The International Centre for Science in Drug Policy (ICSDP) Publishes Misleading Report on Marijuana

A Critique Published by the University of Florida Drug Policy Institute

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<tr>
<th>Name</th>
<th>Title and Affiliation</th>
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**Introductory Note**

In 2006, Milberger and colleagues wrote a seminal article in the journal *Tobacco Control* titled “Tobacco manufacturers’ defence against plaintiffs’ claims of cancer causation: throwing mud at the wall and hoping some of it will stick.” This clever title detailed how the Tobacco industry was served for decades by a systematic campaign to deny the overwhelming evidence about the harms of tobacco.

The International Centre for Science in Drug Policy (ICSDP), a group comprised and funded primarily by supporters of marijuana and other drug legalization (e.g. they are grantees of the Open Society Foundations, the biggest legalization funder in the world), recently published a misleading report on marijuana, “State of the Evidence: Cannabis Use and Regulation”\(^1\) reminiscent of a document that would serve today’s Big Marijuana industry very well.

We find that the ICSDP report is an example of deceptive and biased “research” and that it contains abundant factual errors and logical flaws.

The ICSDP conveniently cites evidence that supports its own predetermined narrative, concluding that only the pro-marijuana lobby has any substantive evidence in its favor—and ignores evidence to the contrary. Its main strategy is to attribute overblown "straw man” arguments to established marijuana researchers, misstating their positions and then claiming to "rebut” these positions with research. By doing so, it depicts those opposed to legalization as irrational fear mongers, despite the fact that the American Medical Association\(^2\), Canadian Medical Association. American Academy of Pediatrics\(^3\), American Society of Addiction Medicine\(^4\), American Academy of Child and Adolescent Psychiatry\(^5\), and most other major medical and health groups worldwide do not support marijuana legalization.

This response/critique reveals the lack of objectivity present in the report and, point-by-point, shows how the interests of the nascent Big Marijuana industry, private equity firms, and lobbyists lining up to capitalize on a new marijuana industry, are served.

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1. [http://www.icsdp.org/cannabis_claims_reports](http://www.icsdp.org/cannabis_claims_reports)
4. [http://www.asam.org/docs/publicy-policy-statements/1marijuana-5-062.pdf](http://www.asam.org/docs/publicy-policy-statements/1marijuana-5-062.pdf)
Executive Summary: Egregious Errors in the ICSDP Study

- The report ignores scientific consensus:
  - For the only two widely legal drugs, tobacco and alcohol, **costs far exceed tax revenues** (tobacco estimates: tax revenues = $32.6 billion in 2011\(^6\), taxpayer expenses = $108.7 billion in 2014\(^7\), total societal cost = $170 billion in 2014\(^8\)) (see figure 1)
  - Rising marijuana potency is correlated with increasing marijuana-related emergency room admissions, which have increased by more than 28 times since 1991\(^9,10\)
  - Marijuana use is correlated with school drop-out, unemployment, social welfare dependence, and lower self-reported quality of life (see Figure 2)\(^12\)

- The report makes basic math errors (e.g. \(\frac{38}{1037} \times 100\% \neq 0.037\%\)). This error may have been accidental, but the fact that their excitement at undermining a finding led to them not double-checking their own math calls into question the reliability of the entire document (see figure 3).

- ICSDP takes a “pick-and-choose” approach to scientific studies exploring associations between marijuana and other social issues. They dismiss studies they don’t like, but use the ones that support their argument.

- The ICSDP authors omit important pieces of scientific literature that don’t support their position—despite stating that they considered all peer-reviewed literature. One example is in the “claim” that marijuana use decreases IQ by as much as 8 points, derived from a study from the National Academy of Sciences (Meier et al.) The ICSDP authors report on a critique of that study (Rogeberg, 2013), but fail to address Meier’s response to that critique (Moffitt et al., 2013).

- ICSDP pass off statements about marijuana that had been issued in error as fact—such as a recalled headline stating that, “Cannabis is addictive as heroin,” conveniently setting up a straw man argument to “rebut.”

- The authors dismiss strong statistical conclusions without good reason. For example, the authors state that the Meier et al. study has too small a population size to draw a conclusion. However, a review shows the sample size is ample—and in line with other similar research.

- A review of the literature refuting the link between marijuana use and cancer found that the seminal study was conducted by the former president and CEO of a publicly traded, for-profit marijuana therapy company. (Note: the study is not cited directly in the ICSDP report but is cited indirectly).

