March 20, 2019 Testimony by Stanford University Professor Keith Humphreys to Joint Hearing of Senate and General Assembly Health and Human Services Committees on "Opioids, cannabis, and vaping: Using science to protect public health" State of Rhode Island

Chairman Miller, Chairman McNamara, and distinguished fellow committee members, thank you for the opportunity for my colleagues and me to speak with you today. My name is Keith Humphreys and I am a professor at Stanford University where I have researched addiction for 30 years. As part of that work, I co-chair the Stanford Network on Addiction Policy – SNAP – which is a non-partisan group of scientists and policymakers who are committed to disseminating the best, most policy-relevant, research on alcohol, tobacco, cannabis, opioids, and other drugs. To keep our advice objective, we are supported philanthropically and accept no funding from the tobacco, alcohol, cannabis, or pharmaceutical industries. Today I will speak to you about what science reveals about cannabis legalization, Dr. Anna Lembke will speak to you about the opioid epidemic, and then Dr. Halpern-Felsher will discuss the science of preventing vaping and tobacco use among youth.

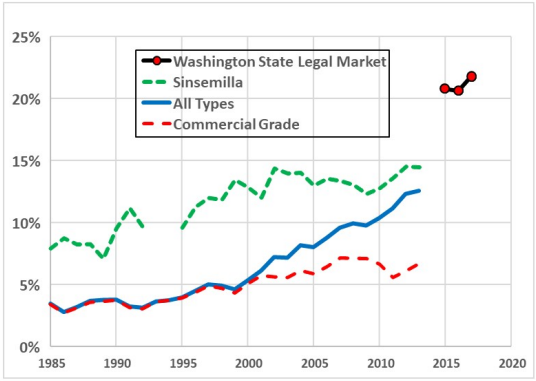
Whether or not to legalize recreational marijuana (or cannabis as I will call it today) is a political decision rather than a scientific one, so I am going to confine my statement to questions science can inform, specifically, if you go forward with legalization, what can you expect from different approaches in terms of public health, public safety, and social justice impacts? I am going to focus on three areas where we have good data: potency and use patterns, prices and taxes, and arrests and racial disparities.

New cannabis versus old cannabis: Higher potency, heavier use

The most important thing to know about cannabis is that contrary to how it is often portrayed, it's a potentially addictive drug that can do serious harm. Research reveals that it's easy to underestimate that potential harm if you aren't aware of how the drug's potency and use patterns have dramatically changed over the years.

The principal intoxicant in cannabis, Tetrahydrocannabinol or THC, was a single digit percentage of typical cannabis from the 1970s into the aughts (Figure 1). But cannabis has been climbing in potency since, and legalization seems to have accelerated this process. The latest data on the State of Washington's market shows that the average potency of cannabis products sold is about 20% THC – that's 5 times the average potency of the cannabis that was consumed 30 years ago. Also, a subset of concentrated cannabis products go much, much, higher than 20%.

Figure 1: Cannabis Potency Has Increased Dramatically



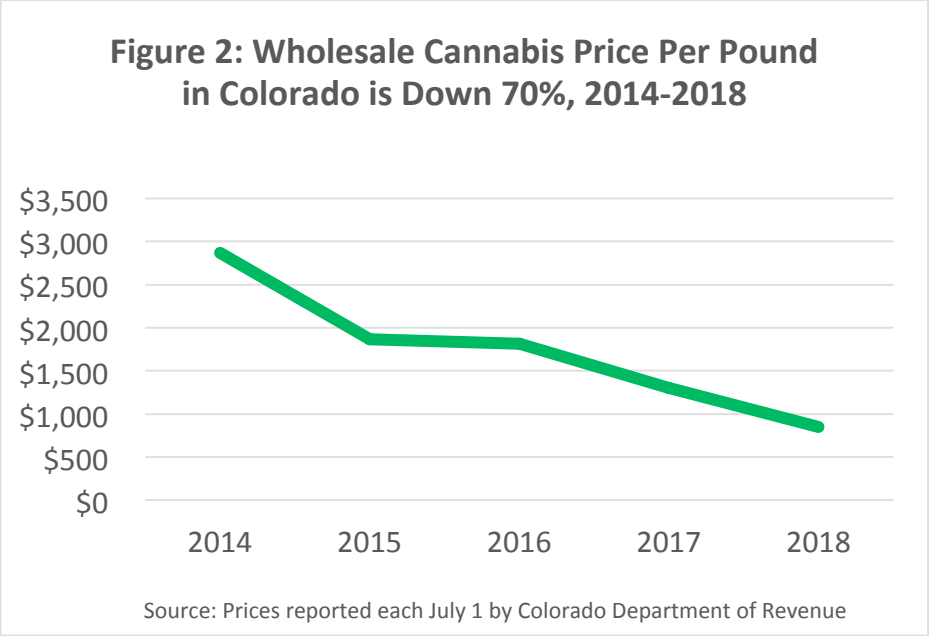
Sources: Smart, R., et al. (2017). Variations in cannabis potency and prices in a newly legal market: evidence from 30 million cannabis sales in Washington state. *Addiction*, 112, 2167-2177; and, analysis of cannabis seizure data assembled by Dr. Jonathan Caulkins, Carnegie Mellon University.

