



# Removal of the obligation to use cycle paths

Compact accident research

Unfallforschung  
der Versicherer





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## Background

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### Background

In most German cities cycling traffic uses cycle paths that are segregated from the road. As a result of a number of changes to the German Road Traffic Regulations (StVO) and the associated General Administrative Regulations as well as relevant court rulings, the obligation to use these cycle paths has increasingly been removed.

There are essentially two reasons for removing the obligation to use cycle paths. Firstly, a ban on using the road due to the existence of a mandatory cycle path in accordance with Section 45(9) of the German Road Traffic Regulations (StVO) is justified only in hazardous situations where, due to particular local circumstances, the level of risk is considerably higher than is generally to be expected. Secondly, cities have removed the obligation to use many cycle paths because their dimensioning and condition no longer met the minimum requirements of the General Administrative Regulations of the Road Traffic Regulations (VwV-StVO).

In most cases where the obligation to use a cycle path is removed, only the road sign for the cycle path is removed; no structural changes are made to the facility. As a result, in many places there are still easily recognizable cycle paths next to the road that cyclists are no longer obliged to use. The question as to how road safety has been affected, now that cyclists can use either the cycle path or the road in these cases, has been unanswered up to now.

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## Aim

In a UDV research project, the Department of Road Planning and Operation (Fachgebiet Straßenplanung und Straßenbetrieb) at Technische Universität Berlin carried out the first in-depth study examining the impact of the removal of the obligation to use cycle paths both on what road users do and on road safety. In particular, the aim was to investigate whether removing the obligation to use cycle paths results in more conflicts on the road and what impact the use of various accompanying measures has on road safety.

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## Methodology

In addition to a review of the literature on the subject, a representative online survey was conducted in German cities with more than 20,000 inhabitants (figure 1). 354 cities answered questions on their experiences of and approach to removing the obligation to use cycle paths. The questions addressed, among other things, the extent of and reasons for the removal of the obligation to use cycle paths, the assessment criteria applied, any accompanying measures, which parts of the infrastructure cyclists used afterwards and the impact on road safety. In addition, the cities were also asked to provide suitable examples that could be studied in the research project. Based on the responses, suitable cycle paths that were no longer mandatory were selected for further study.

For 108 selected cycle paths in eight cities, a macroscopic and microscopic analysis was carried out of the accidents that occurred before and after the removal of the obligation to use the cycle paths. 741 cycling accidents involving injuries that were reported to the police were analyzed, as were, where available, the associated detailed police reports of the accident circumstances. In addition, the key traffic- and infrastructure-related parameters of

the stretches of road studied were ascertained. These included the volumes of cycling and motorized traffic, the widths of the cycle paths and the number and width of lanes on the road. In order to assess road safety, accident rates were ascertained on the basis of the volumes of cycling traffic. Since the volume of cycling traffic in the cities studied changed in some cases considerably over the lengthy period of the study, this had to be taken into account when calculating the accident rates. Depending on when the cycling traffic volumes were obtained, they were projected either into the past (before the removal of the obligation to use cycle paths) or into the future (after the removal of the obligation to use cycle paths). The basis used for this were long-term measurements and the results of the regular traffic survey of urban mobility, Mobilität in Städten (SrV).

In addition to the accident analyses, the study also included behavioral observations and conflict analyses carried out at selected mandatory and non-mandatory cycle paths (10 in each case). Direct before-and-after comparisons were planned initially. However, only two of the ten cycle paths agreed in advance with the cities actually became non-mandatory during the period of the project. Consequently, four mandatory and non-mandatory cycle path stretches were compared instead. The behavior of road users on the selected mandatory stretches was compared with behavior on corresponding non-mandatory stretches before or after them. In addition, behavior was observed on stretches on which the accident analysis revealed a significant rise in accident numbers after the obligation to use the cycle path had been removed.

On the cycle paths observed, 731 road users (including 579 cyclists) were surveyed about, among other things, their reasons for using the cycle path or the road, how safe they felt and their knowledge of the relevant rules concerning the obligation to use cycle paths.

