...working to legalize responsible adult use...
National Organization for the Reform of Marijuana Laws

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Submitted to:
Vermont Senate Judiciary Committee
Montpelier, VT
February 6, 2019

Testimony of Paul Armentano, Deputy Director:
National Organization for the Reform of Marijuana Laws
In Regard to:
S. 54: An act relating to the regulation of cannabis

Cannabis, Psychomotor Performance, and Traffic Safety

My name is Paul Armentano and for the past two-and-one-half decades I have worked professionally in the field of marijuana policy. I have authored various books specific to the issue of cannabis policy, and my writing has been featured in over two-dozen academic anthologies. My work specific to the issue of cannabis and psychomotor performance has been published in various peer-reviewed journals, and I have spoken on this issue at numerous academic symposiums and before various state legislatures.

I currently serve as the Deputy Director for the National Organization for the Reform of Marijuana Laws (NORML) and I hold a faculty position with The Lambert Center for the Study of Medicinal Marijuana and Hemp at Thomas Jefferson University in Philadelphia. I have enclosed my full *curriculum vitae* with my written testimony.

I wish to thank the members of this Committee for providing me with the opportunity to testify on behalf of Senate Bill 54, which seeks to expand

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upon Vermont's existing cannabis law in a manner that establishes a system of licensed, regulated producers and retail providers. NORML is on record[1] in support of S. 54 – opining that pragmatic regulatory framework that regulates marijuana use and access for adults, but continues to discourage access and use among minors – best reduces the risks associated with cannabis' use and commerce.

Some opponents of S. 54 have raised concerns that the passage of this legislation could inadvertently and adversely impact traffic safety. Let me be clear. NORML takes such concerns seriously, and we do not condone driving under the influence of any potentially mood-altering or psychomotor-influencing substance. In fact, principles adopted by NORML's Board of Directors include an explicit 'No Driving' policy which states: "The responsible cannabis consumer does not operate a motor vehicle or other dangerous machinery while impaired by cannabis. … **Public safety demands not only that impaired drivers be taken off the road, but that objective measures of impairment be developed and used, rather than chemical testing**."[2]

To this end, I have spent the better part of my professional career familiarizing myself with the relevant science specific to cannabis, driving performance, and accident risk, and providing evidence-based strategies to better identify marijuana-induced drivers and to discourage this behavior. These latter efforts include partnering as a consultant with the Canadian Public Health Associations' 'Pot and Driving' awareness campaign[3] – which raises awareness among young people with regard to the risks associated with drug-impaired driving – as well as collaborating on the development of the 'My Canary' iPhone application[4], which allows subjects to use validated performance measures accurately assess their psychomotor and cognitive

[1] https://norml.org/action-center/item/vermont-regulate-adult-use-marijuana-sales
[2] https://norml.org/principles
[3] https://www.cpha.ca/pot-driving
[4] https://www.engadget.com/2015/07/30/normls-my-canary-app-knows-if-youre-too-stoned-to-drive/

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performance following cannabis ingestion. Time permitting, I will expand further upon these and other efforts at the conclusion of my testimony.

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With regard to the question of whether the passage of S. 54 will inadvertently pose a risk to traffic safety, let me make a few key points.

First, it should be stressed that driving under the influence of marijuana is already a criminal offense in Vermont. This fact will not be changed by the passage of S. 54. In the eyes of the law, operating a motor vehicle under the influence of cannabis will remain just as illegal upon S. 54's enactment as it is today.

Second, numerous scientific studies exist assessing marijuana-positive drivers and their traffic accident risk. In fact, the largest ever controlled trial assessing marijuana use and motor vehicle accidents, published in 2015 by the US National Highway Traffic Safety Administration, reports that marijuana positive drivers possess a relatively low crash risk compared to drug-free drivers after controlling for age and gender (Odds Ratio 1.05 or five percent).[5] By contrast, drivers with detectable levels of alcohol in their blood at legal limits possess nearly a four-fold risk (400 percent) of accident, even after adjusting for age and gender.

This finding is consistent with prior reviews assessing drug exposure and motor vehicle crash risk. For example, a review of 66 separate crash culpability studies published in the journal *Accident Analysis and Prevention* reported that THC-positive drivers possessed a crash risk on par with drivers testing positive for penicillin (Odds Ratio: 1.10 for cannabis versus OR: 1.12 for penicillin)[6] This risk is far below that associated with many other

[5] US Department of Transportation, National Highway Traffic Safety Administration. *Drug and Alcohol Crash Risk*. February 2015.
[6] Rune Elvik. 2013. *Risk of road accident associated with the use of drugs: A systematic review and meta-analysis of evidence from epidemiological studies*. Accident Analysis and Prevention: 60: 254-267:

