Marijuana Price Estimates And The Price Elasticity Of Demand

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Abstract- This study estimates marijuana prices for every state and the District of Columbia by using historical price data of marijuana purchases. A regional price index is constructed and used to estimate regional price differences of marijuana prices for the years 2002-2007. These price estimates are then utilized to calculate recent average price elasticity of demand and the results are compared to the existing literature on price elasticity as measure of accuracy of our marijuana price estimate model. The average price elasticity of demand (PED) for marijuana (less than 10 grams) for the time period 2002-2007 for all ages within the 50 states and the District of Columbia is -0.44. The PED varies by age group, 12-18 Resulting in a PED for ages 12-17 of -1.01, 18-25 of -0.34, and > 26 of 0.17. Significant differences concerning the sensitivity to marijuana prices exist based on age.

Keywords- marijuana price; price elasticity; medical marijuana; decriminalized marijuana; youth marijuana consumption

I. INTRODUCTION

Understanding how price influences consumption is essential when examining drug policies. Many initiatives have been implemented to reduce marijuana consumption, with the majority of these programs focusing on disrupting the supply of marijuana thus increasing the price of marijuana, rather than focusing on demand side policies. By examining how sensitive consumers are to changes in price, drug polices can be better designed and evaluated.

Marijuana is one of the most commonly used illicit drugs in the world, consumed by about 2.5% of the world's population [1], as well as the most commonly used illicit drug in the United States [2]. One-third of the population in the United States reported consuming marijuana at some point in their lifetime [3]. Illegal drug use produces enormous social costs. These costs range from increased health care, loss of productivity, and lower level of educational attainment [4, 5]. High school graduation is negatively associated with marijuana use, more specifically a 10% increase in frequent marijuana use lowers the probability of graduation by 6.62% [6]. A 20% reduction in marijuana use would be associated with a $600 million savings in averted social costs [7].

Due to a lack of marijuana price data, the majority of studies concerning marijuana consumption seek to explain that behavior through other variables, such as the complementary/substitute nature of cigarettes, family structure, education, race, medical marijuana regulations, etc. Although these variables most likely contribute to marijuana consumption, price is a key factor. This study is an attempt to add to the literature by suggesting current marijuana prices for every state and the District of Columbia by using historical price data of marijuana purchases and constructing a regional price index to estimate regional price differences of marijuana prices for the years 2002-2007. These prices are then utilized to calculate recent average price elasticity of demand and the results are compared to the existing literature on price elasticity as measure of accuracy of our marijuana price estimate model.

Few studies have examined the price elasticity of demand of marijuana. The first such study, published in 1972 by Nisbet and Vakil, was the result of surveying U.C.L.A. students concerning purchasing patterns of marijuana at changing prices. This survey was designed to determine how many ounces of marijuana a consumer would purchase at a set income level at varying prices. The price elasticity of demand for marijuana at the current market price ranged from -0.40 to -1.51 [8].

Clements and Daryal examined price and consumption of marijuana among Australians 14 years and older. The authors demonstrated a price elasticity of approximately -0.50 [9]. This study employed a per gram price of marijuana at a constant $450 (AUD). This constant price of marijuana utilized in this study was derived from the 1989 Cleeland Report, The Illicit Drugs in Australia, Situation Report, The Australian Illicit Drug Report by the Australian Bureau of Criminal Intelligence, and a 1997 article in The Australian Financial Review [9]. All of these sources establish a per gram marijuana price of between $300 and $800 (AUD).

Pacula et al. published a study in 2001 in which marijuana prices were calculated from data published by the Drug Enforcement Agency during the years 1982-1998. Quarterly street level marijuana purchase prices from nineteen cities and the District of Columbia were converted into price per gram and then into real prices by dividing by the annual consumer price index for the U.S. as a whole [10]. The authors demonstrated a price elasticity of demand for annual marijuana consumption of high school seniors of between -0.06 to -0.47 and a thirty-day marijuana consumption elasticity of between -0.002 to -0.69 [10].

van Ours and Williams conducted research concerning the role price plays in encouraging youth to begin consuming marijuana. This study utilized the self-reported cannabis consumption rate of 14 to 22 years of age reported in the 1998 Australian National Drug Strategy's Household Survey. The

authors concluded that cannabis prices have a negative effect on cannabis starting rates and a price elasticity of -0.47 [11].

