

INFORMATION DIFFUSION IN THE EVALUATION OF MEDICAL MARIJUANA LAWS' IMPACT ON RISK PERCEPTION AND USE

Up to date, 25 US states have legalized medical marijuana use through state legislation, but no consistent information has been provided to policymakers, parents, and the general public to assess whether the passage of medical marijuana laws (MMLs) may increase or reduce the risk of marijuana use. With data from the 2004 to 2014 National Survey on Drug Use and Health (NSDUS), the article “Young people’s more permissive views about marijuana: local impact of state laws or national trend,” published in the August issue of *AJPH*, documented a progressive decline in the perceived risk of marijuana use among adolescents and young adults living in MML states.¹ However, upon further analysis by controlling unmeasured between-state differences, this MML-related risk disappeared, as observed in a number of other studies also using national survey data.^{2–4} On the other hand, studies using hospital data and criminal records consistently indicate a positive association between MMLs and marijuana

use.^{5,6} Unfortunately, findings from these studies cannot be generalized to the US population because the study samples are not representative.

Despite the strengths of national survey data, using such data to assess MML must consider the process by which laws and regulations affect people. It is well established that information diffusion is a key process for public health laws and regulations to exert their impact. This mechanism becomes more salient in the information era with increased amount and speed of effective information exchange. Just like the effect of cross-contamination in interfering with the evaluation of a behavioral intervention trial, the effect of MML may be masked, to a great extent, by information diffusion. No valid conclusion would be possible without considering this diffusion process if national survey data were used to assess MML.

In MML research practice, it is neither easy to directly measure the diffusion process nor simple to analyze it with designs and statistical methods commonly used in research. Two approaches can be potentially employed to control for diffusion effect without a direct measurement of the diffusion process: individual-based informational correlation and population-based diffusion modeling. In the first approach, the diffusion effect can be modeled through informational correlation by randomly pairing participants in MML states with participants in non-MML states using a method we developed to assess between-participant communications in an intervention trial.⁷ In the second approach, the effect of MMLs can be effectively detected by incorporating a nonlinear component that characterizes the informational correlation. *AJPH*

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REFERENCES

- Schmidt LA, Jacobs LM, Spetz J. Young people’s more permissive views about marijuana: local impact of state laws or national trend? *Am J Public Health*. 2016;106(8):1498–1503.
- Lynne-Landsman SD, Livingston MD, Wagenaar AC. Effects of state medical marijuana laws on adolescent marijuana use. *Am J Public Health*. 2013;103(8):1500–1506.
- Pacula RL, Powell D, Heaton P, Sevigny EL. Assessing the effects of medical marijuana laws on marijuana use: the devil is in the details. *J Policy Anal Manage*. 2015;34(1):7–31.
- Keyes KM, Wall M, Cerdá M, et al. How does state marijuana policy affect US youth? Medical marijuana laws, marijuana use and perceived harmfulness: 1991–2014. *Addiction*. 2016;Epub ahead of print.
- Wang GS, Roosevelt G, Heard K. Pediatric marijuana exposures in a medical marijuana state. *JAMA Pediatr*. 2013;167(7):630–633.
- Chu Y-WL. The effects of medical marijuana laws on illegal marijuana use. *J Health Econ*. 2014;38:43–61.
- Chen X, Chen D. Mutual information technique in assessing crosslink through a random-pairing bootstrap methods. In: Kennedy WG, Agarwal N, Yang SJ, eds. *Social Computing, Behavioral-Cultural Modeling and Prediction*. Washington, DC: Springer Publishing Company Inc;2014:245–252.

SCHMIDT ET AL. RESPOND

The authors raise an important point about the unclear mechanisms by which medical marijuana policies could be contributing to more permissive views among American youths. Our study found that the implementation of state medical marijuana laws does not directly impact the views of young people in those states. However, independent of this, the United States is witnessing a national trend toward young people adopting more permissive views on marijuana. We stopped short of interpreting these findings to mean that state laws do not matter. Since young people access information through digital and social media, symbolic influences of the medical marijuana debate are unlikely to stay confined within state

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borders. Now, with more than half of US states having passed medical marijuana laws, the cumulative effects on society may be significant.

Although it was beyond the scope of our study to test the mechanisms of shifting norms, future studies should consider how information about marijuana policy diffuses through the social networks of young people. The authors suggest a particular statistical strategy for doing so. However, we would urge hypothesis-driven research that tests multiple mechanisms. Symbolically powerful political events at the national level should be explored, such as President Obama's 2006 public admission to marijuana use and the national debate over the constitutionality of marijuana legalization. Researchers should consider how marketing of new marijuana products (e.g., "dabs") popularized by music celebrities impacts young peoples' views. More generally, they should study the impacts of commercialization of marijuana by producers and distributors.^{1,2} Finally, age-period-cohort studies should consider how cohorts of parents who experimented with drugs while young might influence attitudes in subsequent generations.

We agree that it is important for researchers to measure the extent to which the trend toward more permissive attitudes is impacting marijuana consumption. A young person's attitude about drugs is the strongest single predictor of drug consumption.^{3,4} When a generation of young people grows more permissive in their views, repercussions may be felt over subsequent decades. Thus, those who came of age during the repeal of alcohol prohibition became a "wet generation" on the forefront of a long wave of rising alcohol consumption in America.^{5,6} As current generations mature to voting age, views forged during adolescence may drive more liberal drug policy choices by the electorate. The national trend toward more permissive views among young people observed in our study may portend the continuing relaxation of marijuana controls in America. **AJPH**

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REFERENCES

1. Richter KP, Levy S. Big marijuana—lessons from big tobacco. *N Engl J Med*. 2014;371:399–401.
2. Davis JC. The business of getting high: head shops, countercultural capitalism, and the marijuana legalization movement. *The Sixties*. 2015;8(1):27–49.
3. Bachman JG, Johnston LD, O'Malley PM. Explaining recent increases in students' marijuana use: impacts of perceived risks and disapproval, 1976 through 1996. *Am J Public Health*. 1998;88(6):887–892.
4. Bachman JG, Johnston LD, O'Malley PM, Humphrey RH. Explaining the recent decline in marijuana use: differentiating the effects of perceived risks, disapproval, and general lifestyle factors. *J Health Soc Behav*. 1988;29(1):92–112.
5. Room R. Discussion. Starting on the fringe: studying alcohol in a wet generation. In: *Addictions: Personal Influences and Scientific Movements*. Piscataway, NJ: Transaction Publishers; 1991:179.
6. Room R, Osterberg E, Ramstedt M, Rehm J. Explaining change and stasis in alcohol consumption. *Addict Res Theory*. 2009;17(6):562–576.

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