Response-Inhibition Training: A New Horizon for Young Driver Training?

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Abstract

Impulsiveness contributes to young drivers' risky driving. Three studies tested whether response-inhibition training reduced young drivers' risky simulated driving. Study 1 participants completed 600 or 1200 Go/No-go trials. Performance worsened with training, and test drive speeding increased (relative to controls). Study 2 participants completed 2200 trials of driving-relevant Go/No-go task, Stop Signal and Collision Detection tasks over five days. Study 3 participants completed 1800 Go/No-go and Stop Signal Task enhanced-feedback trials over 10 days. Task performance improved in both studies. Risky driving reduced slightly in Study 3. Any effect of response-inhibition training on simulated driving is likely to be small and difficult to achieve.

Background

There is growing interest in young driver training that addresses age-related factors, including incompletely developed impulse control (e.g. Hatakka et al., 2002). Four of seven studies that have examined transfer of impulse control training amongst young people showed post-training improvements in impulsive behaviours (i.e. consumption of high-calorie foods and alcohol consumption, gambling, and ADHD symptoms; Spierer, Chavan, & Manuel, 2013). The present research sought to investigate the effect of impulse control training on young drivers' risky driving. Training parameters were refined over three studies.

Methods

In each of three studies young drivers (aged 16-24 years) were recruited via UNSW and randomly allocated to a Training or Control group. Response inhibition training tasks were:

- Go/No-go tasks which require that participants respond on Go stimuli (e.g. an X) and withhold responding on the relatively few No-go stimuli (e.g. an X with any arm removed).
- A Stop Signal Task (SST) which require that participants respond in one way to stimulus A (say a green disc) and another way to stimulus B (say a green arrow) but withhold responding if they hear a "Stop signal" soon after stimulus onset.
- A Collision Detection Task in which participants were required to predict whether two vehicles moving toward an intersection (in an overhead view presented on-screen) would collide. Waiting to respond should increase accuracy.

In Studies 1 and 2 Control participants completed "filler" tasks comprising the same number of trials as the training group. These were often Choice Reaction Time tasks.

In Study 1 (n=62), Short Training participants completed 600 of a Go/No-go task, while Long Training participants completed or 1200 trials. In Study 2 (n=65) training was altered to increase engagement and strengthen learning. The training group completed a total of 2,200 trials of three response inhibition tasks featuring driving-relevant stimuli (Go/No-go task, SST and a Collision Detection Task) over five days. The Go/No-go and SST tasks were adaptive (i.e. difficulty increased as performance improved). Performance feedback was provided in all tasks, and participants were compensated based partly on their performance. In Study 3 (n=63), further

measures were taken to increase the chance of observing a transfer effect. The training group completed 1800 trials of the driving-relevant Go/No-go and SST tasks, with enhanced response feedback, spaced over 10 days. A "no treatment" Control group was employed.

All participants completed simulated drives in which measures such as speeding, risky passing, and compliance with traffic controls, were recorded. In Study 1, drives were immediately, and 1-2 weeks, after training. In Studies 2 and 3, drives were before training, half-way through training (Day 3 or 5, respectively) and after training (Days 5 and 10, respectively).

Results

In Study 1, performance on trained tasks worsened with training. In the tests of transfer to risky driving, the Short Training group showed no difference from the Control group. The Long Training group showed evidence of worsened driving.

In Studies 2 and 3, performance on trained tasks improved with training. However, transfer of training to the simulated drive was weak and inconsistent. In Study 2 speed tended to increase from Day 1 to Day 5, with lesser increases in the Treatment group for five of six measures. However, the Day x Group interaction effect was not significant for any driving measure. In Study 3, this pattern of speeding results was not observed, and only one significant effect was consistent with transfer of training. Specifically, an increased proportion of participants in the Training group (but not the Control group) stopped at the red light.

Discussion and Conclusions

Training appeared to benefit from the use of multiple, adaptive, driving-relevant tasks delivered over several days. Nonetheless, findings suggest that any effect of training using response inhibition tasks on simulated driving is likely to be small and difficult to achieve. There may be more scope for impulse control training to improve risky driving in a more representative sample of young drivers, and in the context of real-world motivations for risky driving.

References

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