A 2001 published study from Jacobson examined data from both the Monitoring the Future (a survey high school students) and the National Household survey on Drug Abuse concerning youth marijuana use. This study demonstrated that the size of the youth cohort is negatively related to both the price of marijuana and arrests for drug sales [12]. Holding youth demand stable and assuming that youth population changes only affect the supply of marijuana, the author calculated a price elasticity of -0.85 [12].

Understanding how price affects marijuana consumption is critical to developing successful drug policies, especially due to the fact that more evidence of the harms of marijuana smoking is becoming available. A correlation has been shown to exist between marijuana smoking and the development of lung cancer [13]. Marijuana smoke contains significantly more carcinogens [14, 15] and increased tar delivery to the lungs than tobacco smoke [13]. Cannabis smoke produces mutations in cells in both test tubes and within live animals and therefore can be a potential cause of cancer [16]. Regular marijuana use adds significant risk for the development of respiratory tract carcinoma [17]. When consuming marijuana, larger puff volumes are taken and the smoke from marijuana is inhaled more deeply so the individual retains smoke in their lungs approximately four times longer than tobacco smoke; and the longer breath-holding time characteristic of marijuana smoking results in a larger amount of inhaled tar and an even larger amount of tar retained in the lung [13, 18].

Studies have also suggested an increased risk of other forms of cancers associated with marijuana use. These include an increased risk of head and neck cancer [14], carcinoma of the tongue [19, 20], testicular germ cell tumors [21], and an increased risk of prostate cancer [22]. Exposing a correlation between marijuana smoking and various forms of cancer is difficult due to the fact that many marijuana users also exposed themselves to additional risk factors such as tobacco and alcohol consumption.

An increasing number of studies have provided compelling evidence to conclude that smoking marijuana can lead to adverse mental health conditions, such as psychosis and depression [23]. Psychosis-free subjects who have a lifetime history of cannabis use are at increased risk of a psychosis outcome [24], with one estimate of the risk of psychosis increasing by approximately 40% [25]. Assuming an increased risk of psychosis of 40% and a 40% lifetime cannabis use among young adults, one could expect a 14% reduction in psychotic outcomes if cannabis was not used in society [25].

A correlation between prolonged cannabis use and psychotic symptoms and persons with schizophrenia has also been demonstrated. Cannabis use may trigger schizophrenia in persons who are vulnerable to the disorder; cannabis may also be used to "self-medicate" schizophrenia symptoms [26]. These findings were similar to a previous analysis which concluded that heavy cannabis use at the age of 18 increased the risk of later schizophrenia six-fold [27]. The difficulty lies in deciphering the degree of correlation and the assumptions surrounding persons who may be predisposed to certain mental health conditions.

Cannabis is an addictive substance and dependence can result from experimentation and recreational use [28]. Marijuana dependence is defined as the increased tolerance, compulsive use, impaired control, and continued use despite physical and psychological problems caused or exacerbated by use [29]. More adults in the United States had a marijuana disorder in 2001-2002 than in 1991-1992 [30], with cannabis dependence being the most common form of dependence after alcohol and tobacco [16]. Marijuana is much more potent now than it was in the 1960s, which is one explanation why cannabis-use disorders in the United States have increased over the past 10 years [31]. From the 1960s to 2000, the THC level of an average marijuana "joint" increased from 10 mg to 150 mg [32], an increase of 1,400%. Although marijuana potency has increased over time and is an important issue to consider, the lack of standardized testing concerning the potency of marijuana by law enforcement and the wide variations in marijuana quality lead to hesitation when using potency as a independent variable.

