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Associations between driver training, determinants of risky driving behaviour and crash involvement

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ABSTRACT

The core aim of the study is to examine associations between formal and informal practical driver training as well as driving experience on the one hand and young drivers' safety attitudes, self-assessment of driving ability and self-reported driver behaviour on the other hand. An additional aim is to examine the associations between attitudes, self-assessment and behaviour on the one hand and crash involvement on the other hand. The results are based on a self-completion questionnaire survey conducted among a representative sample of Norwegian drivers aged 18–20 years (n = 1419). The results showed that there were small yet significant associations between driver training, on the one hand and traffic safety attitudes and risky driving behaviour on the other hand. The amount of formal driver training was negatively associated with the respondents' evaluation of their driving skills; although the amount of lay instruction was positively associated with such self-evaluation. The results also showed that attitudes as well as self-assessment of driving ability were significantly associated with self-reported risk behaviour. This was especially true for attitudes related to rule violations. There was a strong association between crash involvement and exposure (measured as months holding a licence). Young novice drivers' crash involvement seems stronger associated with driving skills (manifested as self-assessment of driving ability) than safety attitudes and self-reported driver behaviour. The consequences of the results for driver training and accident prevention are discussed.

1. Introduction

Young drivers are overrepresented in crash and traffic fatality statistics. In member countries of the Organisation for Economic Co-operation and Development (OECD, 2006) between 18% and 30% of killed drivers are between 15 and 24 years old, although the same age group constitutes only between 9% and 13% of the population in their countries. However, there is a significant decrease in the number of accidents among young drivers during the first 6–8 months after passing their driving test (Sagberg, 2000; Mayhew et al., 2003). The strong decrease in crashes during a limited time demonstrated by the empirical findings indicates the risk reduction to be a result of driving experience, and experience to be a main factor in developing driving competence. This effect does not necessarily result from developing essential driving skills, it may also for example, be owing to a positive association between driving experience and safety attitudes. Grasping the primary elements of such a learning process seems important in efforts for enhancing the quality of driver training. Experience and time spent on individual tasks are an essential part of the skill acquisition process (Dreyfus and Dreyfus, 1986; Groeger, 2000). Consequently, it may benefit to provide young drivers as much driving experience as possible before licensing. Due to this, lay instruction is given an important role in the Norwegian driver training system.

Educational efforts are commonly considered successful if learning objectives are met and the students are passing the examinations or tests in the end of the course. Yet, driver education has a wider purpose, owing to the expectations to produce road safety effects. However, crash involvement is a difficult output variable measuring effects of driver training. One explanation for the difficulty to show such connections has been that accidents are rare incidents, which make it difficult to show near associations between educational measures and accidents (e.g. Engström et al., 2003). One possibility is to measure safety effects by using determinants of crash involvement as substitutes for safety. It is an important learning objective in the Norwegian driver training curriculum to influence safety attitudes, self-evaluation skills and safe behaviour in order to producing safe drivers (Norwegian Public Roads Administration, 2004). These variables are more suitable

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for reliable measurement at individual level; provided that the context is neutral and the test is carried out anonymously. However, researchers have also emphasised that many determinants of accidents, such as attitudes, are at another level of specificity than accidents (Iversen, 2004; Stene, 2005; Ulleberg, 2002), which also makes it difficult to show near associations.

The relationship between practical driver training and safety attitudes, self-evaluation skills and behaviour are sparsely examined. Lay instruction is aimed at providing driving experience and to bring forth the safety effects of driving experience. An underlying assumption is that lay instruction will provide a safety effect similar to the effect obtained by driving alone. Driving experience may produce safety effects due to improved driving skills or the safety effect may be caused by improved safety attitudes. Driving experience may contribute to young drivers' understanding of how far various attitudes and behaviours related to safety are safety effective. If so, informal lay instruction may contribute to fulfil official learning objectives and thus may partly replace formal driver training. However, it is an underlying premise for using safety attitudes, self-evaluation skills and safe behaviour as outcome variables that they may result from driver training and that they are associated with crash involvement. Consequently, the present paper aims at *examining the associations between formal and informal practical driver training as well as driving experience on the one hand and safety attitudes, self-assessment of driving ability and self-reported driving behaviour on the other hand. The relationship between attitudes, self-assessment and driving behaviour on the one hand and accident involvement on the other hand is also examined.*

Development of driving competence is described in several theoretical models. In this paper Dreyfus and Dreyfus (1986) and the Goals for Driver Education – (GDE) model (Hatakka et al., 2002; Peräaho et al., 2003) are taken as examples. Dreyfus and Dreyfus see driving competence primarily as a skill, and developing competence mainly resulting from extensive practice in the domain. The GDE-model has a wider focus and identifies attitudes and self-assessment of driving ability as important, safety relevant targets for influence by driver training.

