Do young drivers with a history of both alcohol and cannabis use drive differently than those who only use alcohol in terms of their response to distraction?

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Introduction

Canada has one of the highest rates of cannabis use in the world. Almost 50% of Canadians aged 15-44 have tried cannabis and 13% reported using it in the last month. Usage typically starts in adolescence. In Ontario students, by the age of 15, 24.5% have tried cannabis and by 17, it is 39.2% (cf, 53.5% and 74.4% for alcohol). Rates are even higher among 18-29 year olds. The legalization of cannabis is now being considered; this means that there is need for models of controlled use, dictating the conditions under which cannabis use is and is not permissible. Almost all of the people who use cannabis use alcohol as well, frequently on the same occasion. Both substances affect the brain areas responsible for decision-making, planning, and impulse control, and consequently their combined use is of special concern because those areas are developing in adolescence. These brain areas are also critical to driving performance insofar as they affect divided attention and response times. Though there have been studies that show the deleterious effects of driving under the influence of alcohol and/or cannabis, little is known about the effects of simply having a past history of using cannabis and alcohol -- even when users are not under the influence of the drug. Given that these substance both affect attention and reaction time, it is possible that the effects of a history of using both of these substances may be exacerbated when drivers are distracted by a secondary task. A study was carried out at the University of Guelph, measuring driving performance among students with a history of using alcohol only as compared those who used both alcohol and cannabis. (Unfortunately, at Guelph we could not find enough students who used neither alcohol nor cannabis to form a group. Nor could we find enough for a cannabis only group.)

Research question 1: Do drivers with a past history of alcohol and cannabis use have worse overall driving performance than those who have only used alcohol?

Research question 2: Does increasing the attentional load (adding the secondary task of repeating back digits in a reverse order) have more deleterious effects on drivers with a past history of cannabis and alcohol than on those who only have a past history of alcohol use?

Method

34 drivers with an Ontario G2 or better license (M age = 18.8 years, 16 males) were tested in a driving simulator. All indicated that they had not used drugs or alcohol in the past 24 hours. Drivers did two way-finding drives in which they were required to drive to a specified town (e.g. Kimmall) using road signs and memorized directions involving landmarks (e.g. “turn right at the service station”), once while not distracted and once while distracted by the task of repeating back orally presented lists of digits in reversed orders.

IV: Drug history group
• Alcohol only (n=17)
• Alcohol and cannabis only (n=17)

IV: Driving condition
• No distraction
• Distraction (repeating back lists of digits in reverse order)

DV: Collisions, braking times to hazards, deviation from the speed limit and way-finding errors (e.g. missed turns)

There are many possible causes for these differences between the alcohol-only and alcohol + cannabis groups. They may represent residual effects of cannabis (after 24 hours) or perhaps even the results of long-term neural damage caused by past cannabis use in adolescence: a period when the brain is still developing. It is also possible that these groups differ in in terms of general ability, personality, or patterns of alcohol use. However, we found no significant differences between the alcohol only and alcohol + cannabis groups in cognitive ability (Wonderlic scores M = 28.6 and 24.5 respectively) or risk-taking (Zuckerman Sensation Seeking scores M = 7.6 and 8.2).

Conclusions

Research question 1: Do drivers with a past history of alcohol and cannabis use have worse overall driving performance than those who have only used alcohol?

Yes. Overall, those with a history of alcohol and cannabis had significantly higher hazard reaction times compared to those who had a history of alcohol use alone and also had a larger number of collisions (p < .05). They also deviated more from the speed limit and made more way-finding errors but these differences were not statistically significant at the p = .05 level.

Research question 2: Does increasing the attentional load (adding the secondary task of repeating back digits in a reverse order) have more deleterious effects on drivers with a past history of cannabis and alcohol than on those who only have a past history of alcohol use?

Yes...as it relates to collisions. For both groups, distraction produced deficits in terms of adherence to speed limits and way-finding errors (p < .05), but compared to the alcohol only group, drivers with a history of both alcohol and cannabis use had an especially high number of collisions when distracted (p < .05). This is an alarming finding. However, with this type of study it is very difficult to distinguish between the long term effects of simply using cannabis from those related to being the sort of person who has chosen to use cannabis. It could be that those who choose to use cannabis as well as alcohol differ from those who only use alcohol, either in terms of their abilities, personality, or their past record relating to the amounts of alcohol that they normally consume, or the frequency with which they consume it. Although we found no significant differences in cognitive ability or risk taking between alcohol only and alcohol + cannabis groups, this is only a preliminary investigation. It is possible differences could emerge with larger samples.

Benefits to Canada

In Canada, the societal costs of vehicle collisions have been estimated at $62.7 billion a year (4.9% of our Gross Domestic Product). Alcohol and cannabis are known risk factors. There are regulatory laws controlling the use of alcohol but to this point cannabis has simply been prohibited. However, in recent years cannabis use has become so common that legalization may be an issue in the upcoming election, and if it is legalized, there will soon need to be regulatory laws about cannabis. Consequently, it is important to study whether there are long-term effects that may be evident even when a driver is not technically under the influence of the at the time of testing. This study represents a preliminary first step in this type of investigation.