The risk of marijuana dependence, occurring in approximately 10% of users [26], is higher for daily users and persons who begin consuming marijuana at an early age [33]. This dependence can lead to serious withdrawal symptoms once the stimulant is removed. Withdrawal symptoms have been reported by 80% of male and 60% of female adolescents seeking treatment for cannabis dependence [26]. These withdrawal symptoms are similar to those of alcohol, opiates, and benzodiazepine withdrawal, which includes restlessness, insomnia, anxiety, increased aggression, and muscle tremors [32].

The risk of death from marijuana overdose is incredibly low. There are no reported cases of human deaths attributed to cannabis toxicity [16]. That is not to say that cannabis toxicity is not possible, it is just extremely unlikely that a person can consume the quantity needed to cause death. On average, one "joint" delivers 3 mg THC to the consumer while the lethal dose is approximately 4,000 mg of THC [34] or more than 1,300 "joints." Marijuana associated deaths related to automobile accidents or other mishaps are more difficult to quantify, due to poor reporting standards and/or the likelihood of other intoxicants being present in the individual's system. Also, marijuana is an antiemetic that prevents vomiting, thus possibly preventing persons who have consumed fatal amounts of alcohol from vomiting, which may have prevented death.

II. METHODS

A. Price of Marijuana

Due to the illegal nature of marijuana, accurate prices by state are difficult to obtain, however some secondary on prices do exist. Marijuana prices used in this study were based on data provided by the Office of National Drug Control Policy (ONDCP). The ONDCP collected and published prices for five major illicit drugs (marijuana, powder cocaine, crack cocaine, heroin, and d-methamphetamine) for the years 1981 through 2007. The report titled *The Price of Illicit Drugs: 1981*

through the Second Quarter of 2000 was published in October of 2001 with two subsequent updates, which were expanded to include the purity of four of the illicit drugs, excluding marijuana. *The Price and Purity of Illicit Drugs* utilize data from the Drug Enforcement Agency's System to Retrieve Information from Drug Evidence (STRIDE) database. Prices for illegal drugs are obtained by law enforcement through investigative and enforcement activities and undercover purchases. Quarterly price of the illegal marijuana market from 1981 through 2007 are detailed from purchases in three quantity levels, totaling ≤ 10 grams, 10 – 100 grams, and > 100 grams. Table 1 displays the median national price per gram of marijuana for quantities less than 10 grams.

TABLE I.

Median national marijuana price per gram quantities less than 10 grams (2007 dollars)	
Year	Price
2002	11.39
2003	11.65
2004	10.60
2005	10.89
2006	11.10
2007	14.13

The Price of Illicit Drugs: 1981 through the Second Quarter of 2000 report also detailed regional variations in marijuana prices (as well as the other narcotics studied) by segregating marijuana purchases within six regions: East Central, Mountain, Northeast, Pacific, Southeast, and West Central. Table 2 lists the states that comprise each region. For this study, median marijuana prices are expressed in 2007 dollars. Regional price estimates for marijuana were not available after the second quarter of 2000. Due to this lack of data, a regional index for marijuana prices was calculated. Using available historical marijuana price data, the mean price of marijuana for quantities less than 10 grams for the six above

Southeast 1.152, and West Central 0.887. This index was then multiplied by the median marijuana price per gram of marijuana (2007 constant dollars) for quantities of less than 10 grams for the years 2002-2007. Regional price per gram of marijuana calculated with this index are displayed in Table 3.

B. Price Elasticity of Demand

By using historical price data of marijuana purchases, a regional price index is constructed and used to estimate regional price fluctuations of marijuana prices. Average price elasticity of demand is then calculated using these prices and previous month consumption data for all 50 states and the District of Columbia. Price elasticity of demand is a measure of the percentage change in consumption associated with a 1% change in price [35]. The formula (1) for the average price elasticity of demand utilized in this analysis is noted below.

$$E_d = \frac{\dfrac{Q_2 - Q_1}{(Q_2 + Q_1)/2}}{\dfrac{P_2 - P_1}{(P_2 + P_1)/2}} \tag{1}$$

C. State Level Consumption Estimates

State level consumption data for this study concerning marijuana consumption was taken from the Office of Applied Studies (OAS). Since, 1999 the OAS has provided state level estimates of marijuana consumption, as well as for alcohol, tobacco, and other illegal drugs, for all 50 states and the District of Columbia for individual 12 years of age and up. Estimates are for self-reported marijuana consumption within the past 30 days.