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common driving-related behaviors, such as driving with two or more passengers (OR=2.2)[7] or driving above 60-miles per hour[8] – and has been acknowledged by experts in the field to be comparable to the difference between driving during the day versus driving at night.[9]

Further, data to date from states that have liberalized marijuana's legal status generally show no uptick in motor vehicle crashes. Writing in the February 2017 edition of the *American Journal of Public Health*, investigators at Columbia University reported, "[O]n average, medical marijuana law states had lower traffic fatality rates than non-MML states. .... Medical marijuana laws are associated with reductions in traffic fatalities, particularly pronounced among those aged 25 to 44 years. ... It is possible that this is related to lower alcohol-impaired driving behavior in MML-states."[10]

Most relevant to today's discussion, data from adult use cannabis states also shows no adverse impact on traffic safety resulting from legalization. Specifically, University of Texas researchers writing in the August 2017 edition of *The American Journal of Public Health* compared traffic crash data in the three years prior to the enactment of adult use legalization in Colorado and Washington versus data trends in the three years immediately following legalization. "We found no significant association between recreational marijuana legalization in Washington and Colorado and

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https://www.ncbi.nlm.nih.gov/pubmed/22785089

[7] McEvoy et al. 2007. *The contribution of passengers versus mobile phone use to motor vehicle crashes resulting in hospital attendance by the driver.* Accident Analysis and Prevention: 39: 1170-1176: http://www.sciencedirect.com/science/article/pii/S000145750700036X

[8] Kloeden et al., 1997. Traveling speed and the risk of crash involvement: Volume I: Findings. NHMRC Road Accident Research Unit, The University of Adelaide: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.553.792&rep=rep1&type=pdf

[9] Statement of Dr. Rune Elvik to The Marshall Project, published here: https://www.themarshallproject.org/2017/01/16/when-are-you-too-stoned-to-drive?ref=hp-1-112#.DRKawaFHd

[10] Santaella-Tenorio et al. 2016. *US traffic fatalities, 1985-2014, and their relationship to medical marijuana laws.* American Journal of Public Health: 107: 336-342: http://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2016.303577?journalCode=ajph

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subsequent changes in motor vehicle crash fatality rates in the first three years after recreational marijuana legalization," they concluded. They further reported, "[W]e also found no association between recreational marijuana legalization and total crash rates when analyzing available state-reported non-fatal crash statistics."[11]

Investigators also compared traffic safety trends in Colorado and Washington versus eight control states that had not altered their marijuana laws. They concluded, "[C]hanges in motor vehicle crash fatality rates for Washington and Colorado were not statistically different from those in similar states without marijuana legalization."[12]

A separate assessment authored by researchers at the University of Oregon, entitled "Early Evidence on Recreational Marijuana Legalization and Traffic Fatalities,[13]" reached a similar conclusion. They too compared traffic safety trends in Colorado and Washington post-legalization versus similar states that did not amend their cannabis laws. They concluded: "We find that states that legalized marijuana have not experienced significantly different rates of marijuana- or alcohol-related traffic fatalities relative to their synthetic controls. ... In summary, the similar trajectory of traffic fatalities in Washington and Colorado relative to their synthetic control counterparts yield little evidence that the total rate of traffic fatalities has increased significantly as a consequence of recreational marijuana legalization."

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To be clear, I am not citing this data to imply that driving under the influence of cannabis is without potential adverse consequences. Acute marijuana intoxication can influence many of the abilities necessary to operate a motor vehicle safety, such as reaction time, the ability to properly

[11] Aydelotte et al., 2017. *Crash fatality rates after recreational marijuana legalization in Washington and Colorado*. American Journal of Public Health 107: 1329-1331: https://www.ncbi.nlm.nih.gov/pubmed/28640679
[12] Ibid.
[13] https://www.nber.org/papers/w24417

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maintain lateral positioning, and divided attention task performance. Such impairment is typically more pronounced in more naïve users.

That is why NORML maintains that the use of marijuana prior to driving ought to be discouraged and better efforts ought to be made to identify drivers who may be under the its influence. These include greater use of, and funding for, trained Drug Recognition Evaluators as well as the use of modified roadside field sobriety tests. To date, standard FSTs are only validated to identify persons under the influence of alcohol. Self-evidently, these procedures ought to be expanded to include additional, validated performance measures to identify those who may be under the influence of substances other than alcohol. NORML also promotes the expanded use of hand-held performance evaluation tools, like My Canary and DRUID,[14] which measure users' physical and cognitive performance compared to their own individual baselines.

The imposition of so-called 'open container' prohibitions for cannabis are also worthy of consideration. Just as it is not permitted to drive while drinking alcohol, or to have an open container of alcohol in one's vehicle while driving, it is reasonable to demand that drivers do not operate a vehicle with cannabis present in any form other than in a locked or sealed container.

