Institute of Transport Economics
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Summary

Protected bike lanes and pop-up cycling infrastructure

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Temporary protected bicycle lanes are introduced and evaluated in many cities as a simple and quick measure to improve the safety of cyclists and to entice more people to cycle. In this report, we have examined international research on the topic, and have not found them to have a clear beneficial effect on road safety. However, they can invite more people to cycle where conditions for cyclists originally were poor. We have interviewed potential cyclists and find them to be more positive toward temporarily protected bicycle lanes than existing cyclists, but they are still unsure whether this measure will lead them to start cycling. Video recordings show that many people cycle inside the barriers, but that people cycle outside if they have high speed, there are few cars, or the barrier is too narrow. Future use of protected bicycle lanes should consider places where safety is perceived as an obstacle to cycling, and particularly places with breaks or holes in the bicycle network.

In several places in Oslo, temporary separate bicycle lanes have been established. Temporary measures are far cheaper than permanent ones, and can be implemented significantly faster. At the same time, it is unclear whether they are equally effective on traffic safety and security. The Agency for Urban Environment (BYM) in Oslo Municipality wants to investigate the effect of simple measures that make it safer for cyclists. Before embarking on a major project with temporarily protected bicycle lanes, they wish to learn from the measures that have already been implemented. It is important to improve the infrastructure for existing cyclists, but it is particularly interesting to investigate the extent to which such infrastructure might attract new cyclists.

Protected bicycle lanes are not a standard solution in Norway, neither as a permanent nor a temporary installation. There is therefore little experience with their use, and a great need for knowledge about the effect.

BYM has asked TØI to provide a knowledge base on temporary separate bicycle lanes. This is based a literature study, interviews with cyclists and pedestrians, and video observations of cyclists and motorists.

The literature study was based on peer-reviewed articles, but we supplemented with research reports or local reports where these were relevant. As there is little research literature on pop-up infrastructure, we also included research on standard bicycle infrastructure, especially that concerning permanent protected bicycle lanes.

The interviews (n = 19) were conducted in Strømsveien, St. Halvards gate and Sandakerveien. So-called Klemmfix barriers have been implemented at all three locations, and in the semi-structured interviews we encouraged the infomants to expand upon their thoughts about, and experiences with, these barriers.

We conducted video recordings in four locations. Two of the places have Klemmfix barriers (Strømsveien and St. Halvards gate), one place served as a control location (Strømsveien) and the last one has a more permanent barrier (Kongens gate). Using the RUBA software, we conducted automated and semi-automated measurements of traffic volume, cyclists' location and speed, and the distance cyclists kept from the roadway, as

well as the distance motorists kept from the bicycle lane. In Kongens gate, only traffic volume and location were measured.

Effects on comfort, perceived safety and cycling

In the literature review, we found that people consider protected bicycle lanes to be safer, or experience these as more comfortable, than ordinary bicycle lanes. This corresponds to the general impressions from the interviews.

It is still unclear of whether these impressions impact cycling levels. In the interviews, people were asked both what they think about cycling within the barrier (if they had experience with it) and whether they think the Klemmfix barrier is important for their route choice. There is much variation in their answers. Some are quite clear that they view the barrier positively and as an improvement to no barrier. Half of the informants are neutral and have not thought much about the barriers before, but believe they can have positive effects. Others still prefer unprotected bicycle lanes, and a couple are clearly against implementing such barriers as a general rule. Most of the informants were recruited while cycling in the street, or indicated that they would have been comfortable doing so.

However, several of them thought that the barrier would have a greater impact on whether they would feel comfortable cycling with children. This also applied if the barriers were placed at more dangerous locations, or near more vulnerable groups (e.g. along a bicycle route used by school children). In a previous study, they found that more people said they would be more comfortable cycling with a 10-year-old in an intersection with a protected bicycle lane than through an intersection with other solutions (Monsere, McNeil, & Sanders, 2020).

At the same time, some informants pointed out that the barrier can be experienced as a new difficulty. Informants mentioned challenges with accessibility, if the barrier makes it difficult to pass other cyclists or make a new choice of route, and the risk of colliding with or falling over the barrier.

It is difficult to be specific about the expected effect on the number of cyclists. Although it generally appears that bicycle lanes increase the number of cyclists, the results are more mixed than for studies of subjective experiences (Buehler & Dill, 2016). Significant increases have been seen in cycling after the implementation of both protected cycle lanes (Goodno, McNeil, Parks, & Dock, 2013) and pop-up cycle lanes (Kraus & Koch, 2020), but there are indications that the expected effect will be somewhat lower in cities that already have a relatively well-developed infrastructure for cyclists.