D. Marijuana Decriminalization and Medical Marijuana

Data concerning states that have passed medical marijuana ordinances were retrieved from ProCon.org, a registered nonprofit public charity that is not associated with any

TABLE II.

State Regions					
East Central	West Central	Southeast	Mountain	Northeast	Pacific
Alabama	Arkansas	Delaware	Arizona	Connecticut	Alaska
Illinois	Iowa	District of Columbia	Colorado	Maine	California
Indiana	Kansas	Florida	Idaho	Massachusetts	Hawaii
Kentucky	Louisiana	Georgia	Montana	New Hampshire	Oregon
Michigan	Minnesota	Maryland	Nevada	New Jersey	Washington
Mississippi	Missouri	North Carolina	New Mexico	New York	
Ohio	Nebraska	South Carolina	Utah	Pennsylvania	
Tennessee	North Dakota	Virginia	Wyoming	Rhode Island	
Wisconsin	Oklahoma	West Virginia		Vermont	
	South Dakota				
	Texas				

listed regions were divided into the national average marijuana price for that year. These annual indices for each region were summed for the years 1981-2000 and divided by the number of years of valid data (no region contained less than 13 years of data), resulting in an average price index for that region. Price indices for the six regions were calculated as East Central 0.712, Mountain 1.156, Northeast 0.944, Pacific 1.038,

government agency. As of 2007 twelve states have enacted

TABLE III.

Regional marijuana price for quantities less than 10 grams based on marijuana price index (2007 dollars)

Region	East Central	Mountain	Northeast	Pacific	Southeast	West Central
2002	$8.11	$13.17	$10.75	$11.83	$13.12	$10.11
2003	$8.29	$13.46	$11.00	$12.09	$13.42	$10.33
2004	$7.54	$12.25	$10.00	$11.00	$12.21	$9.40
2005	$7.75	$12.59	$10.28	$11.30	$12.54	$9.66
2006	$7.90	$12.83	$10.48	$11.52	$12.78	$9.84
2007	$10.05	$16.33	$13.33	$14.66	$16.27	$12.53

medical marijuana laws and have been coded as medical marijuana states for this study. These states include Alaska, California, Colorado, Hawaii, Maine, Montana, Nevada, New Mexico, Oregon, Rhode Island, Vermont, and Washington. States that have subsequently enacted medical marijuana laws include Michigan, New Jersey, and the District of Columbia. Two states, Arizona and Maryland, have not passed laws that allow for the use of medical marijuana, but have regulations that are favorable toward persons whom consume marijuana for medicinal purposes. Arizona and Maryland were not coded as medical marijuana states.

Decriminalization refers to a reduction in state level sanctions for possessing small quantities of marijuana. Twelve states have been classified as decriminalized. These states include Alaska, Arizona, California, Colorado, Maine, Minnesota, Mississippi, Nebraska, New York, North Carolina, Ohio, and Oregon. These twelve states have commonly been referred to as decriminalized in the drug policy debate literature and are commonly grouped together in empirical analyses [36].

III. RESULTS

The average price elasticity of demand for marijuana (less than 10 grams) for the time period 2002-2007 for all ages within the 50 states and the District of Columbia is -0.44. This suggests that the marijuana is relatively inelastic. However, the price elasticity varies among age groups. As seen in table 4, as consumer age decreases marijuana becomes more elastic. Elasticity ranges from 0.17 for ages 26 and up, -0.34 for 18-25, and -1.01 for those age 12-17. As evident from these results, youths are far more sensitive to price changes than those age 18 years and greater with regards to marijuana prices.

