads with cycle facilities show that safety or the lack thereof is dependent upon infrastructural details and the quality of the cycle facility. The planning implication of this for most roads is to not provide cycle facilities rather than to provide a cycle path of poor quality. It may be counterintuitive that accident rates are relatively low on roads where protection lanes are provided. This may be due to good intervisibility between motorists and cyclists. The perceived lack of safety may result from the fact that cyclists cannot look back over their shoulder and become aware of accident risks.

On the other hand, the risks cyclists are exposed to when using contra-flow cycling facilities are underestimated. The risk of accidents is four to six times higher compared to facilities where cyclists move with the flow of motorised traffic and not against it. Careful plan-

Pucher, J., Buehler, R. (eds.) (2012): City Cycling. Cambridge, MA: MIT Press.

Pucher, J., Buehler, R. (2008): *Lessons from the Netherlands, Denmark, and Germany. Transport Reviews, Vol. 28, No. 4, pp. 495-528.*

More information can be found in
CyE I-1 State of the Art Design for Cycling Facilities
CYE I-2 Cycling in Urban Main Streets
CyE I-8 Safety by Cycling Facilities - basics
CyE O-7 Encouraging Cycling in Rural Municipalities
CyE S-6 Children on Bicycles - Mobility Education
CyE S-9 Road Traffic Safety Campaigning



Long term trends of bike use and fatalities while cycling in the Netherlands. Source: Pucher, J., Buehler, R. (2008): Making Cycling Irresistible. Lessons from the Netherlands, Denmark, and Germany. Transport Reviews, Vol. 28, No. 4, 2008, pp. 495-528.)

ning is required to ensure that contra-flow cycling traffic is able to cross a side road junction safely. Using the pavement also poses greater risks to cyclists than expected, as they have to cross minor exits where car drivers might not see them due to poor visibility. Providing simple, straightforward and clearly visible cycle facilities can thus improve safety.

Additional risk of accidents may come from the new technological innovation of electric bikes (pedelecs). In the Netherlands, experience shows that senior citizens who make up a large user group hardly travel at greater speeds than 20 km/h (12 mph) when using pedelecs. However, the question needs to be considered as to whether there is an increase in the average cycling speed involving more overtaking manoeuvres and requiring infrastructure suitable for s. Bicycles must become more stabile and robust, and designs must allow for bikes to be converted to electric bikes. In terms of safety, it must also be considered that other road users might not be used to and might not expect higher cycling speeds.

Planning responses

The German Insurers Accident Research UDV (Unfallforschung der Versicherer) gives the following recommendations to reduce the number of accidents involving cyclists:

- appropriate upgrading and modification of transport facilities
- modification of signal control (optimising signal timings for pedestrians and cyclists to provide for their safety)
- introducing in urban locations a speed limit of 50 km/h (30 mph) on main roads with a high accident rate; providing stationary speed monitoring
- increasing controls to prevent red light abuse by cyclists and motorists
- increasing breathaliser tests also for cyclists

Bike safety technology

Bikesafety technology increasingly features in research and development in Europe. Inventions include external airbags for cars, warning systems (e.g. for opening doors) and a turning assistant for HGVs. For cyclists, safety equipment – apart from the essential helmet – also includes a head airbag that inflates extremely quickly. The European Union SAFECYCLE project has systematized more than 100 technological applications, provided recommendations for standardisation and a research agenda.

Conclusion

Cyclists are exposed to danger where cars turn into or out of a road; they are exposed to danger when using cycle paths going against the flow of motorised traffic; when violating rules and regulations and when cycling under the influence of alcohol. Safety risks also result from inadequate cycling infrastructure, parked cars and high motor-vehicle speeds. The risk of one-sided accidents caused by bollards on the cycle path and other infrastructure flaws are normally underestimated. In the long run a mix of communication activities, road safety education and control must be used to make the coexistence of pedestrians, cyclists and motorists mutually smoother.

Funded by Federal Ministry of Transport, Building and Urban Development

All images by Jörg Thiemann-Linden

"Cycling Expertise" is available online:
www.nrvp.de/cye

Imprint
Publisher: German Institute of Urban Affairs (Difu) gGmbH
Zimmerstraße 13–15, 10969 Berlin
Department for Mobility and Infrastructure
Editor: Sebastian Korn, Jörg Thiemann-Linden
cycling-expertise@difu.de