## Review of the literature

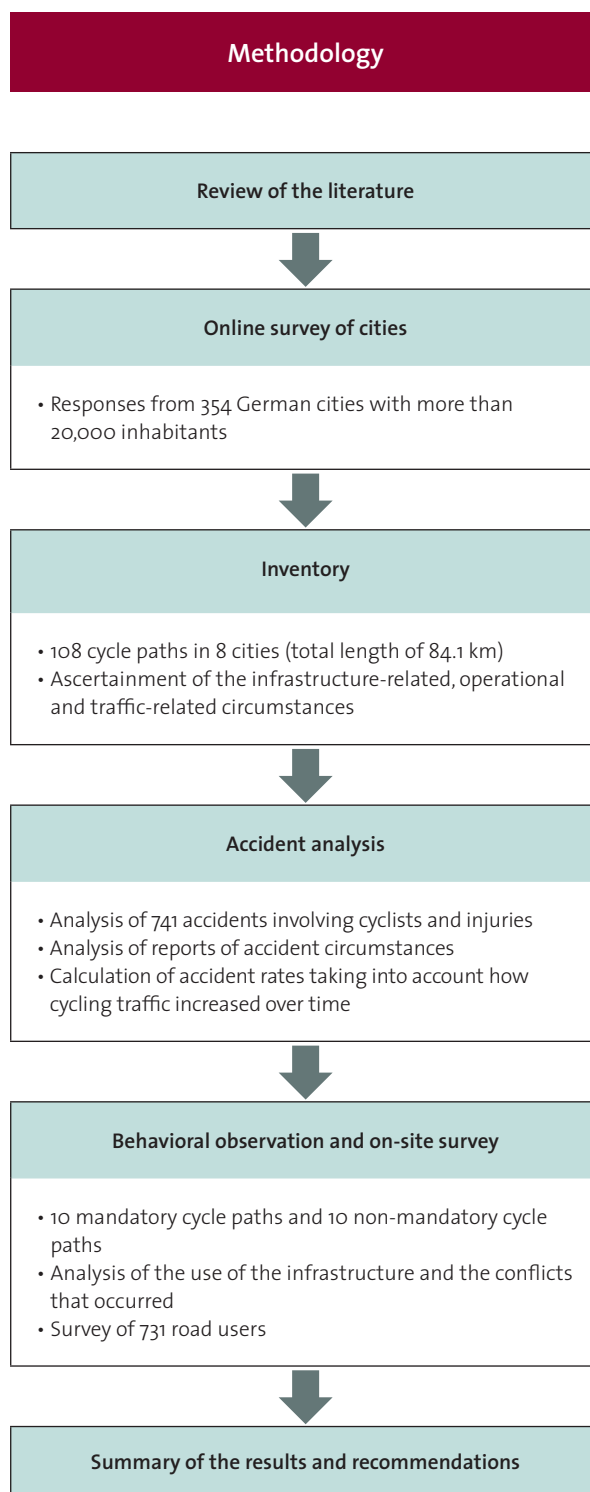


Figure 1: Methodology

## Review of the literature

In the literature there are relatively few conclusive findings on the effects of removing the obligation to use cycle paths. In some studies it was assumed that removing the obligation to use cycle paths could have an impact on road safety (e.g. Alrutz et al. 2009, UDV 2013, UDV 2015 and FGSV 2016). However, there are hardly any studies that specifically address this issue. Only Alrutz et al. 2009 investigated the effects of the removal of the obligation to use cycle paths in part of their study. A before-and-after comparison was carried out for 10 cycle paths. No negative impact on road safety could be ascertained after the removal of the obligation to use cycle paths.

Alrutz et al. 2009 and UDV 2013a, among others, made statements about the use of different parts of the infrastructure. According to them, regardless of whether or not there is an obligation to use cycle paths, around 90 percent of cyclists use cycle paths where they exist, and only a few use the road. Regardless of traffic volumes on the road, and even where cycle paths were clearly too narrow, it was found in both studies that the existing cycle paths were very often used. In both studies the reasons for this were found to be that people felt safer on the cycle path and cycled there out of habit, but also that they did not know the rules. The great majority of road users (70 percent in Alrutz et al. 2009 and 85 percent in UDV 2013a) did not know, for example, that cyclists can also use the road where there is no obligation to use the cycle path.

## Online survey

An online survey was conducted to find out what had been learned following the removal of the obligation to use cycle paths in a total of 354 cities.

It emerged that very different approaches were taken to the removal of the obligation to use cycle paths in the different cities. That applies primarily to reviewing whether it is necessary for existing cycle paths to be mandatory but also to the actual removal of the obligation to use them. 77 percent of the cities indicated that they had cycle paths that were not mandatory. 62 percent of the cities stated that the removal of the obligation to use cycle paths was sensible. Almost a third of them indicated that they had already reviewed whether it was necessary for cycle path use to be mandatory. A further third had at least begun to review this. Around 5% of the cities surveyed stated that they had no plans in the future to review whether existing cycle paths should continue to be mandatory (figure 2).

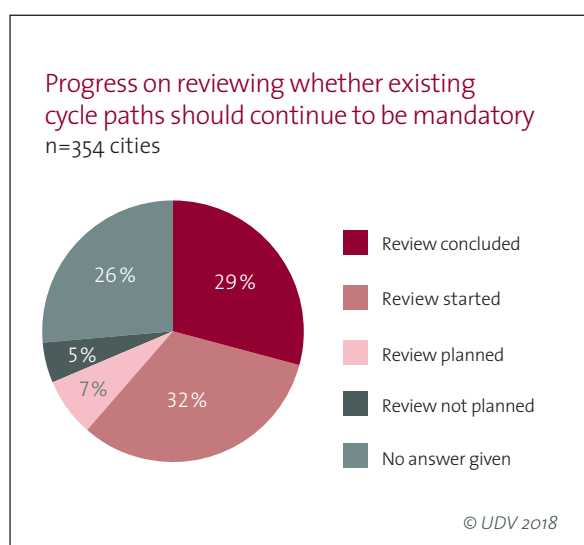


Figure 2: Many cities have already reviewed whether mandatory cycle paths are necessary

In over half of the cities that had reviewed this issue, the obligation to use the cycle paths reviewed had often been removed. 28 cities had already removed the obligation to use cycle paths almost completely. Structured programs for reviewing and removing the obligation to use cycle paths exist in around a quarter of the cities that have conducted reviews.

Many cities stated that they introduced accompanying measures when they removed the obligation to use cycle paths. The introduction of markings for advisory lanes or mandatory cycle lanes, the adaptation of traffic lights and information campaigns were mentioned particularly often in this context. However, in most cases these were measures taken on specific cycle paths in isolation. In some cities, in isolated cases speed limits were imposed, cycle paths were removed, barriers or beacons were put in place, the sidewalk was opened up to cyclists, or pictograms were marked on the road and/or the non-mandatory cycle path. The accompanying measures implemented were generally the result of decisions taken on a case-by-case basis. There are generally no accompanying measures that are carried out as standard. Instead, decisions are taken based on the specific characteristics of the relevant stretches of road.

