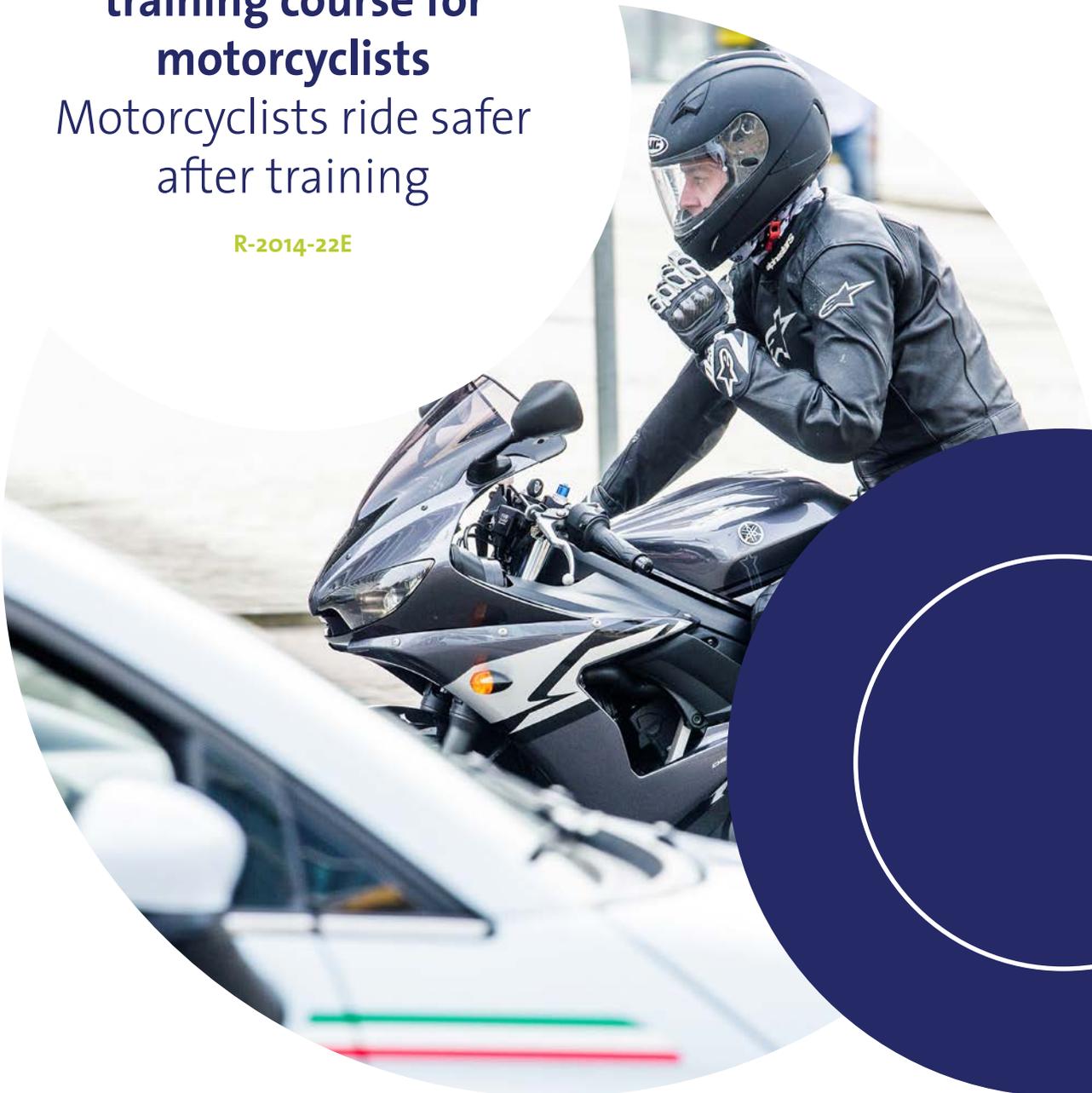


# Evaluation advanced training course for motorcyclists

Motorcyclists ride safer  
after training

R-2014-22E



### **Motorcyclists ride safer after training**

Motorcyclists are vulnerable in traffic. A popular measure to reduce crash risk is motorcycle training. However, there is little evidence for the effectiveness of training. SWOV therefore evaluated the 'Risk' advanced training course of the Royal Dutch Motorcyclists Association (KNMV). This one-day course teaches motorcyclists to recognize, analyse, and anticipate potential traffic hazards. Results from the two-year evaluation indicate that the 'Risk' training has a positive effect on safe riding behaviour and hazard perception of motorcyclists in the short term (the first few months after training). Even in the long term (one year to eighteen months after training) 'Risk' trained motorcyclists showed safer traffic behaviour than a control group without 'Risk' training. This is a remarkable result, because until now no studies were found that scientifically establish positive effects of an advanced rider training course.