TABLE IV.

Average Price Elasticity of Demand for Marijuana

Age range	All states	Medical marijuana states	Decriminalized states	Non-medical marijuana or decriminalized states
All	-0.44	-0.20	-0.42	-0.71
12-17 years old	-1.01	-0.50	-0.94	-1.30
18-25 years old	-0.34	-0.04	-0.27	-0.64
26 and older	0.17	-0.31	-0.15	0.16

Marijuana is an inelastic good (0.17) for persons age 26 years of age and older. Results were similar for both decriminalized states (-0.15) and non-medical marijuana or decriminalized states (0.16). In medical marijuana states marijuana approaches the level of a somewhat inelastic good (-0.31).

Persons residing in non-medical marijuana or marijuana decriminalized states are more responsive to changes in the price of marijuana than those in other states. Youths age 12-17 are far more sensitive to price changes in these states those youths in medical marijuana and/or decriminalized states.

Persons are also more sensitive to the price of marijuana in decriminalized states than those in states that allow for the medicinal consumption of marijuana. Again, these figures may be influenced by the norms and beliefs of persons within these states regarding marijuana consumption and the likelihood of possible peer influences leading to marijuana consumption. These factors, as well as the reduced risk of legal sanctions, greater acceptance, peer influences and peer pressure, and lower perception of risk, aid in reducing the overall cost of consuming marijuana leading to increased consumption.

IV. DISCUSSION

This article estimates the average price elasticity of demand for illegal marijuana for the age groups 12-17, 18-25, and 26 and older using current marijuana price estimates calculated from historical price data from illegal marijuana purchases. Our price elasticity for youth ages 12-17 of -1.01, and 18-25 of -0.34 is comparable to youth price elasticity's found in prior studies, which ranged from -0.002 to -0.85 [10-12].

Two important conclusions come to light concerning the average price elasticity of demand for marijuana. First, significant differences appear based on age. Youth's age 12-17, are far more responsive to prices changes of marijuana than those age 18-25, and 26 years and older. These differences remain even when controlling for medical marijuana and decriminalized states. This suggests that policies that successfully increase the price of marijuana will have a greater impact in reducing the number of marijuana smokers between the ages of 12-17 than older individuals.

Secondly, Controlling for factors such as medical marijuana state and marijuana decriminalization state reveal

that policies designed to increase the price of marijuana will all 50 states and the District of Columbia. Marijuana is more inelastic in medical marijuana states and states in which marijuana is decriminalized. As a whole the average price elasticity in non-medical marijuana states is -0.71, compared to -0.42 in decriminalized states, and -0.20 in medical marijuana states. Therefore, policies aimed at increasing the price of small quantities of marijuana in these states will not produce similar decreases of marijuana consumption. This suggests that removing criminal sanctions associated with marijuana smoking decreases the current cost of consumption.

One reason for this increased sensitivity to price may be explained by the fact that states that uphold restrictions for marijuana consumption aid in conveying norms and beliefs concerning that behavior, which may further influence youths decision not to consume marijuana. Also, as medicinal marijuana consumers increase in number, the social encounters by youths with persons who are taking or have taken medical marijuana will likely increase [37]. This may not lead to similar reductions in marijuana consumption across act to reinforce the perception that marijuana use has health benefits and the risk of harm is exaggerated.

This goal of this study was to suggest marijuana prices for every state and the District of Columbia by using estimates of state by state price fluctuations of quantities of marijuana less than 10 grams. These price estimates were then used calculate recent average price elasticity of demand that are similar to previous studies that employed different methods of estimating marijuana price data. The lack of reliable and accurate data regarding street level prices of marijuana has restricted many studies concerning marijuana consumption. This study demonstrates that the current price elasticity of demand for marijuana varies greatly among different age groups and within states with different marijuana regulations. These results should be considered when designing policies that are aimed to reduce marijuana consumption. Hopefully, these price estimates can add value in analyzing how costs influence the health risk behavior of marijuana consumption.

