Accident Analysis and Prevention 79 (2015) 152–159

Contents lists available at ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

A randomized controlled evaluation study of the effects of a one-day advanced rider training course

Marjolein J. Boele-Vos *, Saskia de Craen

SWOV Institute for Road Safety Research, PO Box 93113, NL-2509 AC Den Haag, The Netherlands

ARTICLE INFO

Article history:
Received 28 November 2013
Received in revised form 10 February 2015
Accepted 14 March 2015
Available online 30 March 2015

Keywords:
Powered two-wheelers
Advanced rider training
Evaluation
Overconfidence
Hazard perception

ABSTRACT

Motorcyclists have a relative high risk of crash involvement. As a consequence there is an on-going search for safety measures to improve road safety for motorcyclists. One popular measure is motorcycle training. Although intuitively sound, there are only few thorough studies on rider training courses and they do not always show a positive safety effect.

The aim of this study was to assess the effects of the advanced rider training course 'Risk'. Through random assignment motorcyclists ($N = 222$) were assigned to an experimental and control condition. At pre- and post-test, participants completed a questionnaire and their riding behaviour was assessed in an on-road ride. Furthermore, a selection of participants took a hazard perception test at post-test. Participants in the experimental condition ($n = 137$) followed the advanced training course 'Risk' between pre- and post-test.

Results indicated that trained participants were rated higher on safe riding than the control group. A positive effect was also found for riding behaviour, i.e., speed and position on the road if it needed to be adapted to increase visibility and in reaction to potential hazard. The training did not affect riders' assessment of their own riding behaviour. Overall the trained riders performed better on the hazard perception test.

This study is a step forward to demonstrate that motorcyclists' traffic behaviour can be positively influenced by the right training course. Crucial for this training course is that it did not lead to overconfidence, while it quantifiably improved traffic behaviour.

1. Introduction

In most countries, motorcyclists have a relative high risk of crash involvement (SafetyNet, 2009). Moreover, crash consequences are relatively severe due to the limited protection of the motorcyclist. Also in the Netherlands, motorcyclists' risk of fatal crashes is high (SWOV, 2014). Over the past 10 years, there has been an annual average of 63 fatalities among motorcyclists in the Netherlands. This is about 10% of the total number of fatalities on Dutch roads. This percentage is very high, considering the low exposure of motorcyclists (less than 1.5% of the total distance traveled). Additionally, each year there are more than 1100 serious road injuries among motorcyclists (around 7% of all serious road injuries).

As a consequence of this relative vulnerability, there is an on-going search for safety measures to improve road safety for motorcyclists. Improving pre-licence rider training or the development of advanced rider training courses are popular measures. Like driver training, a common assumption for motorcycle training is that it contributes to road safety. Although intuitively sound, there are only few thorough studies on rider training and they do not always show a positive safety effect (Elvik et al., 2009). Two important reasons have been suggested for the lack of demonstrated effect of rider training on road safety. First, many studies suffer from methodological shortcomings, which makes them unsuitable to draw conclusions about safety effects of the training; and, second, the content of some training programmes may be counterproductive for road safety.

Ideally, training courses should be scientifically evaluated using a randomised controlled design to ensure that observed effects can be attributed to the training course, rather than confounding factors (Beanland et al., 2013). However, many evaluations do not accomplish this. A Cochrane review on motorcycle rider training (Kardamanidis et al., 2010) explicitly mentioned the methodological shortcomings of most evaluation studies. Kardamanidis et al. (2010) quantified the effectiveness of motorcycle training courses,

* Corresponding author. Tel.: +31 703173333.
E-mail address: marjolein.boele@swov.nl (M.J. Boele-Vos).

http://dx.doi.org/10.1016/j.aap.2015.03.021
0001-4575/

both pre- and post-licence (i.e. advanced training). They included a total of 23 studies in this review. More than half of the studies were conducted 20 years or more ago. Only three studies (MAIDS, 2004; Perrino et al., 2002; Savolainen and Mannering, 2007) were from the present century. These studies were not randomised, which increased the risk of selection bias. For example the study of Perrino et al. (2002), in which the effectiveness of mandatory pre-licence training on safer riding was evaluated, failed to adjust for differences at baseline. Females were overrepresented in the trained group (intervention) and more experienced riders in the untrained group (control). The study did not find a statistically significant difference in offence rates between the groups. The MAIDS project (2004) was an in-depth study conducted to gain insight in the nature and causes of powered two wheeler accidents. In this study it was not clear whether cases and controls came from the same population and how the control group was recruited. Besides the number of riders who had received advanced training was small in both groups, this prevented the researchers from making any kind of reliable analysis with regard to the effect of advanced training. The study of Savolainen and Mannering (2007) assessed a non-mandatory training that could be taken by motorcycle riders with and without a licence. Two groups were recruited, the intervention group from a list of trainees and the control group from a motor vehicle database. These groups were not drawn from the same population. The study found that the intervention group was more likely to be involved in crashes than the control group.

