International Journal of Drug Policy xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

International Journal of Drug Policy

journal homepage: www.elsevier.com/locate/drugpo

Research paper

The effect of medical cannabis laws on juvenile cannabis use

Lisa Stolzenberg *, Stewart J. D'Alessio, Dustin Dariano

Florida International University, United States

ARTICLE INFO

Article history:
Received 18 October 2014
Received in revised form 2 May 2015
Accepted 29 May 2015

Keywords:
Medical cannabis laws
Juvenile cannabis use
Juvenile illicit drug use
Panel analysis
Youth

ABSTRACT

Background: A number of states in the United States legally allow the use of cannabis as a medical therapy to treat an illness or to alleviate symptoms. Concern persists as to whether these types of laws are increasing juvenile recreational cannabis use. It is also plausible that medical cannabis laws engender an escalation of illicit non-cannabis drug use among juveniles because cannabis is frequently considered to be a gateway drug.

Methods: This study uses longitudinal data drawn from the National Survey on Drug Use and Health for the 50 U.S. states and a cross-sectional pooled-time series research design to investigate the effect of medical cannabis laws on juvenile cannabis use and on juvenile non-cannabis illicit drug use. Our study period encompasses five measurement periods calibrated in two-year intervals (2002–2003 to 2010–2011). This research design is advantageous in that it affords us the ability not only to assess the effect of the implementation of medical cannabis laws on juvenile drug use, but also to consider other state-specific factors that may explain variation in drug use that cannot be accounted for using a single time series.

Results: Findings show that medical cannabis laws amplify recreational juvenile cannabis use. Other salient predictors of juvenile cannabis use at the state-level of analysis include perceived availability of cannabis, percent of juveniles skipping school, severity of perceived punishment for cannabis possession, alcohol consumption, percent of respondents with a father residing in household, and percent of families in the state receiving public assistance. There is little empirical evidence to support the view that medical cannabis laws affect juveniles' use of illicit non-cannabis drugs.

Conclusion: Based on our findings, it seems reasonable to speculate that medical cannabis laws amplify juveniles' use of cannabis by allaying the social stigma associated with recreational cannabis use and by placating the fear that cannabis use could potentially result in a negative health outcome.

Background

Because of its purported medicinal value (Clark, 2000; Kramer, 2015; Lynch & Ware, 2015; Watson, Benson, & Joy, 2000), both the nationwide and worldwide popularity of legalizing cannabis for medical purposes has reached epic proportions. A 2010 Gallup poll found that approximately 70% of Americans are in favor of allowing doctors to prescribe cannabis to mitigate pain (Mendes, 2010), whereas a survey of 1446 physicians from 72 countries revealed that 76% of the physicians supported the use of cannabis for medical purposes (Adler & Colbert, 2013). Twenty states in the U.S. since 1999 and the District of Columbia have legalized the use of cannabis for medicinal purposes, and a number of additional states are expected to follow suit. The number of registered medical cannabis identification card holders in the United States (U.S.) as of April 2013 stands at 1,029,325, and this number is expected to grow in the coming years (ProCon.org, 2014).

Debate as to whether the labeling of cannabis as non-harmful not only facilitates its acceptability (Miech et al., 2015), but also ameliorates the perceived riskiness of its use continues to escalate as more states allow medical cannabis use (Khatapoush & Hallfors, 2004; Schuermeyera et al., 2014; Wall et al., 2011). Some argue that cannabis use is a tangible health risk (Hall, 2015), that alternative medications currently exist to deal with ailments typically treated with cannabis (Watson et al., 2000) and that medical cannabis laws amplify the recreational use of cannabis in the population (Clark, 2000; Gorman & Huber, 2007; Joy, Watson, & Benson, 1999).

A number of studies find evidence that medical cannabis laws amplify cannabis use in the population, particularly among youth.

* Corresponding author at: Department of Criminal Justice, Florida International University, 11200 SW 8th Street, PCA 257, Miami, FL 33199, United States. Tel.: +1 305 348 6276.
E-mail address: stolzenb@fiu.edu (L. Stolzenberg).

http://dx.doi.org/10.1016/j.drugpo.2015.05.018
0955-3959/

Wall et al. (2011) examined cannabis use among adolescents (12–17 year olds) in states with and without medical cannabis laws and found that on average cannabis use was higher among youths living in states that legalized medical cannabis. They also observed a marked decline in the perceived riskiness of cannabis use among youth following the passage of a medical cannabis law. In a cross-sectional study, Cerdá, Wall, Keyes, Galea, and Hasin (2012) evinced evidence that adults had a substantially higher likelihood of cannabis use in states that allowed the use of medical cannabis. Salomonsen-Sautel, Sakai, Thurstone, Corley, and Hopfer (2012) found that 73.8% of the individuals admitted to substance abuse treatment in the Denver metropolitan area reported that they had used the cannabis prescribed to another individual for medicinal purposes, although these medical cannabis users did admit that they were also more apt to use non-medicinal cannabis on a regular basis.