The survey also revealed that maintenance measures tend to be carried out less often on non-mandatory cycle paths than on mandatory cycle paths. The greatest differences are seen with regard to a regular winter service. While 79 percent of the cities provide a regular winter service on mandatory cycle paths, only 58 percent do so on non-mandatory cycle paths.

The cities' subjective assessments of the impact of removing the obligation to use cycle paths vary greatly. The main positive effects mentioned are increased road safety, improved cycling convenience and improved visibility of cyclists as well as more appropriate driving by drivers. The main negative effects, according to the cities, are problems getting drivers to accept the new situation and the feelings of cyclists that they are not safe on the road. The criteria used in the cities for making cycle path use mandatory vary greatly. Most cities stated that the vol-

## Accident analysis

ume of vehicular traffic was a criterion (71 percent). However, the limit values used also vary greatly. Some cities referred to the different traffic load ranges (depending on the speed and volume of traffic) in the ERA recommendations for cycling facilities but often did not specify concrete limit values. The other most frequently mentioned criteria were the proportion of large trucks, the accidents that occurred, the width of the road cross-section as well as the speed limit or actual speeds driven by motor vehicles.

## Accident analysis

In the accident analysis, 741 cycling accidents that were reported to the police and happened before and after the obligation to use cycle paths had been removed were studied on 108 selected stretches of road in eight cities (table 1). In the case of almost three-quarters of the cycle paths studied, the obligation to use them had been removed without any accompanying measures. Although most of the cities stated in the online survey that they had implemented various accompanying measures, they mentioned very few specific stretches of road for potential investigations.

Table 1: Over 80 kilometers of cycle paths were studied

City	All cycle paths	No accompanying measures		Advisory lane markings without removal of the cycle path		Advisory lane markings with removal of the cycle path		Signs permitting cycling on the sidewalk		Cycling pictograms	
	Number [-]	Number [-]	Length [km]	Number [-]	Length [km]	Number [-]	Length [km]	Number [-]	Length [km]	Number [-]	Length [km]
Berlin	27	23	21.26					4	2.71		
Bremen	6	4	5.85							2	1.35
Düsseldorf	12	10	5.15	1	0.56			1	0.89		
Halle (Saale)	21	19	10.87	1	0.19			1	0.54		
Hamburg	22	17	12.42			4	4.08	1	1.49		
Nürnberg	10	2	2.98							8	4.19
Paderborn	8			3	2.32					5	6.12
Ulm	2	1	0.56			1	0.56				
Summe	108	76	59.09	5	3.07	5	4.64	7	5.63	15	11.66



The accidents that occurred at intersections and on stretches of road without intersections were analyzed separately. It was found that more cycling accidents generally occurred in the periods after the obligation to use the cycle paths was removed than beforehand. However, that can be explained by the general increase in cycling traffic over time in the cities studied.

In cases where the obligation to use the cycle path was removed without any accompanying measures, once the increased volume of cycling traffic was taken into account, the risk of an accident for cyclists did not change significantly either at intersections or on stretches without intersections. Taking into account the volumes of cycling traffic, accident rates remained virtually unchanged after the obligation to use the cycle paths was removed (figure 3).

The sample sizes for cycle paths with accompanying measures were much smaller than the large sample of cycle paths without any accompanying measures. The accident rates where accompanying measures were introduced on stretches of road without intersections were higher after the obligation to use the cycle path was removed. However, these increases could be put down to the strong influence of a small number of specific stretches. The conspicuous findings for these stretches could not be explained by particular traffic- or infrastructure-related factors. When these outlier stretches were excluded, there were scarcely any changes in the accident risk for the various accompanying measures on stretches without intersections. At the intersections there was a sharp decrease in the accident rate when an advisory lane was marked and the cycle path was removed. On four of the five stretches studied, the accident rates decreased significantly at the intersections (figure 4). On the remaining stretch there were no accidents either before or after the obligation to use the cycle path was removed. There was a general decrease in accident rates across all the intersections; it was not due to the influence of particular intersections. Overall, however, it should be noted that the sample of 20 intersections was relatively small.