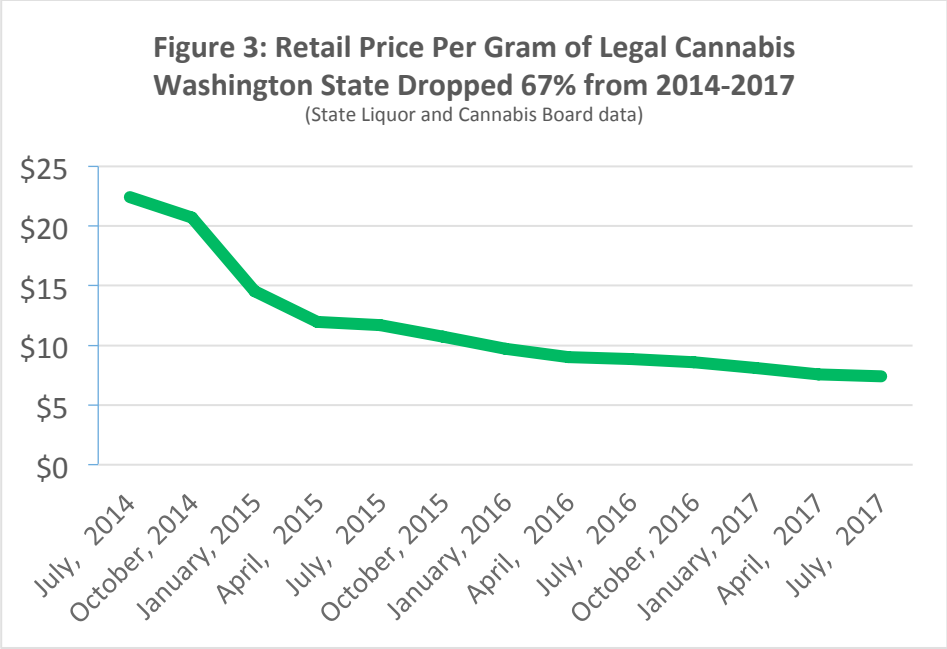
Scientists don't know much about these higher strength cannabis products, but the experience with other drugs is that higher potency usually creates more risk of addiction and harm than does lower potency. Scientists worry much more about the risks of fentanyl than Vicodin for example, just as a parent would probably worry more about catching their teenager with vodka than with a beer. One data point I can provide comes from The Netherlands, which has sold cannabis legally for decades. As the average potency of cannabis in that country rose over time from 8% to 20%, the rate of first-time treatment seeking for cannabis use disorder almost quadrupled, and as potency later declined, cannabis treatment admissions declined as well (Freeman, T.P., et al., 2018, *Psychological Medicine, 14,* 2346-2352*)*. All of this suggests that from a public health viewpoint, placing a cap on the potency of cannabis products until scientists better understand the effects of high-strength cannabis is a good idea for *at least* the next few years and maybe longer than that depending on emerging research findings.