# 1. Introduction

Motorcyclists are vulnerable in traffic. The risk of a fatal crash per kilometre travelled is approximately twenty times higher for motorcyclists than for car occupants. The difference in risk of sustaining serious injury in a road crash is even larger.

## Background

The relative vulnerability of motorcyclists motivated the Ministry of Infrastructure and the Environment in the Netherlands to draw up an action plan to improve the road safety of motorcyclists.<sup>1</sup> One of the measures in this plan is to develop an advanced rider training course aimed at training higher order skills. Higher order skills include recognizing, analysing and anticipating risks in traffic. For car drivers clear indications were found that insufficient control of these skills plays an important role in the occurrence of crashes.<sup>2</sup>

The action plan was reason to consider the existing advanced rider training course 'Risk'. Because this course of the Royal Dutch Motorcyclists Association (KNMV) seems to meet all the requirements for an effective course,<sup>3</sup> it was decided to evaluate this training course instead of developing a new one.

So far few advanced training courses for motorcyclists have been evaluated. And none of those that were evaluated scientifically showed a positive effect. One of the problems of evaluation studies is that they often examine self-reported riding behaviour, which is how people say they ride. However, self-reported riding behaviour is not always a reliable predictor of actual behaviour.

## This study

The SWOV evaluation study investigated whether it was possible to train higher order skills with the 'Risk' training. We examined if the training had an effect on motorcyclists' safe riding behaviour and on their hazard perception in the short term (a few months after the training) and in the long term (one year to eighteen months after the training).

Three specific research questions were formulated:

1. What is the effect of the training on observed riding behaviour?
2. What is the effect of the training on self-assessed riding behaviour?
3. What is the effect of the training on hazard perception?

This report on the advanced rider training course is organized as follows: *Chapter 2* briefly discusses the course content and evaluation; *Chapter 3* discusses the evaluation method; *Chapter 4* presents the results of this evaluation study; and *Chapter 5* presents the conclusions. A detailed description and justification of this study can be found in the background reports; these reports are in Dutch.<sup>3,4</sup>



<sup>1</sup> IenM (2011). *Actieplan verbetering verkeersveiligheid motorrijders*. Ministerie van Infrastructuur en Milieu, Den Haag. (Dutch)

<sup>2</sup> SWOV (2014). *Hazard perception in traffic*. SWOV Fact sheet, September 2014. Leidschendam.

<sup>3</sup> Boele, M.J., Craen, S. de & Erens, A. (2013). *The effects of a one-day advanced rider training for motorcyclists*. R-2013-3. SWOV, Leidschendam. (Dutch with English summary).

<sup>4</sup> Boele, M.J. & Craen, S. de (2014). *Langetermijneffecten van een eendaagse voortgezette rijopleiding voor motorrijders*. R-2014-22A. SWOV, Den Haag. (Dutch)

## 2. Advanced rider training

The aim of an advanced rider training course is that it contributes to road safety. Advanced rider training is perceived as a way to speed up learning through experience. Although intuitively sound, this effect has not been demonstrated yet. Few motorcyclist courses have been evaluated thoroughly. Moreover, there are questions regarding the content of the training.

### Few good and recent studies

A recent review<sup>5</sup> compared 23 studies into the effects of motorcycle training. More than half of these studies were completed over twenty years ago; only three studies were carried out after the year 2000. The researchers concluded that most studies suffered from methodological weaknesses and therefore were unable to quantify the effectiveness of training on, for example, crashes.

### Content of the training

The content of training also seems to explain the fact that many advanced rider courses for motorcyclists have little or no effect. Studies on advanced training for (young) drivers show that such courses do not always have a positive effect – and sometimes even have a negative effect – on road safety. For example, training aimed at acquiring complex (lower order) skills like how to recover from a skid, seem to be counterproductive. A reason may be that drivers overestimate their skills after training and as a result take more risks in traffic.

It is possible that motorcycle training unintentionally encourages dangerous riding, due to overconfidence without actually improving riding skills.

The box on the right contains the programme of the evaluated 'Risk' training course.

### The 'Risk' training

The 'Risk' training of KNMV is both a theoretical and practical training. It aims at timely perception and recognition of traffic hazards and adaptation of riding behaviour to deal with these risks. In the training the – coherent – factors conspicuity, speed, glance behaviour, risk perception and risk acceptance all play a role.