## Accident analysis

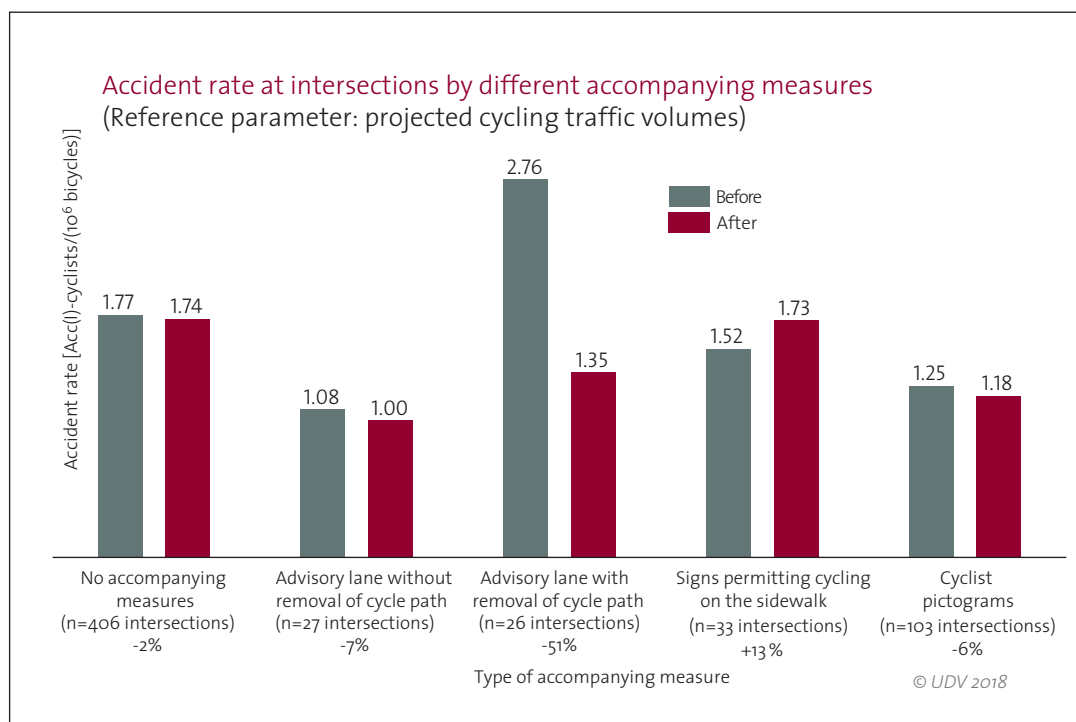
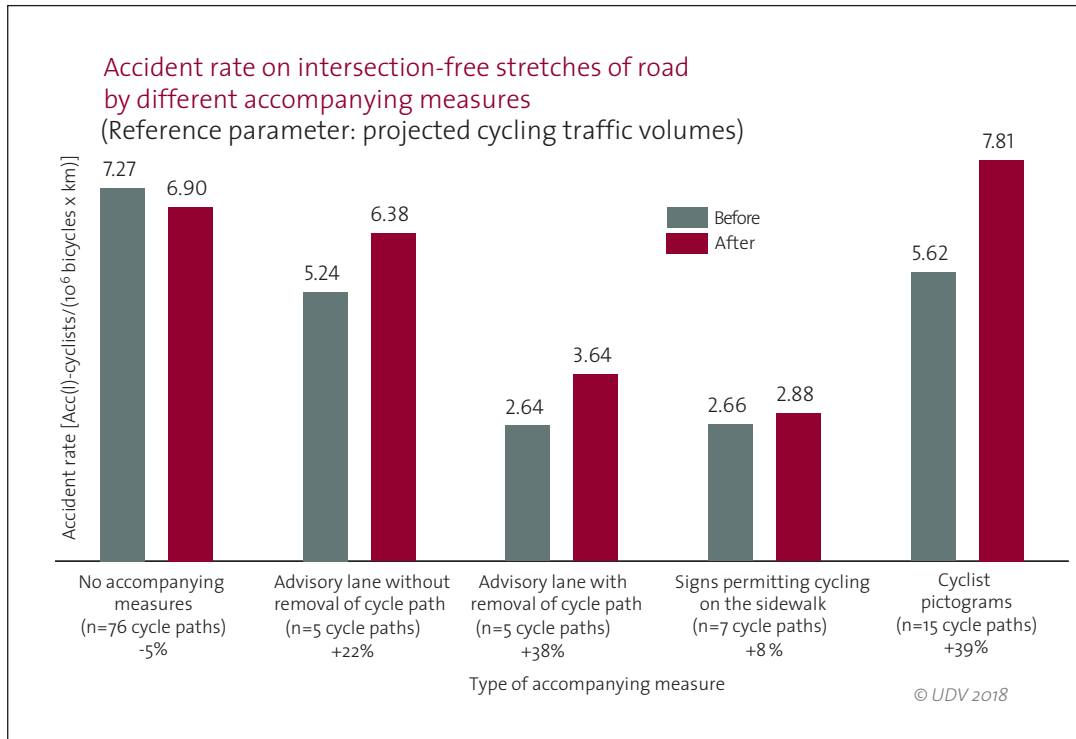


Figure 3: No significant change to the accident risk for cycle paths without an accompanying measure

