

Evaluating bicycling crash risk with the CycleRAP tool

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The Royal Dutch Touring Club (ANWB) and the International Road Assessment Programme (iRAP) have developed a first-generation model dedicated to assessing bicycling risk, CycleRAP. The CycleRAP tool was created to assist road authorities identify and address locations where there is a high risk of bicycling-related crashes, particularly those that do not involve motor vehicles. The reason for this is that the Netherlands and many other countries are increasingly aware that:

1. Underreporting rates for bicycling crashes which do not involve motor vehicles are very high. This is because, even if seriously injured, victims are often taken directly to hospital without the crash being reported to police. Crashes may also not be located on the road network.

2. These crash types account for a very high proportion of serious injuries and fatalities for this road user group. For example, a study of England's Hospital Episode Statistics (HES) database shows that of the 37,504 pedal cyclists injured in traffic collisions in England between 1999 and 2005, 67% were involved in a non-collision crash.

In 2014, the Institute for Road Safety Research (SWOV) published a number of studies on the development of quantitative methods for assessing bicycling safety. In the following year, ANWB agreed with the City of Amsterdam and SWOV to develop a tool to assess bicycling network safety. The aim was two-fold:

1. To increase proactive measures to promote road safety in urban areas, and
2. To use a methodology based on that used by iRAP's road safety star rating system.

In 2016, iRAP developed CycleRAP in partnership with ANWB and SWOV. The following year, the first version (consisting of 32 attributes) was piloted on approximately 170km of roads and bike paths in The Netherlands.

In 2018, a second phase of pilots using an updated version of the model (with 63 attributes) was completed for a further 240km. This phase calculated index scores which were used for reporting and analysis.

Similar to star ratings, the risk scores which underpin the CycleRAP model should be substantiated by evidence, such as crash modification factors (CMF). A CMF is something shown to influence the likelihood or severity of a particular crash type. However, a lack of research into cycling crashes made this challenging at the time the model was created. So in 2019, ANWB supported iRAP to undertake a comprehensive review of cycling research globally.

To help achieve this, iRAP engaged researchers to assist with reviewing relevant literature across multiple languages. Prior to the review, 36 relevant studies had been identified. Upon completion, a total of 100 studies were identified.

The review found that, in recent years, research into bicycling crashes has increased markedly. Much of this relates to vehicle-bicycle crash types. Research into other crash types still remains limited, although there is emerging research examining risks related to new forms of micro and electric mobility. The Dutch and English language reviews yielded the greatest number of studies, along with the Norwegian Road Safety Handbook.

Overall, only a small proportion of the studies relate to crash types not involving motor vehicles. Even when they do, the research typically lacks the necessary quality and robustness to establish a causal relationship between an attribute and the risk of a given crash type. Definitive evidence on the causes of single cycle crashes remains difficult to capture in research. To address this issue, iRAP is working directly with researchers to further refine single bicycle crash risk modelling.