An important aim of the training is to prevent participants to feel safer riders after training, but to be aware of the (overt and covert) risks in traffic.

The training takes one day and has a maximum number of nine participants who are guided by three KNMV-certified 'advanced training'-instructors. The morning section is dedicated to risk awareness followed by a motorcycle ride in traffic. After the theoretical part in the afternoon the motorcycle ride in traffic focuses on the choices and execution of riding behaviour.<sup>6</sup>

### Programme of a training course

08.30 h	Reception
08.45 h	Introduction
09.00 h	What is Risk? (homework assignment)
09.30 h	Motorcycle ride 1
11.00 h	Feedback on ride with theory (video confrontation)
12.00 h	Lunch
12.45 h	Explanation theory for ride 2 (solutions)
14.15 h	Motorcycle ride 2 (video analysis)
16.00 h	Evaluation
16.30 h	Conclusion of the day

<sup>5</sup> Kardamanidis, K., et al. (2010). *Motorcycle rider training for the prevention of road traffic crashes*. In: Cochrane Database of Systematic Reviews, nr. 10.

<sup>6</sup> Source: Royal Dutch Motorcyclists Association (KNMV), Arnhem.

### 3. Evaluation method

The evaluation study was carried out during the period 2012 – 2014. The study consisted of a pre-test and two post-tests with an experimental group (participants of the ‘Risk’ training course) and a control group (no training). The participants were randomly assigned to one of the two groups.

The diagram below shows a timeline of the different phases for the experimental group and for the control group (→ Table 1).

#### Participants

The motorcyclists for this study were recruited at the annual Motorcycle Fair in Utrecht in February 2012. A brief survey among 496 visitors showed that – for the surveyed characteristics – visitors of the Motorcycle Fair are similar to the entire population of motorcyclists in the Netherlands. Of the 496 surveyed fair visitors, a total of 222 participants (137 experimental and 85 control condition) completed the short-term evaluation and 111 participants (77 experimental and 34 control condition) took part in the entire study (short and long-term evaluations).

**Table 1:** The different phases of the evaluation study and their content for the two groups of participants. The number of participants who took a hazard perception test is given in square brackets.

Evaluation phase		Content	Experimental group (number)	Control group (number)
2012 spring	Pre-test	 +  Questionnaire + On-road ride	158 	117 
summer	Training	 VRO Risk training	156 	x
autumn	Post-test - Short term	 +  +  Questionnaire + On-road ride [+ Hazard perception test]	137  [65]	85  [33]
2013 autumn + 2014 spring	Post-test - Long term	 +  +  Questionnaire + On-road ride [+ Hazard perception test]	77  [42]	34  [27]

## Instruments

The participants completed a questionnaire at each of the test intervals. In addition, their riding behaviour during a twenty minute ride on public roads was assessed by KNMV instructors using a checklist. Each on-road assessment ride was recorded on film. Furthermore, the motorcyclists took a hazard perception test at either the short-term post-test or long-term post-test. To prevent recognition of the test, different participants were used for the

short-term post-test and for the long-term post-test; assignment to the hazard perception test was random. Neither the KNMV instructors nor the interviewers at the hazard perception test knew whether or not the participant had followed a training. A random selection of film recordings of the on-road assessment was also assessed by external experts (motorcycle instructors at the Police Academy and A-licence examiners of the Dutch Driving Test Organisation CBR).

### Instruments



#### Questionnaire

To measure how participants assess their own riding skills they rated themselves (marks from 0 to 10) for the aspects skilful, smooth, and safe riding. Because the 'Risk' training focuses on seeing and being seen in traffic, participants were also asked what they do to see and be seen in traffic (glance behaviour and conspicuity).



#### On-road ride

After each on-road ride the instructors completed a checklist about the riding behaviour of the participants. On a 0 to 10 rating scale they indicated the participants capabilities of skilful, smooth and safe riding. In addition, they assessed whether the participant was capable of:

1. creating extra space ahead to allow timely reactions if necessary and to ensure being seen in time by other road users;
2. perceiving hazardous situations in time; and
3. responding effectively to potential hazards.



#### Hazard perception test

The test consists of 10 animated films of about 40 seconds recorded from the perspective of the motorcyclist. The films contain covert (hidden) and overt (visible) latent hazards. The participants have to imagine they are the motorcyclist. The purpose of the hazard perception test is for participants to recognize the potential overt and covert hazards and name them correctly.