## Accident analysis

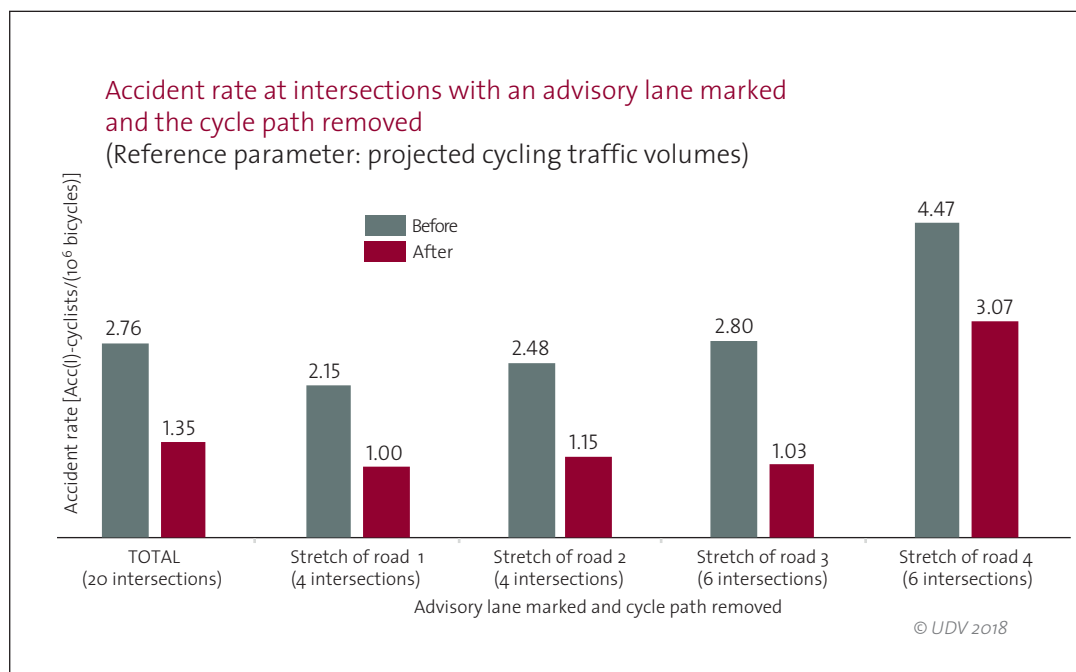


Figure 4: Positive effect of advisory lane markings and removal of the cycle path

Due to the very small sample sizes, a more in-depth accident analysis did not permit any reliable conclusions to be drawn for the stretches of road with accompanying measures. On the other hand, more in-depth analysis was possible for cycle paths without accompanying measures, which was the largest sample.

For these cycle paths, it was ascertained whether more accidents involving cyclists occurred on the road after the obligation to use the cycle path was removed. This was done by analyzing the available detailed police reports of the accident circumstances. It was found that there was hardly any shift in accidents from the cycle path to the road after the obligation to use the cycle path was removed (figure 5). On the other hand, it is noteworthy that even when there was an obligation to use the cycle path, some of the accidents involving cyclists still occurred on the road. Thus, even when there was an obligation to use the cycle path, some cyclists were riding on the road in violation of the rules.

An explanation for the absence of a shift in accidents from the cycle path to the road was provided by the analysis of short-term traffic counts. These were conducted on 42 stretches of road with non-mandatory cycle paths, since the cities were unable to provide any traffic data on them. They revealed that the great majority of cyclists use the cycle path rather than the road, even though they were not obliged to do so. When there were no accompanying measures, 89 percent of cyclists used the cycle path (figure 6). Even in cases where an advisory lane had been marked and the cycle path had been removed, more than 16 percent of cyclists used the sidewalk. The largest sample, cycle paths without accompanying measures, was examined to ascertain connections between the parts of the infrastructure used by cyclists, on the one hand, and the structural and operational characteristics of the stretches of road, on the other. It was found that fewer cyclists used the road the greater the volume of vehicular and truck traffic, the wider the cycle path and the narrower the right-hand lane on the road.

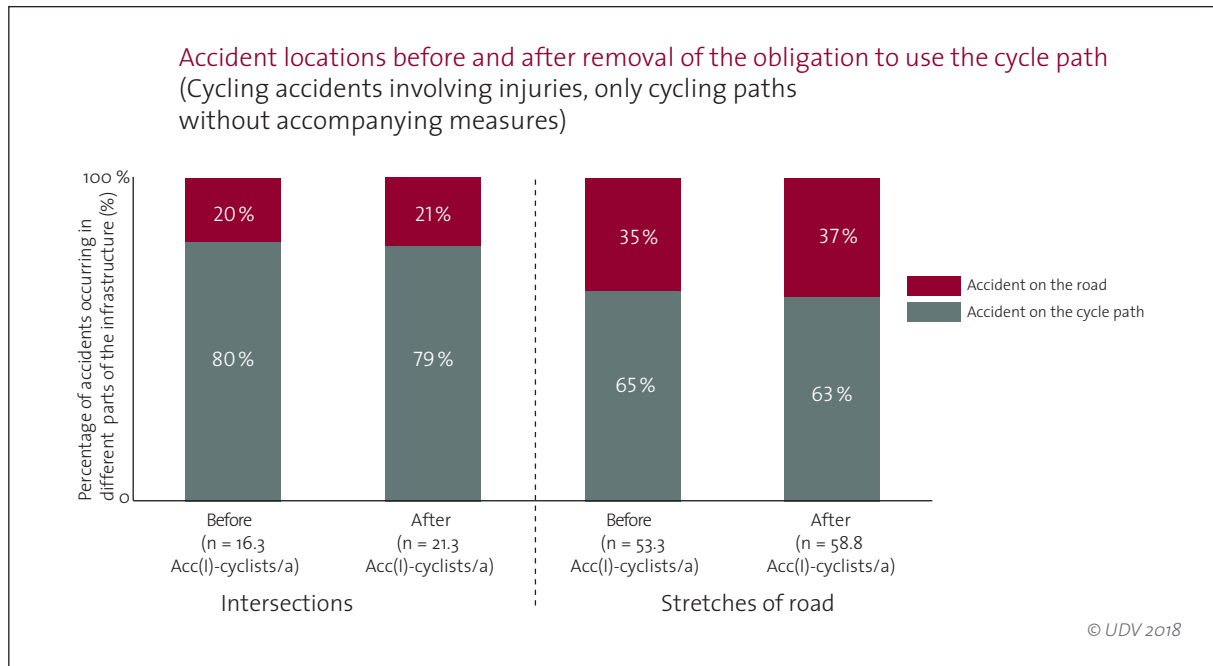


Figure 5: There was hardly any shift in accidents from the cycle path to the road after the obligation to use the cycle path was removed

An attempt was also made to use the data to assess the accident risk of cycling on the road when the obligation to use the cycle path had been removed and no accompanying measures had been put in place. However, due to the low overall number of cycling accidents on the road, no reliable conclusions could be drawn.