These results illustrate the potential limitations of the studies identified in this review (Kardamanidis et al., 2010). The authors were unable to draw any conclusions regarding the effectiveness of motorcycle training due to poor design, quality and reporting of the studies. The review of Daniello et al. (2009) comes to a similar conclusion that many studies suffer from methodological weaknesses (e.g. lack of randomisation), which makes the outcomes of the studies doubtful.

The second suggested reason for the lack of demonstrated effect of rider training is the content of the training course (Chesham et al., 1993; Haworth et al., 2000). As demonstrated by Daniello et al. (2009) and Kardamanidis et al. (2010) many studies give very limited information about the form of motorcycle training and the way it is carried out (Elvik et al., 2009). However, we do know from studies on advanced *driver* training that there is concern that it might lead to overconfidence and consequently to increased risk taking (Gregersen, 1996). Advanced driver training courses are aimed at young, inexperienced drivers and are perceived as a way to speed up learning through experience. However, 20–30 years ago research showed that these training courses do not always have a positive effect on crash risk (Lund and Williams, 1985). In some cases advanced driver training even led to a higher crash risk (Glad, 1988; Jonah, 1986; Siegrist and Ramseier, 1992). Until 1990 advanced driver training was aimed at teaching complex lower order skills, such as how to recover from skid or advanced braking. A meta-analysis (Elvik et al., 2009) of various studies confirms that training aimed at managing difficult situations is counterproductive and has a detrimental effect on road safety. It was suggested that trained drivers overestimate their newly acquired skills and at the same time underestimate the traffic hazards.

Around the nineties a new generation of advanced driver and rider training courses was developed. The European ADVANCED project (Bartl et al., 2002) drew up rules which advanced rider training courses for novices have to comply with. In contrast with previous advanced training courses, which focussed on lower order procedural skills, the main aim of the new advanced training courses was to train higher order skills, focussing on anticipating and avoiding hazardous situations. These newer ideas suggest that motives, self-confidence, anticipation, and other factors are more important to road safety than driving/manoeuvring skills (Ranney, 1994). Unfortunately the effect of this new generation of advanced training was not always positive either. This was demonstrated by the European NovEv-project (Sanders and Keskinen, 2004), which evaluated the effect of the rules drawn up by the ADVANCED-project in six European countries. The results showed that the new generation advanced driver training, can still lead to overestimation of skills. Moreover, the results of a recent questionnaire survey (Mynttinen et al., 2010) into the advanced driver training in Finland and Austria showed a negative effect on driver safety of young drivers. The risk awareness of the Finnish young drivers was even lower after taking the advanced driver training. The researchers stated that the content and the goals of the training did not match. It is possible that advanced motorcycle training courses, just like advanced driver training courses encourages dangerous riding, due to overconfidence, without actually improving skills (Williams et al., 2009).

Taking the results of previous studies of advanced training courses into account the Royal Dutch Motorcyclist Association (KNMV) developed a new advanced rider training course in the Netherlands. The 'Risk' training course of KNMV aims to improve motorcyclists' higher order skills. The training is both a theoretical and practical training and focuses 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. A detailed description of the training course can be found in Section 2.

This paper evaluates the advanced rider training course 'Risk'. Aware of the limitations of previous studies on rider training (pre-licence and advanced) we used a sound scientific design to eliminate discriminating factors between trained and untrained riders. Ideally we would have analysed the effect on crashes. However, crashes are relatively rare events, which requires very large samples to reliably detect even small effects on crash rates (Beanland et al., 2013). This was not possible within the scope of this study. We therefore evaluated the effects of training in terms of intermediate safety indicators. The study aims to answer three research questions.

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

A randomized controlled study was used with experimental and control groups assessed at two points in time, before and several months after the training. The independent variable in each analysis is the condition of the motorcyclist: whether or not the motorcyclist participated in the 'Risk' training. One of the problems with evaluation studies is that they often examine only 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 (De Craen et al., 2008). Therefore the effect of training on observed riding behaviour was assessed with the following dependent variables: grades for Smooth, Skilful and Safe riding. Also speed choice and position on the road were assessed. As discussed earlier, previous evaluations of advanced driver training showed that training could lead to overestimation of skills, compromising potential positive effects of the training. An important aim of the 'Risk' training course is to prevent participants to feel safer riders after training, but to be aware of the risks. Therefore we also analysed the dependent variable: self-assessed riding behaviour. Participants assessed their own riding skills by grading their ability to ride Smooth, Skilful and Safe riding. Finally, as the 'Risk' training deals with risk anticipation, we