According to Dreyfus and Dreyfus' five-stage model, initially a 'novice' primarily depends on context-free rules to act (Dreyfus and Dreyfus, 1986; Wackerhausen, 1997). Acquisition of driver skills implies an enhanced understanding of the context in which the rules are applied. The 'advanced beginner' will interpret the rules in elucidation of the current traffic situation and will be able to place the rules into the context. When a driver reaches the stage of 'competence', he or she links decision-making to emotional involvement, because of the complexity and uncertainty in given situations. Resulting positive and negative emotional experiences will strengthen successful responses and inhibit unsuccessful ones, and the rules and principles formerly used as guidance for acting will gradually be replaced by situational discrimination, accompanied by associated response. When a driver has reached the stage of 'proficiency', reading of the current situation happens intuitively although the decision to act remains the result of specific considerations. At the stage of 'expertise', the expert will be able to perform immediately and intuitively in a domain, based on his or her response to a given situation. Such immediate and intuitively based responses will replace reasoned responses (Dreyfus and Dreyfus, 1986). In the advanced stages of the model, it will be expected that the rules will be less important in the driver's performance. Hence, dependence on the rules will be reduced. However, the skill model does not contain reference to motivational aspects of driving. Consequently, the skill model does not differ between accidents resulting from skill deficits and accidents resulting from failures in drivers' motivation and intentions to drive safely, because the latter is overlooked in the model.

Albeit motivational aspects such as safety attitudes are absent in the model of Dreyfus and Dreyfus, it is possible to derive some consequences of their approach about the role of safety attitudes. Owing to the role of rules in the skill model, it will be expected that safety attitudes may develop in a less than ideal direction, while getting more driving experience, provided measurement of safety attitudes is linked to attitudes towards rule violations. Consequently, the skill model does not indicate change in safety attitudes as a possible explanation of the strong risk reduction with increased amount of driving experience. Due to the skill-oriented perspective in this model, the explanation of the reduced risk should be enhanced driving skills, in the present study measured in terms of self-assessment of driving ability.

The Goals for Driver Education – (GDE) model is a framework for goals and contents of driver education. Opposite to the view of the skill model, the GDE-model provides a framework emphasising the necessity of motivational and intentional aspects of driving besides the importance of skill-based competence.

The model distinguishes between four levels of driving in a hierarchy. These four levels are from bottom to top: *vehicle manoeuvring*, *mastering traffic situations*, *goals and context of driving*, and *goals for life and skills for living* (for a more thorough presentation, see Hatakka et al., 2002; Peräaho et al., 2003). It could be considered an advantage of the GDE-model that it includes a fourth level linking it to social cognition models identifying behaviour as an interaction of personal factors, such as attitudes and self-assessment as well as the social and physical environment, see for example, Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) (Fishbein and Ajzen, 1975; Ajzen, 1991). The GDE-model suggests that the factors on the highest of the four levels are the most important for safety (Peräaho et al., 2003). Moreover, the GDE-model emphasises that the highest levels determine actions and behaviour on the lowest levels in the hierarchical model. In the GDE framework, it is argued that the goals and motives of the driver are important variables to explain young drivers' behaviour and accidents (Hatakka et al., 2002).

Compared to the skill model, the GDE-model has a broader perspective, indicating that also changes in motivational and intentional factors such as safety attitudes may be a part of the explanation of the risk reduction during the first half a year of licensed driving. The wider perspective in the GDE-model opens for driving experience as a source for strengthening ideal safety attitudes. Driving experience may contribute to understanding of the importance of appropriate safety attitudes and behaviour to avoid accident involvement in traffic.

What we can see is that the different theoretical approaches in the skill model and the GDE-model, respectively, may lead to contradicting hypotheses about the relationship between driving experience and development of safety attitudes: *Based on the view in the skill model it seems likely that driving experience contributes to less ideal safety attitudes provided measurement of safety attitudes is linked to attitudes towards rule violations. In contrast, the wider perspective in the GDE-model opens for driving experience as a source for strengthening ideal safety attitudes.* However, both models consider developing driving skills as important for safety. In addition the GDE-model is stating that the driver's self-assessment of driving ability has to be in balance with actual driving skills as a base for appropriate regulation of the driving process.

1.1. Associations between driving experience and driver training on the one hand and self-assessment of driving ability, safety attitudes and risk behaviour on the other hand

Lajunen and Summala (1995) found that development of driving skills (measured as self-assessment of driving skills) was correlated with driving experience. Also other studies have found a