

STASH, Vol. 7(10) - How does marijuana smoking impact driving? A randomized placebo-controlled study

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About 10 million Americans report that they have driven under the influence of an illicit drug at least once during the past year (US Department of Health and Human Services, Substance and Mental Health Services Association, Office of Applied Studies, 2007). Marijuana is the most commonly used illicit drug (ibid.). This week's STASH reviews a randomized control study that examines the effect of smoking marijuana versus a placebo on a driving simulator (Anderson, Rizzo, Block, Pearson & O'Leary, 2010).

Method

- Investigators recruited 50 men and 35 women 18 - 31 y/o who used marijuana at least once but fewer than 10 times per month during the past year. The researchers excluded participants whose urine-screening test detected any drug other than tetrahydrocannabinol (THC) the psychoactive ingredient in marijuana.
- During the baseline session, participants became familiarized with a math task that would serve as a distracting task during the driving session.
- During the smoking session, participants smoked a cigarette that contained 2.9% (active) or 0% (placebo) of THC. The instructions encouraged participants to consume the entire cigarette, but participants could stop anytime if they felt uncomfortable.
- Using a driving simulator, participants then performed a driving assessment (see Figure 1). Each participant drove for approximately 15 miles. An uneventful section of the drive lasted one minute. Then, the driving was interrupted by the following events:
 - *Multitasking.* Drivers completed a math test designed to distract them from the driving. The investigators measured the number of math errors made compared to the baseline, as well as the speed

and the steering wheel position.

- *Response to emergency vehicle.* The task assessed attention to the appearance of a police car. The dependent measures were speed, steering position and reaction time.
- *Go/NoGo.* The task measured safe driving through the yellow light. Safe driving was operationalized as no hesitation in making a decision.
- *Dog incursion avoidance.* The task measured safe avoidance of a dog, measured as the ability to stop the car or steer clear of the dog.
- *Intersection incursion avoidance.* The task measured the speed at first contact and avoidance tactic.



Figure. View of a driving simulator (copied from Anderson, Rizzo, Block, Pearlson & O'Leary, 2010). Click image to enlarge.

- The researchers assessed participants' heart rate, self-reported level of "highness" (0: no effect - 10: highest) and sleepiness (Stanford Sleepiness Scale; Hoddesetal. 1973) at baseline, after smoking and after driving.

Results

- The results include only those participants who completed the entire cigarette. The analytic sample included 49 men (25 in the active group) and 24 women (9 in the active group)

- As expected, marijuana smoking significantly increased heart rate ($F = 66.4$, $p < .001$) immediately after smoking, and subjective feeling of “highness” compared to placebo ($F = 65.1$, $p < .001$) immediately after smoking.
- Women rated themselves as being “higher” than men for both active marijuana and placebo ($F = 4.6$, $p < .05$).
- Men were less sleepy than women after driving ($F = 4.6$, $p < .04$). Women who smoked active marijuana reported to be more sleepy than men after driving ($F = 6.0$, $p < .02$), but not immediately after smoking.
- Both marijuana and placebo groups performed similarly on all driving tasks; there were no sex differences.

Limitations

- The driving simulator results are not necessary directly applicable to real life driving situations.
- This study only investigated the first 15 miles of driving under certain conditions. It is still possible that marijuana affects prolonged driving, or driving under conditions that were not investigated in the study (e.g., slippery road or obscure vision).
- This study uses a small sample, especially in the active marijuana female group. This might be a reason for a failure to find sex X drug effect interaction for all measures, but sleepiness.

Conclusion

A meta analytic study concluded that there was a subtle effect of marijuana on driving performance (Berghaus, Sheer, & Shmidt, 1995). Anderson et al. (2010) provided results that did not support these earlier findings. Using a modern driving simulator might have influenced these results; in addition, the different finding might have emerged because of Anderson et al. investigated different driving tasks and driving evaluation methods.

Results obtained in a lab are not always generalizable to real life. Specifically, previous studies showed that marijuana influenced driving performance impairments are more likely to be manifest within a driver stimulator test compared to on road settings (US Department of Transportation, 1993). The present study did not find any marijuana effect on simulated driving. However, we should interpret this null finding with caution because there are many

methodological (e.g., large measurement error) and analytical (e.g., small sample size; small effect size) reasons for failing to finding differences between groups. In addition, it is possible that smaller undetected effects exist or that marijuana impacts actual driving.

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What do you think? Please use the comment link below to provide feedback on this article.

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