## Accident analysis

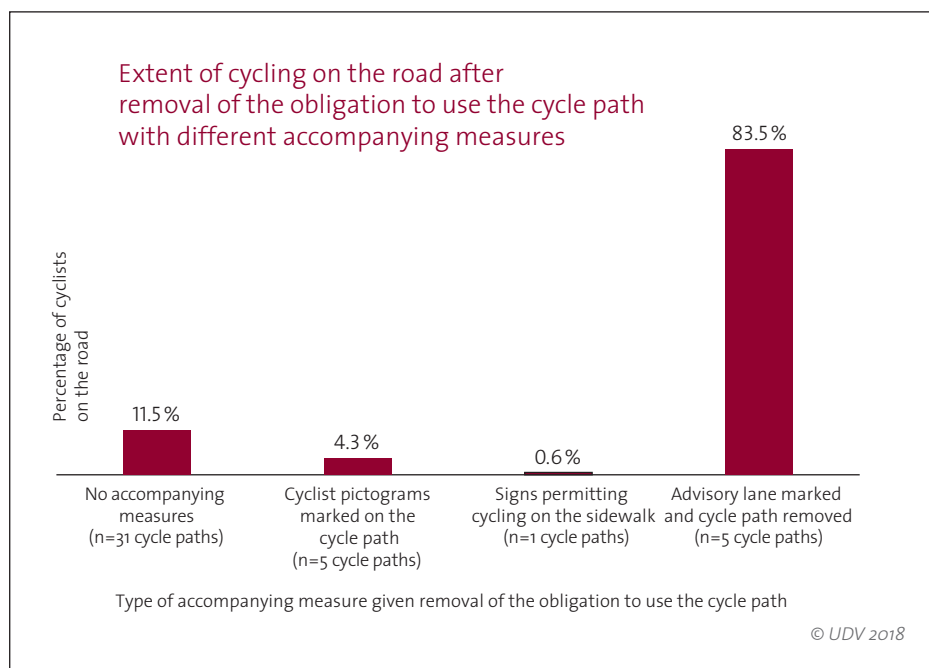


Figure 6: Even when there is no obligation to use the cycle path, the majority of cyclists use it if it is still there

There were no significant differences in the accident characteristics of accidents involving cyclists after the removal of the obligation to use cycle paths when there were no accompanying measures. Regardless of whether or not there was an obligation to use the cycle path, most accidents occurred at intersections. That is where 75 percent of cycling accidents involving injuries happened. No noteworthy changes in the accident types that occurred could be found after the obligation to use the cycle path was removed. Both beforehand and afterwards, over three-quarters of the accidents involving cyclists were caused by vehicles turning off, turning into or crossing the road. There were some differences in the distribution of the accident types on the intersection-free stretches of road before and after the obligation to use the cycle path was removed. However, this was due to the relatively small total number of accidents on these stretches of road. Here, too, regardless of whether or not the cycle path was mandatory, accidents caused by vehicles turning off, turning into or crossing the road at entrances or T-junctions were most common (39 percent to 53 percent).

The removal of the obligation to use the cycle path had no significant effect on the age and gender of those involved in accidents, either the cyclists themselves or the other parties involved.

It was also investigated whether, when the obligation to use the cycle path is removed, certain infrastructure-related or operational characteristics of the stretches of road affect the accident risk of the cyclists. Different results emerged for different vehicular and cycling traffic volumes as well as for different numbers and widths of lanes on the road. However, no connection could be found to the removal of the obligation to use the cycle path, since there was no significant shift in the occurrence of accidents from the cycle path to the road. General recommendations about the conditions in which the obligation to use a cycle path can be removed or should remain in place for safety reasons could therefore not be derived from this analysis.

## Behavioral observation

## Behavioral observation

In addition to the accident analyses, behavioral observations and conflict analyses were carried out at selected mandatory and non-mandatory cycle paths (10 in each case). A key aspect was the impact of the removal of the obligation to use a cycle path on the cyclists' choice of which parts of the road infrastructure to use. Where there were no accompanying measures, the part of the infrastructure they used did not change. The great majority of cyclists continued to use the cycle path (table 2). On stretches of road where there was no obligation to use the cycle path, only 1 percent of cyclists used the road (on stretches where there was an obligation to use the cycle path, it was 3 percent). On the stretch of road studied where there were cyclist pictograms on both the cycle path and the road, no more than 5 percent of cyclists used the road. Even where an advisory lane was marked and the cycle path had been removed, a third of cyclists remained in the space next to the road and used the sidewalk.

A total of 502 conflicts were observed between cyclists and other road users. 26 (5 percent) of these conflicts were serious. In other words, an accident was only narrowly avoided. 99 percent of the conflicts ascertained happened when cyclists were using the space next to the road (cycle path or sidewalk). Only 11 conflicts occurred when cyclists were on the road: four of them on roads with mandatory cycle paths and seven on roads with non-mandatory cycle paths (table 3). Since most of the mandatory and non-mandatory cycle paths were in different locations (rather than being the same cycle paths in a before-and-after comparison – see methodology), the absolute figures are not comparable. However, what became clear, as was also revealed by the traffic counts, was that only very few cyclists use the road regardless of whether or not there is an obligation to use the cycle path. Consequently, very few conflicts took place here.

