A SIMULATOR-BASED EVALUATION OF TWO HAZARD ANTICIPATION TRAINING PROGRAMS FOR NOVICE DRIVERS

INTRODUCTION

Newly licensed young drivers are involved in motor vehicle crashes at higher rates than drivers of any other age, and die in crashes at higher rates than all but the very oldest drivers. Previous research has attributed the high risk of this vulnerable population of road users in part to their immaturity but mainly to their lack of driving experience. In particular, studies have shown that inexperienced young drivers are less likely to notice latent hazards, scenarios in which there is not yet any visible threat but from which a threat could potentially emerge, in the driving environment. It has been hypothesized that young novice drivers' crash risk could be reduced if their hazard anticipation skills could be improved through instruction or training.

In an attempt to identify new ways to reduce the risks faced by young novice drivers, the AAA Foundation for Traffic Safety previously sponsored the development of two prototype computer-based self-administered training programs that sought to improve novice drivers' ability to detect and respond to hazards on the road: the Perceptual and Adaptive Learning Module (PALM) and the Accelerated Curriculum to Create Effective Learning (ACCEL). The purpose of the current study was to examine the effects of these two training programs on the attentional allocation and driving performance of young novice drivers. The study compares measures of attentional allocation and driving performance of newly licensed young drivers in a driving simulator before and after completing the PALM or ACCEL training with those of a control group who did not complete any training.

KEY FINDINGS

Overall, few statistically significant differences in attentional allocation or driving performance measures were observed in association with the training. Participants who received one of the training programs showed improvement on one or more measures in many of the driving scenarios examined; however, most of these improvements were not significantly larger than those exhibited by the control group. In some driving scenarios examined, there were substantial chance differences between groups in pre-training baseline performance. These measures often converged after training; however, it was unclear whether this represented a training effect, random variation, or an effect of additional driving experience that participants accrued between their first and second drives in the simulator.

It is possible that the training program influenced neither the participants' attentional allocation nor driving performance; however, other explanations are also possible. The training might have had some effects that were obscured by the wide variability in performance between the study participants. It is also possible that the training improved the performance of a subset of participants but not all of them. Detecting

VIEW REPORT

ABOUT

Established in 1947 by AAA, the AAA Foundation for Traffic Safety is a not-for-profit, publicly funded, 501(c)(3) charitable research and educational organization. The AAA Foundation's mission is to prevent traffic deaths and injuries by conducting research into their causes and by educating the public about strategies to prevent crashes and reduce injuries when they do occur. This research is used to develop educational materials for drivers, pedestrians, bicyclists and other road users. Visit www.AAAFoundation.org for more information.

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such subgroup effects statistically would likely require a larger study. Finally, it is also possible that effects might not manifest themselves immediately but could become observable after subjects accrue additional driving experience.

Although this study does not provide evidence of efficacy of these programs, results should not be construed as evidence of lack of efficacy. Components of the ACCEL program, in particular, have shown

significant positive effects in other studies. Further research is needed to understand how or whether such training programs affect new drivers' performance and safety.

METHODOLOGY

Researchers from the University of Iowa recruited a sample of 109 teenagers from Iowa City, Iowa, and the surrounding area between August 2018 and August 2019. Participants, who were all 15 or 16 years old, were recruited shortly before they obtained their first license that allowed them to drive unsupervised, and began participation in the study within two weeks of becoming licensed. Each participant was randomly assigned to receive either the PALM training, the ACCEL training, or no training.

Participants reported to the National Advanced Driving Simulator laboratory at the University of Iowa as soon as possible after obtaining their license, and then again approximately six weeks later. In their first visit to the laboratory, participants completed a baseline drive in a fixed-base high-fidelity driving simulator. After completing the drive, participants assigned to receive the PALM or ACCEL training completed the training, and then all participants completed a short questionnaire. When participants returned to the lab for their second visit, they completed another drive in the driving simulator.

The simulated drive was approximately 22 minutes long and consisted of driving in an urban commercial area, a residential area, and a rural area. During each drive, participants encountered 15 driving scenarios in which there was the potential for a hazard to emerge (e.g., a crosswalk at which the driver's view was obscured by a parked vehicle; a sharp curve; a work zone) as well as numerous ordinary uneventful driving scenarios. The order, locations, and circumstances of the driving scenarios were varied to create different versions of the drive, so that the same skills were assessed in the first and second visits but the drives did not appear identical to the participants.

While participants drove in the simulator, their speed, lane position, and measures such as releasing the accelerator or applying the brake were assessed at selected points in the scenarios containing potential hazards. Participants' attentional allocation (i.e., what features of the driving environment they looked at, when they first looked, and how much time they spent looking) were also assessed using an eye-tracking device.

The effects of the training were evaluated statistically using models that estimated the changes in trained participants' performance from the first visit (before training) to the second visit (after training) relative to the corresponding changes among participants in the control group. Models controlled for participant sex, license type, number of miles driven between their first and second visits, the version of the simulated drive that they completed, and the group to which they were assigned.