

The importance of safety on the bicycle friendliness of cities

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1 INTRODUCTION AND PURPOSE

In the framework of questions like climate protection, healthy lifestyles and more livable cities it is important to increase cycle use and replace motorized traffic. Safe cycling is one of the preconditions for the growth of cycle use, especially considering the more vulnerable user groups. But how important is safety in relation to other factors influencing bicycle friendliness like comfort of the cycle path and bike parking, accessibility or communication? And how is the relation between 'objective safety' - represented by the number of recorded accidents - and 'subjective safety' as the perceived safety feeling of the bike users?

2 METHOD AND DATA SOURCES

The raised questions can be answered by using data from the ADFC Bike-Friendly Cities Rating (ADFC-Fahrradklima-Test or directly translated Bicycle Climate Test) of the German Cyclists' Federation (ADFC). This survey collects cyclists' perceptions of cycling in their home city or town. Cyclists are regarded as being able to assess their cycling environment because they are "experts by daily experience". Questions include all relevant conditions which have an impact on cycle use. The questionnaire contains twenty-seven assessment questions grouped into five categories as follows: bicycle and traffic climate; value of cycling; safety; comfort; and infrastructure. Everybody who receives the information about the survey, and wishes to respond is invited to participate. There is no selection process (sampling) for acquiring the data. Despite this limitation, the data is generally stable and has proved to be suitable for comparing, monitoring and benchmarking in cities [1]. The roots of the survey can be traced back to 1988. Since 2012 the survey is conducted every two years. Within the 2020 edition of the survey, ratings for 1023 German cities with altogether about 220.000 participants are available. The methodology of the survey had been transferred to several other countries and is meanwhile applied in France, the Netherlands, Czech Republic, Switzerland, Austria, Sweden, Belgium and other countries.

The structure of the questionnaire contains assessment questions in form of a semantic differential: respondents choose a value from a six-point ordinal scale between opposite (positive and negative) statements. The higher the value, the worse the mark. The ADFC Bike-Friendly Cities Rating comprises seven assessment questions within the category of cycling safety (see Table 1).

Table 1: ADFC Bike-Friendly Cities Rating, assessment questions of the cycling safety category

Cycling Safety

In my city	1	2	3	4	5	6	
11. one feels safe as a cyclist.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	one feels vulnerable as a cyclist.
12. conflicts between cyclists and pedestrians are rare.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	there are many conflicts between cyclists and pedestrians.
13. conflicts between cyclists and cars are rare.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	there are many conflicts between cyclists and cars.
14. there are no obstacles on bicycle paths and	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	there are many obstacles on bicycle

	bicycle lanes.		paths and bicycle lanes (e.g. traffic signs, lanterns, advertising displays).
15.	bicycle theft is not a big problem.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	many bicycles are stolen.
16.	bicycle paths and bicycle lanes are safe and comfortable for cycling, also for old and young.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	bicycle paths and bicycle lanes are not safe for cycling, especially for old and young.
17.	one is safe and quick to cycle on roads shared with other road users.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	as a cyclist one is under pressure from and hindered by other road users.

These assessment questions can be compared to the overall bicycle friendliness which is measured by the following item:

1 2 3 4 5 6

All together, our city is bicycle friendly	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	All together, our city is not bicycle friendly at all.
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Additionally, also the importance of 21 different topics which match with the 27 assessment items had been questioned.

The data of the ADFC Bike-Friendly Cities Rating allows a variety of analytical approaches, e.g. comparing the results of cities, comparing the results of the different questions or correlation analysis of the different questions. Also, the data can be compared to other data sets, e.g. data of accident records of the police.

3 SELECTED RESULTS

Within this abstract, a short number of analysis results shall be outlined.

Table 2 shows the correlation of the twenty-seven single assessment questions with the overall bicycle friendliness assessment. Safety feelings determine most of the bicycle friendliness in a city. Also, the feeling of fun while cycling is very much connected to a bicycle friendly city. Both the quality of cycling in mixed traffic as well as off-street-cycling (Riding on bike paths and bike lanes) is very influential for good cycling. Conflicts with motor vehicles determine bicycle friendliness much more than conflicts with pedestrians.

Table 2: Correlation of single assessment questions with the overall bicycle friendliness

	Pearsons correlation		Pearsons correlation
Feeling of safety	0,774	Cleaning of cycle paths	0,534
Cycling as fun or stress	0,712	Control of illegal parking on cycle paths	0,528
Acceptance as road user	0,699	Signposting for cyclists	0,515
Riding on bike paths and bike lanes	0,689	Advertising for cycling	0,501
Bicycle promotion in recent times	0,644	Winter maintenance on cycle paths	0,498
Riding in mixed traffic with motor vehicles	0,643	Media reports	0,496
Width of bike lanes	0,641	Bike parking facilities	0,482
Interruption-free cycling	0,636	Conflicts with pedestrians	0,449
Conflicts with motor vehicles	0,604	Open one-way streets in opposite direction	0,388
Accessibility of the city center	0,586	Cycling by old and young	0,387
Obstacles on cycle paths	0,582	Bicycle transport in public transport	0,318
Surface of the cycle lanes	0,575	Public bicycles	0,237
Guidance at construction sites	0,568	Bicycle theft	0,203
traffic lights for cyclists	0,551		

Figure 1 shows the importance of different topics for cycling. Again, cycling safety proves to be the most important issue for cycling - in the view of the 220.000 participants assessing their hometowns. The feeling of safety is very much connected to the felt acceptance as road users which is the second most important topic.