By contrast, NORML strongly opposes the imposition of so-called *per se* thresholds, which make it a criminal violation to operate a vehicle with the trace presence of either THC or its inactive metabolite above an arbitrary level in one's blood, breath, saliva, or urine. These latter policies are not evidence-based[15] and they are opposed[16] by the majority of experts in the

[14] https://www.druidapp.com/
[15] Paul Armentano. 2013. *Should per se limits be imposed for cannabis?* Humboldt Journal of Social Relations 35: 45-55.
http://norml.org/pdf_files/per_se_limits_for_cannabis.pdf
[16] https://norml.org/marijuana/fact-sheets/item/marijuana-and-psychomotor-impairment

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scientific and traffic safety community, including the US National Highway Traffic Safety Administration and the American Automobile Association.[17]

Specifically, NHTSA opines: "It is difficult to establish a relationship between a person's THC blood or plasma concentration and performance impairing effects. ... It is inadvisable to try and predict effects based on blood THC concentrations alone, and currently impossible to predict specific effects based on THC-COOH (metabolite) concentrations."[18] A 2018 review paper of the subject authored by Dr. Mark Kleiman and the BOTEC research firm[19] similar concludes: "There is some tendency to take the solution found for alcohol and apply it directly to the very different problems created by cannabis. That is unlikely to result in either an efficient solution, or a just one."[20]

This is because, unlike the case with alcohol, maximal levels of either THC or carboxy-THC are not consistently associated with the impairment of psychomotor performance. In addition, residual levels of THC and its metabolite may be detectable for weeks or even months following past consumption[21] – well beyond any reasonable expectation of driver impairment.[22] Consequently, the enforcement of these strict liability standards risks inappropriately convicting unimpaired subjects of traffic safety violations, including those persons who are consuming cannabis legally in accordance with state statutes.

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[17] AAA. 2016. An Evaluation of Data from Drivers Arrested for Driving Under the Influence in Relation to Per Se Limits for Cannabis

[18] NHTSA. Drugs and Human Performance online factsheet.

[19] http://botecanalysis.com/about-us/

[20] Kleiman et al. 2018. *Driving While Stoned: Issues and Policy Options*. BOTEC: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3163816

[21] Odell et al., 2015. *Residual cannabis levels in blood, urine and oral fluid following heavy cannabis use*. Forensic Science International: https://www.ncbi.nlm.nih.gov/pubmed/25698515

[22] Ronen et al., 2008. Effects of THC on driving performance, psychological state and subjective feelings relative to alcohol. Accident Analysis and Prevention 40: 926-934: https://www.ncbi.nlm.nih.gov/pubmed/18460360

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I believe that efforts should be made to better educate the public with regard to the existing traffic safety laws, as well as to the evidence surrounding marijuana's potential influence on driving. In particular, this messaging should stress the fact that combining marijuana and alcohol greatly impacts driving behavior and is associated with far greater risk of accident than the use of either substance alone.[23]

Specifically, these public awareness campaigns should target the younger driving population aged 18 to 25, as this group is most likely to consistently use cannabis and is also more likely to acknowledge having operated a motor vehicle shortly after consuming the substance. In addition, this population possesses less actual on-road driving experience, may be more prone to engaging in risk-taking driving behavior, and may be more naïve to the marijuana's psychoactive effects. Such an educational campaign was implemented nationwide in Canada and could readily be replicated in legal cannabis states and promoted by groups like the American Automobile Association.

In addition to increasing public safety, I believe that implementing these steps would help assuage concerns that regulating the adult use of marijuana could potentially lead to an increase in incidences of drugged driving or limit the state's ability to successfully identify and prosecute such behavior.

Thank you for your time and consideration and I'm happy to answer any questions that you may have.

ATTACHMENTS:

Paul Armentano *curriculum vitae*

[23] Poulsen et al. 2014. *The culpability of drivers killed in New Zealand road crashes and their use of alcohol and other drugs.* Accident Analysis and Prevention: 67: 119-128: https://www.sciencedirect.com/science/article/abs/pii/S0001457514000645

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Paul Armentano. S*hould per se limits be imposed for cannabis? Equating cannabinoid blood concentrations with actual driver impairment: Practical limitations and concerns*. Humboldt Journal of Social Relations: 35: 45-55.

US Department of Transportation, National Highway Traffic Safety Administration. *Drug and Alcohol Crash Risk*. February 2015.

Rune Elvik. 2013. *Risk of road accident associated with the use of drugs: A systematic review and meta-analysis of evidence from epidemiological studies*. Accident Analysis and Prevention: 60: 254-267.

Aydelotte et al., 2017. *Crash fatality rates after recreational marijuana legalization in Washington and Colorado*. American Journal of Public Health 107: 1329-1331.

Kleiman et al., 2018. *Driving While Stoned: Issues and Policy Options*. BOTEC Analysis.