#### External assessment

The on-road rides in the pre-test and the two post-tests were assessed by KNMV instructors of the 'Risk' training. The results of the study could therefore rely on the KNMV ideas of safe motorcycle riding. To make sure that this is not the case a random selection of on-road rides was also assessed by external experts (motorcycle instructors of the Police Academy and A-licence examiners of the Dutch Driving Test Organisation CBR).<sup>7</sup> The external experts could not assess the actual on-road rides, but assessed a random selection of film recordings instead.

<sup>7</sup> Roelofs, E., Hemker, B. & Vissers, J.A.M.M. (2014). *BikeSense beoordelaarsstudie: Een onderzoek naar overeenstemming tussen KNMV-beoordelaars en externe beoordelaars*. RoyalHaskoningDHV, Amersfoort. (Dutch)

## 4. Results

### What is the effect of the advanced training on observed riding behaviour?

In both post-tests, the instructors gave higher ratings for 'Safe driving' to the motorcyclists who had followed the 'Risk' training than to the motorcyclists who had not, i.e. the control group (→ *Figure 1*). The training also demonstrably improved riding behaviour where needed:

- to increase visibility of the motorcyclists;
- to react in a timely manner; and
- in reaction to potential hazards.

The training had no effect on the ratings for 'Skilful/Smooth riding'.

### External assessment

The assessment of the on-road ride by external experts matched that of the original KNMV instructors.<sup>8</sup> Therefore, there is no reason to believe that the KNMV-background of the reviewers affected their assessment of the motorcyclists' riding behaviour.

### What is the effect of the training on self-assessed riding behaviour?

An important pitfall for advanced rider trainings is that participants may feel their riding skills have improved more after the training than is actually the case. This could result in participants taking more risks. For this reason, the study also examined the participants' own assessment of their riding skills.

Both at the short- and the long-term post-test, all participants in the study are more positive about their own riding skills than at the pre-test. However, no difference was found between trained participants and the control group. In other words, the 'Risk' training does not seem to cause overconfidence.



**Figure 1:** Means of instructors grades on the aspect 'Safe riding', with standard error bars.



<sup>8</sup> Before the experiment was carried out, it had already been established the road safety assessment of motorcyclists' riding behaviour using films is approximately identical to assessment based on real live observations during the ride.

See Roelofs, E., Hemker, B. & Vissers, J.A.M.M. (2014). *BikeSense beoorde-laarsstudie: Een onderzoek naar overeenstemming tussen KNMV-beoorde-laars en externe beoordelaars*. RoyalHaskoningDHV, Amersfoort. (Dutch).

### What is the effect of the training on hazard perception?

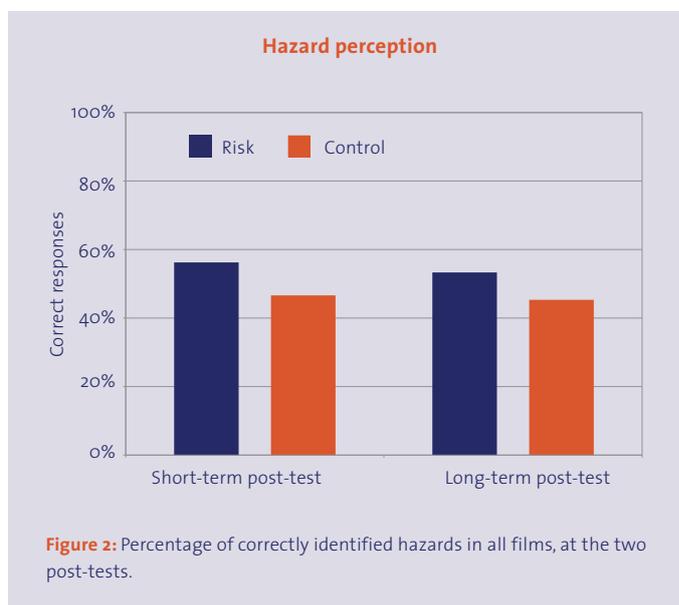
Recognizing and analysing potential hazards in traffic is one of the learning objectives of the 'Risk' training. The hazard perception test aims to measure these skills. At the short-term post-test, trained participants performed better on the test than the control group, which suggests they were therefore better able to perceive hazards in traffic than the control group (→ *Figure 2*).

In the long term (→ *Figure 2*) trained participants also scored better on the hazard perception test than the control group. However, this difference was not statistically significant which means that we cannot rule out that these results were based on chance. This suggests that the impact on hazard perception in the short term was not sustained in the long term.