Despite the findings generated in these research studies, not everyone is fully convinced that medical cannabis laws influence the recreational use of cannabis (Clark, 2000). Khatapoush and Hallfors (2004) investigated whether attitudes regarding perceived dangers of cannabis use changed over time in California and 10 other comparable states. Although they noted a significant decrease in people's perceived harm of cannabis from 1995 to 1999, the rate of cannabis use in the population remained relatively stable. Gorman and Huber (2007) endeavored to establish whether cannabis use rose following legislation to legalize medical cannabis in several cities and metropolitan areas in four states from 1994 to 2002. Their interrupted time series analysis showed that cannabis use among criminal arrestees and people admitted to emergency rooms for drug overdoses did not increase substantially following the legalization of medical cannabis for any of the areas studied. In a replication of the Wall et al. (2011) study, Harper, Strumpf, and Kaufman (2012) used a difference-in-difference regression model to discern whether medical cannabis laws influenced recreational cannabis use. In contrast to the results reported in the Wall et al. study, Harper and his colleagues found that medical cannabis laws did not substantially elevate cannabis use among youth between the ages of 12–17. Finally, Lynne-Landsman, Livingston, and Wagenaar (2013) used data drawn from the Youth Risk Behavior Surveillance System to measure statewide prevalence rates of cannabis use. They examined four states – Montana, Delaware, Rhode Island, and Michigan – that each passed a medical cannabis law sometime between 2003 and 2011. Using logistic regression difference-in-difference models, Lynne-Landsmen and her associates found no statistically discernible rise in either self-reported prevalence or frequency of cannabis use among adolescents following the legislation of medical cannabis.

Methodological problems with prior research

Although certainly informative, much of the prior research examining the effect of medical cannabis legislation on attitudes toward cannabis use and on recreational cannabis use is problematic for a number of reasons making any conclusions tentative at best. Methodological problems include small and unrepresentative samples, an overreliance on cross-sectional data, inappropriate statistical methodology, and a general failure to investigate the possibility that medical cannabis laws increase non-cannabis drug use. First, many previous studies were based on small and non-representative samples often drawn from a few select geographical locations. For example, Salomonsen-Sautel et al. (2012) analyzed 164 cases, Thurstone, Lieberman, and Schmiege (2011) 80 cases, Lynne-Landsman et al. (2013) studied four states and Gorman and Huber (2007) examined only high-risk urban populations. The unrepresentiveness of these samples not only hinders one's ability to generalize the results generated in these studies, but it is also plausible that appreciable changes in sample composition might alter some or all of the effects observed in these studies.

Second, with a few noteworthy exceptions, most of what we currently know about the effect of medical cannabis laws on attitudes toward cannabis and cannabis use among youth comes from the examination of survey data collected at a single point in time (Cerdá et al., 2012; Salomonsen-Sautel et al., 2012; Thurstone et al., 2011). The analysis of cross-sectional data cannot easily identify the specific causal processes at work. To illustrate, just because a person living in a state with a medical cannabis law has a greater likelihood of cannabis use than an individual living in a state without such a law does not necessarily mean that the implementation of the medical cannabis law engendered this difference in the probability of cannabis use. People living in medical cannabis states might have always used more cannabis. In fact, more liberal attitudes in regards to cannabis use in these states might have been the initial impetus for the passage of the medical cannabis law. An analysis of longitudinal data is needed to determine more accurately the effect of medical cannabis laws on juvenile cannabis use. As Cerdá et al. (2012, p. 25) note, "Future studies should use large-sample survey data collected in years prior to and after enactment of cannabis laws in states with and without such laws, to compare prevalences and trends."

Third, while a few studies have heeded the call to analyze longitudinal data, these studies also have shortcomings that limit their ability to draw definitive conclusions. To determine whether cannabis use increased following legislation to legalize medical cannabis in several cities and metropolitan areas in different states, Gorman and Huber (2007) conducted an Autoregressive Integrated Moving Average (ARIMA) interrupted time series analysis with fewer than 50 pre-intervention quarterly time-periods. However, while an interrupted time series ARIMA analysis is generally considered a robust statistical procedure for interpreting aggregate change (McCleary & Hay, 1980), there needs to be an adequate number of pre-intervention periods so that trend and seasonality can be modeled appropriately. It is generally accepted that at least 50 measurement periods are needed in the pre-intervention series to model accurately trend and seasonality. Otherwise, ARIMA results can become unstable (McCain & McCleary, 1979, p. 235). Other longitudinal research studies were also problematic in that they had too short a post-intervention period to draw firm conclusions (Wall et al., 2011) or they had a limited time-period for evaluation purposes (Harper et al., 2012).

Finally, current research remains surprising silent on whether medical cannabis laws amplify juveniles' use of illicit drugs. An expansive literature suggests that cannabis use is correlated, at least in the short term, with an increase in the probability of an individual using other illicit drugs (Hall & Lynskey, 2005). For example, using a sample of young persons from the National Household Survey on Drug and Abuse, Kandel and Yamaguchi (2002) found that 90% of respondents reported using cannabis prior to cocaine. Fergusson, Boden, and Horwood (2006) analyzed data on 1200 New Zealand children from the Christchurch Health and Development Study over a 25-year period. They found that of those who reported using illicit drugs other than cannabis, 98% admitted to using cannabis within the same year or before using the illicit drug(s). However, it was also noted that the relationship between cannabis use and other drug use weakened as the respondents grew older. Van Gundy and Rebellon (2010) generated similar findings in their study of 1286 young adults living in South Florida. Using logistical regression and controlling for stress and life perspective variables, they observed that illicit drug use was higher for respondents who reported using cannabis in grades eight and nine. Despite the possibility of cannabis acting

Please cite this article in press as: Stolzenberg, L., et al. The effect of medical cannabis laws on juvenile cannabis use. *International Journal of Drug Policy* (2015), http://dx.doi.org/10.1016/j.drugpo.2015.05.018