The other reason to worry more about cannabis today than a generation ago is that today's typical user consumes it much more intensely. According to the National Survey on Drug Use and Health, since the modern low point of cannabis use in the US, 1992, the number of people using the drug at least once in the past year has doubled, but the number using it every day or nearly every day has increased ten-fold. This disproportionate growth in the very heavy using segment of the cannabis using population may be due to the higher potency cannabis products being more addictive, legal industries promoting cannabis aggressively, changes in social attitudes, or some combination thereof. Regardless, everything we know from neuroscience would suggest that the impact on the human brain of consuming a high-strength drug every day will be more profound than consuming a low-strength drug occasionally. And this will be particularly true for young people, because their brains are more "plastic" than those of adults.

Understanding Prices and Taxes Under Legalization

Let me turn now to economic data. Perhaps the most remarkable feature of prohibition is that it make easy to grow plants sell at the price of precious metals. As soon as the prohibition on weed is removed, its production price will quickly move to that of…a weed. Wholesale prices in Colorado for example have fallen 70% in 4 years (Figure 2); retail prices in Washington State fell about that far in just 3 years (Figure 3). The natural bottom production price for cannabis may be close to that of tea, which is about a dollar an ounce. At that price, you could roll your own joint for a few pennies.





This has several implications. First, if you stay awake at night worrying about cannabis black markets after legalization, you can roll over and go back to sleep. Some enforcement will still be needed as it is for alcohol, but few dealers will be able to compete economically with the legal market. Second, any state that relies on cannabis tax revenue based *solely* on a percentage tax is playing a losing game. A 25% tax on cannabis that sells for $400 an ounce brings in a lot of revenue, but a 25% tax on cannabis that sells for a dollar an ounce does not – meaning that super low price cannabis could be a net money loser for a state because the taxes wouldn't even cover the costs of regulation.

That's a key reason why it's sensible to tax legal cannabis by weight (as Maine has recently started doing). The only downside of weight-based taxes is that they might stimulate producers to make only high potency products, but as I discussed before that can be handled by capping the allowed potency. You could also address it by charging progressively higher taxes as potency goes up, much as is done with alcoholic beverages.

The data I mentioned earlier on the explosion of heavy cannabis use provides another public health rationale for weight-based taxes: They keep a floor price under cannabis. Substantial research demonstrates that drugs are like any other commodity: people use more of them when they are cheap (Babor, T.F., et al., 2018, *Drug Policy and the Public Good – 2nd edition,* Oxford University Press*)*. A big surge in heavy marijuana use stimulated by rock bottom prices will translate over time into an increase in problems like school failure and auto accidents, which are bad in themselves, and also impose costs on the public purse.

Reducing Arrests and Racial Disparities in Arrests

A common motivator for legalizing cannabis is to reduce arrests in absolute terms and also to reduce the disparity between arrest rates between whites and people of color. Cannabis legalization thus far has not accomplished much on either of these dimensions. If a state went from an aggressive prohibition regime to full legalization, it would indeed produce a huge drop in the number of arrests for multiple racial groups. But that hasn't happened and isn't likely to because states with that regime are politically against legalization. Instead legalization happens in states that have already softened prohibition by lax enforcement and/or formal decriminalization of personal possession. This typically produces a huge drop in arrests – in California for example, data from the state's Criminal Justice

Statistics Center showed that cannabis possession arrests decreased by 86% in just 12 months after the 2010 decriminalization law. But you can only eat that lunch once. By the time legalization becomes politically plausible in a state, most arrests have already been eliminated.

When cannabis arrests fall, they fall across racial groups (Shover, C.L., & Humphreys, K., in press, American Journal of Drug and Alcohol Abuse). This benefits members of all racial groups, but because the decline is roughly equal across them, racial disparities in arrests tend to stay the same. So if the policy goal is to reduce the disproportionate harm of cannabis enforcement on people of color, a legalizing state will have to take specific steps in that direction. The simplest thing would be to expunge cannabis arrests that occurred in the past. Because the number of people who carry those criminal records and suffer from them are disproportionately people of color, expungement would help reduce racial disparities in enforcement harms in a way that legalization itself will not.

Conclusion

To conclude, I've talked about just three areas where we have enough science to help you make the tough design decisions you will have to make if you choose to legalize recreational cannabis. There are many other areas about which science can inform your important work regarding cannabis, so I look forward to further discussion with you at this hearing, as well as beyond at it, at your convenience.