In some cases, part of the increase can be due to existing cyclists changing their route, while in others, other changes are made at the same time. For example, during the corona pandemic, there have been other factors that have supported cycling, in addition to increased development of cycling infrastructure. It is unclear what the effect would be in a more normal situation, as well aswhat the effect of implementing protection around already existing bicycle lanes would be. A previous route selection study found, using GPS data, that there is no difference between the different types of cycle paths (separate or not), but that cycle paths where cyclists and pedestrians share the road were less attractive than other types of cycling infrastructure (Skov- Petersen, Barkow, Lundhede, & Jacobsen, 2018).

Effects on traffic safety

We have investigated the expected impact on traffic safety during a literature review, and the results appear ambiguous. Although some studies show a reduction in accident risk (Teschke et al., 2012), others show a decrease for bicycle lanes with solid barriers and an increase for bicycle lanes with lighter barriers (Cicchino et al., 2020), or a lower accident risk, but greater risk of more severe injuries in the accidents that do occur (Wall et al., 2016). Others find changes in the type of accident that occurs (Jensen, 2008). For example, that a smaller proportion of cyclists were hit by cars from behind, , while more were hit from behind by other cyclists. There was also an increase in accidents at intersections (Jensen, 2008).

We used video recordings to examine how the cyclists interacted with the barriers. We see that the vast majority cycled inside the barriers, but that a slightly larger proportion chose to cycle outside the barrier in Kongens gate than in Strømsveien. There are several differences between the places, but this may be related to the narrower entrance to the cycle lane within the barrier at Kongens gate. We also see that a larger proportion cycle in the roadway on Saturday than on Thursday, which may be related to less car traffic.

In Strømsveien, fewer people cycled inside the barrier when going down rather than up the hill, which is likely related to the greater speed they held. At the beginning and end of the barrier, it curves into the bicycle lanes, narrowing the entrance and exit points. This could have led those with higher speeds to prefer the roadway. The larger share of cyclists riding inside the barrier when riding uphill, may also indicate that cyclists who maintain a slower speed put more import on the protection a barrier provides.

Discussion and recommendations for implementation

Some informants commented on the less than pleasing design of the temporary Klemmfix barriers, and suggested changes, particularly if the barriers are implemented for a whole season or more. The design suggestions varied somewhat, and it should be considered to what extent they can be fulfilled within the regulations that apply to railings and other road installations.

Although temporarily protected bicycle lanes have become more widespread, there are still few international studies that provide easily transferred knowledge. In addition, the definitions of different forms of protected or separate bicycle lanes may overlap and vary both between countries and between individual articles. There is therefore a need for more systematic knowledge, in a Norwegian context, and particularly concerning the experiences of, and possible impact on, potential cyclists. It is also unclear how the impact will differ when installing protections on existing bicycle lanes, compared to implementing protected bicycle lanes where there was no cycling infrastructure before.

In this report, we have relied on both international research and our own. However, it is still difficult to make a clear recommendation regarding the use of temporary protected bicycle lanes. Existing cyclists are divided on whether they see the most advantages or disadvantages, while potential cyclists are more positive. People in both groups believe that the barriers would have a greater impact if they were cycling with children. However, it is unclear whether this expressed preference will result in actual increased cycling or changed route choices.

It may seem that the potential impact of temporary measures is greatest where the original condition is poor. It is therefore possible that Oslo, where much of the route network has already been implemented, will benefit less from such measures than cities with less cycling

infrastructure. At the same time, there are still areas in Oslo, especially through central Oslo, with holes or missing links in the network. It is therefore our recommendation that any further trials with protected or temporary bicycle lanes should be carried out in central city streets, which are more deterring for cyclists than the streets evaluated in this project.

We cannot provide a final recommendation as to whether temporarily protected bicycle lanes should be implemented, but we have identified some parameters that should be included in such a decision. This applies to aesthetics, visibility, width, traffic volume, traffic safety and design towards intersections, perceived safety, and whether the need is new or improved infrastructure. In some cases, these can be contradictory and must be weighed against each other. There are positive results associated with protected bicycle lanes from other countries, but we also see that the specific context is essential. The most important recommendation we can give is therefore to carry out controlled pre- and post-evaluations when implementing the measure.