### Discussion

This evaluation study is probably one of the first road safety studies to find scientific evidence of positive behavioural change effects of an advanced rider training course for motorcyclists, KNMV's 'Risk' training in this case. This was examined with a pre-test and post-tests at two different points in time after the training. Furthermore, a control group and an experimental group were used, to which the participants were randomly assigned. This way two comparable groups were formed that did not differ at the beginning of the study. In addition, unlike many other studies, we measured more than self-assessed behaviour only. Actual riding behaviour was assessed based on a ride on public roads, and a hazard perception test was taken that was developed completely outside the scope of the training. Finally, the post-tests were 'blind' tests: neither the instructors nor the interviewers at the hazard perception test knew to which group the participants had been assigned.

This evaluation study indicates that the 'Risk' training has a positive effect on safe riding behaviour (both in the short term and in the long term) and on hazard perception skills of motorcyclists (in the short term only). This



**Figure 2:** Percentage of correctly identified hazards in all films, at the two post-tests.

does not prove, however, that every advanced rider training will have a positive effect. While the effectiveness of a training course is influenced by its learning objectives and content, the course delivery method may be equally if not more important. In this regard, the quality and enthusiasm of instructors appeared to play an important role. Therefore, it may be difficult to implement the 'Risk' training course on a larger scale and realize the same positive results.

Good riding skills like perceiving (potentially) hazardous traffic situations and adapting the riding, are important for safe traffic participation. Whether a 'Risk' training course indeed reduces the risk of crashes cannot be established in this kind of study. The number of crashes that the participants had been involved in between the pre-test and the two post-tests over the two-year study period was too small to be able to measure the effect on crashes. The type of study required to ascertain crash risk reduction potential would need a design and size that is virtually impossible to execute.

### Why the 'Risk' training is successful

In SWOV's opinion the successful elements of the 'Risk' training are:

#### **The training does not lead to overconfidence**

The 'Risk' training does not seem to lead to overconfidence. The training aims to give motorcyclists a realistic idea of their own skills, because the practical part of the training does not take place within a closed-off area, but on public roads. Participants therefore face the risks that normal traffic situations may entail.

#### **Use of film recordings**

In the 'Risk' training participants analyse video images of their own traffic behaviour. One learns more from one's own mistakes than from the mistakes made by others.

#### **Content of the training**

The course is varied, interactive and the participants analyse their own behaviour. The 'Risk' training is taught in small groups of up to nine participants with at least three instructors. Big enough for a group discussion and small enough for individual attention. Both practice on public roads and theory in the classroom are part of the course. The video images are discussed in small groups, but also in the classroom.

#### **Quality of the trainers**

KNMV's 'Risk' training is only taught by certified VRO instructors employed by KNMV. Also after their certification, the trainers receive additional schooling and their quality is monitored. If a trainer fails to meet the high standards set for KNMV advanced riding course he will no longer be allowed to teach the 'Risk' training.



## 5. Conclusions

Compared to car drivers, motorcyclists are vulnerable in traffic. The 'Risk' training course learning objectives are: to increase motorcyclist awareness of traffic hazards; to teach motorcyclists to anticipate hazards; and, to change their behaviour accordingly, for example by changing road position and/or speed. This evaluation indicates that 'Risk' training has had a positive effect on motorcyclists' riding behaviour. This effect is still present one year to

eighteen months after the training. The effect on hazard perception that was found initially does not seem to last in the long term. No evidence was found that the training could lead to overconfidence of skills. The results of this study are notable, because no earlier scientific studies were found that indicated scientifically proven positive road safety effects of an advanced training course for motorcyclists.

### Recommendation

This long-term evaluation shows that the 'Risk' training has a positive effect on motorcyclists' riding behaviour. However, it seems too soon to implement this training on a large scale. If the training is to retain its effect, not only the design and curriculum must be guaranteed, but also the didactic and substantive quality of (new) trainers. If the training is to be given on a larger scale, it is recommended to regularly monitor the execution of the course and its effects.



## 6. More information

### Background reports

**Boele, M.J., Craen, S. de & Erens, A. (2013)**

*The effects of a one-day advanced rider training for motorcyclists.* R-2013-3. SWOV, Leidschendam.

(Dutch with English summary)

**Boele, M.J. & Craen, S. de (2014)**

*Langtermijneffecten van een eendaagse voortgezette rijopleiding voor motorrijders.* R-2014-22A. SWOV, The Hague.

(Dutch)

### Other relevant publications

**SWOV (2010)**

*Motorcyclists.* SWOV Fact sheet, December 2010. SWOV, Leidschendam.

(English)

**De Craen, S., Boele, M.J., Everink, A. (2014)**

*Long-term effects of a one-day advanced rider training.* In: Proceedings of the 10th International Motorcycle Conference, 29-30 September 2014, Cologne. Institute for Motorcycle Safety.



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# Colophon

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