Most conflicts, like most accidents, took place at the intersections. That is where 77 percent of the conflicts happened. When cyclists used the cycle paths, conflicts that

Table 2: Cyclists overwhelmingly use cycle paths where they still exist

Scenario	Mandatory cycle path				Non-mandatory cycle path or afterwards			
	Number of cyclists	Part of the infrastructure used			Number of cyclists	Part of the infrastructure used		
		Road	Cycle path	Sidewalk		Road	Cycle path	Sidewalk
Stretches of road without accompanying measures*	5,605	3%	94%	4%	4,841	1%	96%	4%
Pictograms marked on the road and cycle path**	344	4%	90%	6%	248	5%	87%	8%
Advisory lane marked and cycle path removed**	88	0%	93%	7%	99	65%	0%	35%

\* With/without comparison; \*\* Before/after comparison

## Survey of road users

Table 3: Most conflicts took place on the cycle paths

Scenario	Mandatory cycle path			Non-mandatory cycle path or afterwards		
	Number of conflicts	Part of the infrastructure used		Number of conflicts	Part of the infrastructure used	
		Road	Space next to the road		Road	Cycle path
Intersections	64	4 (6%)	60 (94%)	321	5 (2%)	316 (98%)
Intersection-free stretches	15	0 (0%)	15 (100%)	82	2 (2%)	80 (98%)
Public transport stops	3	0 (0%)	3 (100%)	17	0 (0%)	17 (100%)
Total	82	4 (5%)	78 (95 %)	420	7 (2%)	413 (98%)

\* Absolute figures for mandatory and non-mandatory cycle paths are not comparable, because they are not the same cycle paths

are typical for cycle paths occurred: when motor vehicles turned into the road (57 percent), when they turned off to the right (16 percent), and when pedestrians crossed the cycle paths (19 percent). The most frequent type of conflict that occurred when motor vehicles were turning into a road was when cycle path crossings were blocked by motor vehicles at the sight line to the main road waiting for gaps between vehicles crossing in front of them. When cyclists used cycle paths on intersection-free stretches, most of the conflicts that occurred were with vehicles parking on the cycle paths transverse to the direction of travel (24 percent), with cyclists riding in the opposite direction on the left in violation of the rules (24 percent) and with pedestrians crossing the cycle path (23 percent). The conflicts on cycle paths at public transport stops all occurred with pedestrians who were crossing the cycle path.

The 11 conflicts experienced by cyclists riding on the road were very different: They occurred with road users who were turning into a road (four), turning off a road (two), braking (two), stopping (one), parking (one) or turning round (one). However, none of these conflicts was serious.

## Survey of road users

On the stretches of road where road users' behavior was observed, a total of 731 road users were asked about their behavior and knowledge of the rules. 579 of those surveyed were cyclists. Regardless of whether or not a cycle path was mandatory, around 96 percent of cyclists surveyed used the cycle path, 3 percent used the road, and 1 percent used the sidewalk in violation of the rules. The distribution of the cyclists in the sample across the parts of the infrastructure they used corresponded to the distribution revealed by the behavioral observation. 89 percent of the cyclists surveyed on mandatory cycle paths said that they would continue to use the cycle path after it had been made non-mandatory.

The cyclists were asked in different ways for their reasons for using the part of the infrastructure that they used. Directly after they stopped, they were asked an open question about why they were currently using the part of the infrastructure that they were using. The spontaneous answers of the 234 cyclists using the non-mandatory cycle paths could mostly be assigned to one of three groups:

## Survey of road users

- Over half of them said that they feel safer on the cycle path.
- A further quarter of them said they used the cycle path out of habit.
- A further 15 percent were under the impression that they had to use what was actually a non-mandatory cycle path.

Of the total of 10 cyclists using the road who were included in the survey, only two said that they were using the road because it was safer. The rest said they were doing so because it was quicker or more convenient.

In addition, the cyclists were asked to rate the aspects of “safety”, “making quick progress” and “convenience” in terms of their significance in leading them to use the part of the infrastructure they were using. Regardless of whether the cycle path was mandatory or non-mandatory, the feeling that they were safer using this part of the infrastructure played an important role for 92 percent of the cyclists. Only about 40 percent said that making quick progress or convenience was important.

The cyclists were also asked to rate the safety of riding on the cycle path and riding on the road. They were asked to rate the intersections and the stretches between intersections separately. There were scarcely any differences in the ratings for mandatory and non-mandatory cycle paths. The majority of cyclists rated cycling on the cycle path as safe: Over three-quarters of cyclists rated the use of the cycle path on intersection-free stretches as safe (figure 7). The results were less uniform for the intersections, but nevertheless only 12 percent of cyclists rated the use of the cycle path here as dangerous. Cycling on the road, on the other hand, was rated as dangerous both at the intersections and on the stretches of road between intersections by around 60 percent of cyclists.