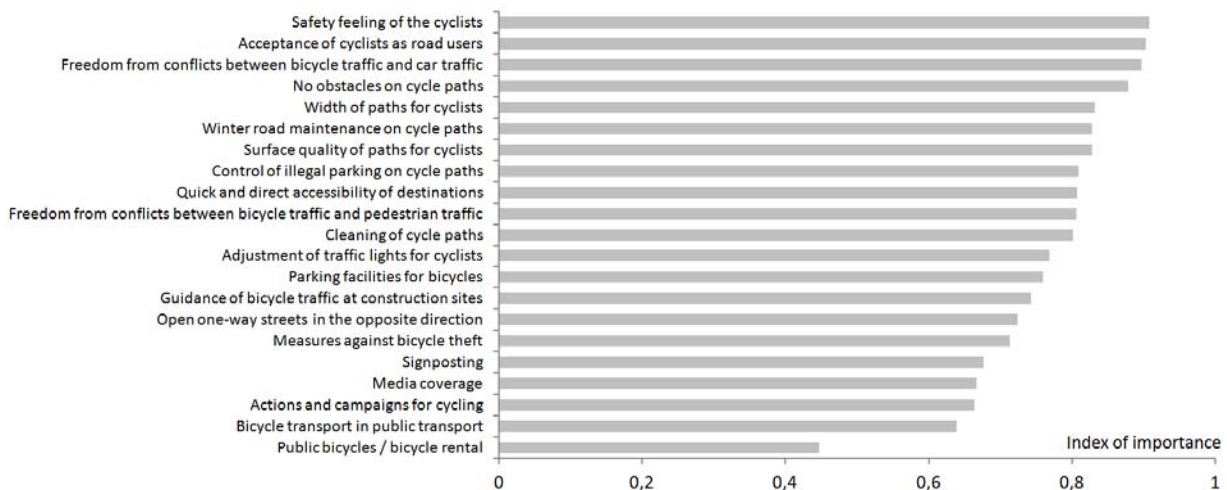


Figure 1: Index of importance regarding cycling for different topics

Figure 2 compares the perceived (subjective) safety from the ADFC Bike-Friendly Cities Rating for different German cities (> 100.000 inhabitants) with the objective data from accident records. The bicycle accidents with injured people [2] were related to the driven kilometer by bicycle extracted from household surveys [3].

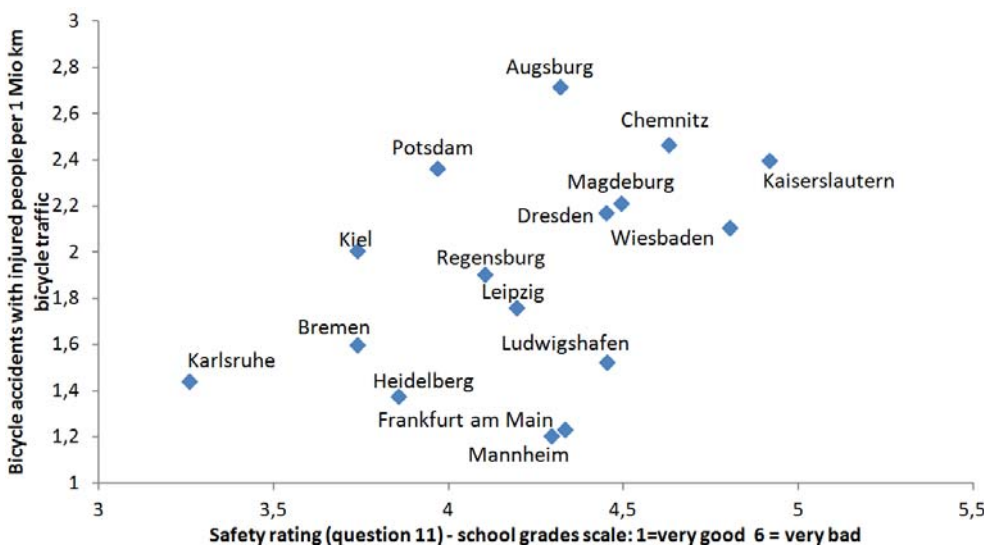


Figure 2: Accident rate vs. assessment of the perceived safety for different German cities

It is clearly visible that the interrelation between indicators of objective and subjective safety exists, but there is still a wide spread between cities which might be due to other factors.

4 CONCLUSIONS

Within the concept of bicycle friendliness of cities, ensuring cycling safety seems to be the most important issue. Interrelation between objective and subjective safety needs further elaboration.

REFERENCES

- [1] T. Böhmer, Measuring “Customer Satisfaction” in the Field of Bicycle Planning and Policy in Cities: the ADFC Bicycle Climate Test; in: R. Gerike, J. Parkin, (eds.) Cycling Futures: From Research into Practice; Ashgate: London, UK, 2015
- [2] www.unfallatlas.de
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