REFERENCES

[1] S. Selvanathan and E. A. Selvanathan, *The demand for alcohol, tobacco and marijuana: International evidence*. Burlington, VT: Ashgate Publishing Company, 2005.

[2] C. J. Gibbons, C. Nich, K. Steinberg, R. A. Roffman, J. Corvino, T. F. Babor*, et al.*, "Treatment process, alliance and outcome in brief versus extended treatments for marijuana dependence," *Addiction,* vol. 105, p. 10, 2010.

[3] J. Williams, "The effects of price and policy on marijuana use: What can be learned from the Australian experience?," *Health Economics,* vol. 13, p. 14, 2004.

[4] J. P. Caulkins, R. L. Pacula, S. Paddock, and J. Chiesa, "School-based drug prevention. What kind of drug use does it prevent?," ed. Santa Monica, CA: Rand Corporation, 2002.

[5] D. M. Fergusson and L. J. Horwood, "Early onset cannabis use and psychosocial adjustments in young adults," *Addiction,* vol. 92, p. 18, 1997.

[6] T. Yamada, M. Kendix, and T. Yamada, "The impact of alcohol consumption and marijuana use on high school graduation," *Health Economics,* vol. 5, p. 16, 1996.

[7] H. A. Pollack and P. Reuter, "Early adolescent cannabis exposure and positive and negative dimensions of psychosis," *Addiction,* vol. 102, p. 4, 2007.

[8] C. T. Nisbet and F. Vakil, "Some estimates of price and expenditure elasticities of demand for marijuana among U.C.L.A. students," *The Review of Economics and Statistics,* vol. 54, p. 3, 1972.

[9] K. Clements and M. Daryal, "The economics of marijuana consumption," ed. Economic Research Centre, Department of Economics, The University of Western Australia, 1999.

[10] R. L. Pacula, M. Grossman, F. J. Chaloupka, P. M. O'Malley, L. D. Johnston, and M. C. Farrelly, "Marijuana and youth," in *Risky Behavior among Youths: An Economic Analysis*, J. Gruber, Ed., ed Chicago: University of Chicago Press, 2001.

[11] J. C. van Ours and J. Williams, "Cannabis prices and dynamics of cannabis use," *Journal of Health Economics,* vol. 26, p. 19, 2007.

[12] M. Jacobson, "Baby booms and drug busts: Trends in youth drug use in the United States, 1975-2000," *The Quarterly Journal of Economics,* vol. 119, p. 32, 2005.

[13] R. Mehra, B. A. Moore, K. Crothers, J. Tetrault, and D. Fiellin, "The association between marijuana smoking and lung cancer," *Archives of Internal Medicine,* vol. 166, p. 9, 2006.

[14] Z.-F. Zhang, H. Morgenstern, M. R. Spitz, D. P. Tashkin, G.-P. Yu, J. R. Marshall*, et al.*, "Marijuana use and increased risk of squamous cell carinoma of the head and neck," *Cancer Epidemiology, Biomarkers & Prevention,* vol. 8, p. 9, 1999.

[15] M. Marselos and P. Karamanakos, "Mutagenicity, developmental toxicity and carcinogenicity of cannabis," *Addiction Biology,* vol. 4, p. 8, 1999.

[16] W. Hall, L. Degenhardt, and M. Lynskey, "The health and psychological effects of cannabis use," 2nd ed: National Drug and Alcohol Research Centre: University of New South Wales, 2001, p. 153.

[17] F. M. Taylor, "Marijuana as a potential respiratory tract carcinogen: A retrospective analysis of a community hospital population," *Southern Medical Journal,* vol. 81, p. 4, 1988.

[18] M. P. Sherman, M. D. Roth, H. Gong Jr., and D. P. Tashkin, "Marijuana smoking, pulmonary function, and lung macrophage oxidant release," *Pharmacology, Biochemistry & Behavior,* vol. 40, p. 7, 1991.