There were considerable gaps in road users’ knowledge of the rules in relation to whether or not cycle paths are mandatory. Many cyclists did not know which parts of the infrastructure they were allowed to use. On stretches of road with mandatory cycle paths, 45 percent of the cyclists surveyed stated erroneously that they were also

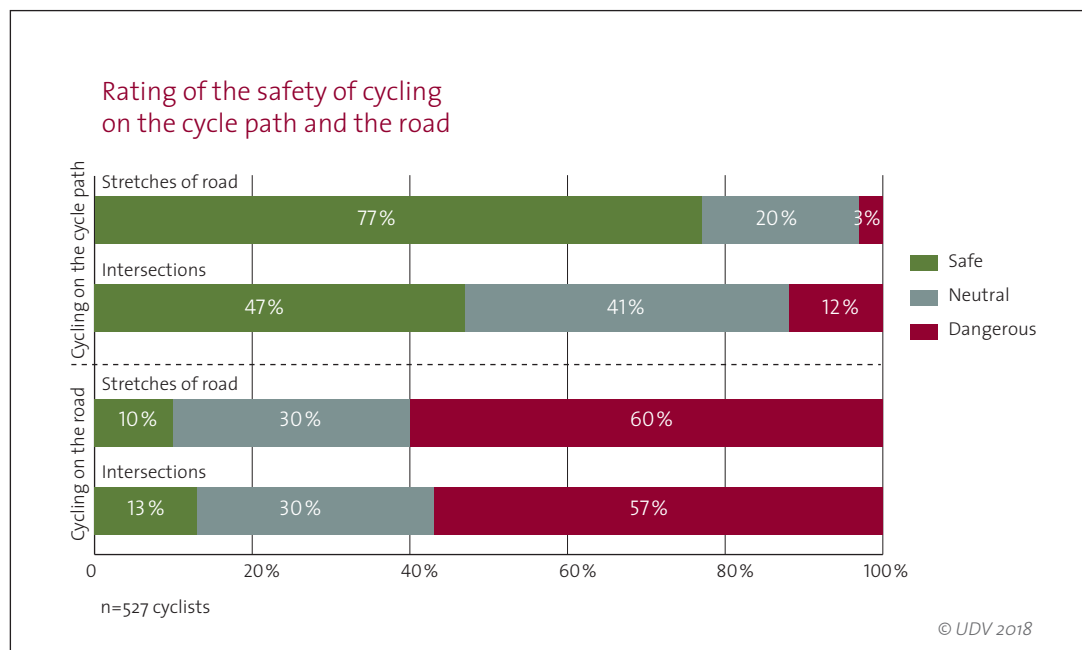


Figure 7: Cyclists rate cycling on the road as dangerous.



## Conclusion and recommendations

allowed to use the road there. A further 9 percent were not sure. On stretches of road with non-mandatory cycle paths, over two-thirds did not know that they were also allowed to cycle on the road there. Pedestrians' level of knowledge was similarly poor. None of the 10 car drivers surveyed on stretches of road with non-mandatory cycle paths knew this either.

## Conclusion and recommendations

The study showed one thing very clearly: Cycling facilities are used by the majority of cyclists regardless of whether or not they are mandatory. Even cyclist pictograms have no effect on this. Very many cyclists believe that cycling in mixed traffic on the road is dangerous, and most of them therefore prefer to use cycle paths. That applies all the more the wider the cycle path is, the narrower the road and the more vehicular traffic there is on the road. Accordingly, after the obligation to use cycle paths had been removed, there were no significant changes in the accident characteristics or the numbers of conflicts that occurred. This applies, in particular, to cycle paths without accompanying measures, but also to still existing cycle paths with cyclist pictograms or advisory lanes that exist in parallel with them. Isolated changes to the numbers of accidents occurring on stretches with cyclist pictograms or advisory lanes parallel to cycle paths could not be attributed to any systematic factors.

Cycle paths that are no longer mandatory are thus just as safe or unsafe as they were when they were mandatory. On the one hand, this can be viewed positively, since the parts of the infrastructure used hardly change and there are essentially no new conflicts or accidents. On the other hand, it also means that problems that existed on the cycle paths when they were mandatory continue to exist when they are made non-mandatory. Above all, the turning-into and crossing accidents at intersections that are typical for cycle paths continued to occur once the

cycle paths had become non-mandatory. Since the cycle paths that have become non-mandatory continue to be used by the great majority of cyclists, they must on no account be treated as in any way second-class cycle paths. This is also true if the road authority or public agency responsible for the cycle path changes once it has been made non-mandatory. Any safety problems on the non-mandatory facilities must be resolved just as they are on mandatory cycle paths. A particular focus of the safety work should be on the known accident and conflict blackspots.

Only the removal of the cycle path and simultaneous marking of a cycling facility on the road brought clear improvements in safety, at least at the intersections. Away from the intersections, however, there were no clear effects on safety due to the very low number of accidents occurring there. Since these are completely different cycling facilities, they are no longer comparable with the previous, mandatory cycle paths in terms of the accidents and conflicts that occur. The safety of the different types of cycling facilities depends instead on the details of their design.

The UDV therefore generally recommends designing existing cycling facilities, regardless of whether or not they are mandatory, in compliance with the relevant guidelines and regulations (e.g. the General Administrative Regulations of the Road Traffic Regulations (VwV-StVO), the Directives for the Design of Urban Roads (RASt 2006) and the Recommendations for Cycling Facilities (ERA 2010)). There should be a particular focus on the known accident and conflict blackspots. The design of safe intersections is particularly important in this context. A number of UDV publications make relevant recommendations about how to do this (e.g. UDV 2013a-c, UDV 2017 and UDV 2018a).

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