[19] G. A. Caplan and B. A. Brigham, "Marijuana smoking and carcinoma of the tongue," *Cancer,* vol. 66, p. 2, 1990.

[20] G. Almadori, G. Paludetti, M. Cerullo, F. Ottaviani, and L. D'Alatri, "Marijuana smoking as a possible cause of tongue carcinoma in young patients," *The Journal of Laryngology and Otology,* vol. 104, p. 4, 1990.

[21] J. R. Daling, D. R. Doody, X. Sun, B. L. Trabert, N. S. Weiss, C. Chen*, et al.*, "Association of marijuana use and the incidence of testicular germ cell tumors," *Cancer,* vol. 115, p. 9, 2009.

[22] S. Sidney, C. P. J. Quesenberry, G. D. Friedman, and I. S. Tekawa, "Marijuana use and cancer incidence (California, United States)," *Cancer Causes and Control,* vol. 8, p. 7, 1997.

[23] N. C. Stefanis, P. Delespaul, C. Henquet, C. Bakoula, C. N. Stefanis, and J. van Os, "Early adolescent cannabis exposure and positive and negative dimensions of psychosis," *Addiction,* vol. 99, p. 9, 2004.

[24] J. van Os, M. Bak, M. Hanssen, R. V. Bijl, R. deGraaf, and H. Verdoux, "Cannabis use and psychosis: A longitudinal population-based study," *American Journal of Epidemiology,* vol. 156, p. 9, 2002.

[25] M. Nordentoft and C. Hjorthoj, "Cannabis use and risk of psychosis in later life," *The Lancet,* vol. 370, p. 2, 2007.

[26] W. Hall, "The mental health risks of adolescent cannabis use," *PLoS Medicine,* vol. 3, p. 4, 2006.

[27] L. Arseneault, M. Cannon, R. Poulton, R. Murray, A. Caspi, and T. E. Moffitt, "Cannabis use in adolescence and risk for adult psychosis: Longitudinal prospective study," *British Medical Journal,* vol. 325, p. 2, 2002.

[28] W. van den Brink, "Forum: Decriminalization of cannabis," *Current Opinion in Psychiatry,* vol. 21, p. 5, 2008.

[29] *Diagnostic and statistical manual of mental disorders*, Fourth Edition, Text Revision ed. Washington, DC: American Psychiatric Association, 2000.

[30] W. M. Compton, B. F. Grant, J. D. Colliver, M. D. Glantz, and F. S. Stinson, "Prevalence of marijuana use disorders in the United States 1991-1992 and 2001-2002," *Journal of the American Medical Association,* vol. 291, p. 8, 2004.

[31] A. Joffe, "Response to the American Academy of Pediatrics report on legalization of marijuana," *Pediatrics,* vol. 116, p. 2, 2005.

[32] C. H. Ashton, "Pharmacology and effects of cannabis: A brief review," *British Journal of Psychiatry,* vol. 178, p. 6, 2001.

[33] C. Coffey, J. B. Carlin, M. Lynskey, N. Li, and G. C. Patton, "Adolescent precursors of cannabis dependence: Findings from the Victorian adolescent health cohort study," *British Journal of Psychiatry,* vol. 182, p. 7, 2003.

[34] R. S. Gable, "Toward a comparative overview of dependence potential and acute toxicity of psychoactive substances used nonmedically," *American Journal of Drug and Alchol Abuse,* vol. 19, p. 20, 1993.

[35] J. P. Caulkins and P. Reuter, "What price data tell us about drug markets," *Journal of Drug Issues,* vol. 28, p. 20, 1998.

[36] R. L. Pacula, J. F. Chriqui, and J. King, "Marijuana decriminalization: What does it mean in the United States?," *National Bureau of Economic Research Working Paper 9690,* p. 35, 2003.

[37] R. L. Pacula, B. Kilmer, M. Grossman, and F. J. Chaloupka, "Do penalties facing marijuana users influence marijuana prices?," presented at the International Health Economics Association 5th World Congress, Barcelona, Spain, 2007.

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