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\(^6\) http://www.facethefactsusa.org/facts/a-tax-revenue-source-thats-just-smokin
\(^7\) http://ash.org/u-s-taxpayers-bear-cost-of-smoking/
\(^8\) http://ash.org/u-s-taxpayers-bear-cost-of-smoking/

The tobacco industry costs the United States over 5 times tax revenues generated—in health care costs alone.

- $170B for health care expenses
- $33B for revenues

New Zealand study showing relationship between cannabis use and social outcomes:

- % gained university degree (by age 25)
- % unemployed (ages 21-25)
- % welfare dependent (ages 21-25)

Participant information for seminal study linking marijuana use to lower IQ:

- # of participants: 1,037
- % of heavy marijuana users in study sample: 3.7%
The ICSDPs’ errors result in incorrect conclusions for each point in their report, summarized here:

<table>
<thead>
<tr>
<th>Claim</th>
<th>ICSDP’s Argument</th>
<th>Response</th>
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<tbody>
<tr>
<td>“Cannabis [is] as addictive as heroin.”</td>
<td>A lifetime of cannabis use carries a low risk of dependence (9%), while the risk of cannabis dependence is very low among those who report using it for one year (2%) or even 10 years (5.9%). This is much lower than the estimated lifetime risk of dependence to heroin (23.1%).</td>
<td>This is a quintessential straw man argument – the original claim is from a news title issued in error. Still the ICSDP report underemphasizes the marijuana addiction rates and the harm of marijuana addiction.</td>
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<td>“[D]id you know that marijuana is on average 300 to 400 percent stronger than it was thirty years ago?”</td>
<td>Although this claim overstates the existing evidence, studies do suggest that there have been increases in THC potency over time in some jurisdictions.</td>
<td>We agree with the ICSDP that THC potency has increased. It should be noted that in some cases potency has increased by much more (e.g. butane hash oil 98% potency vs. average 2% smoked marijuana in the 1960s).</td>
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<td>“I’m opposed to legalizing marijuana because it acts as a gateway drug.”</td>
<td>Evidence to date does not support the claim that cannabis use causes subsequent use of “harder” drugs.</td>
<td>The ICSDP authors readily dismiss data when it does not support the pro-marijuana narrative. Marijuana use is absolutely correlated with other drug use, even if most users of marijuana do not go on to use cocaine or heroin. Moreover, the important issue in this debate is not whether or not marijuana precedes other drug use - it does - but rather why this is happening. Some studies indicate that the ease of access of marijuana may stimulate other drug use, and that marijuana helps prime the brain for enhanced responses to other drugs. The report ignores these.</td>
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<td>Cannabis use “can cause potentially lethal damage to the heart and</td>
<td>There is little evidence to suggest that cannabis use can cause lethal damage</td>
<td>The claim seems to be taken out of context, and the study upon which the claim is based is not even referenced. Evidence supports that marijuana smoking can be a trigger for severe adverse cardiovascular events. There is also evidence of negative cardiovascular, pulmonary, and other health effects correlated with marijuana smoking.</td>
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<td>arteries.”</td>
<td>to the heart, nor is there clear evidence of an association between cannabis use</td>
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<td>and cancer.</td>
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<td>Cannabis use lowers IQ by up to 8 points.</td>
<td>There is little scientific evidence suggesting that cannabis use is associated</td>
<td>False. A rigorous longitudinal study shows that smoking marijuana causes a decrease in IQ. The ICSDP rebuttal is predicated on simulated data that was later proven irrelevant.</td>
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<td>with declines in IQ.</td>
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<td>[Cannabis] is a drug that can result [in] serious, long-term</td>
<td>While scientific evidence supports an association between cannabis use and</td>
<td>There are strong correlations between cannabis use and schizophrenia incidence, and the correlation appears in a dose-dependent fashion. This, of course, doesn’t mean the relationship is causal – but that is not what was ever claimed.</td>
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<td>consequences, like schizophrenia.”</td>
<td>schizophrenia, a causal relationship has not been established.</td>
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<td>Legalization / regulation increases the availability of cannabis.</td>
<td>Evidence suggests that the supply of illegal cannabis has increased under a</td>
<td>The example of alcohol and tobacco tell a very different story - legalization increases availability and normalization. The two legal drugs, tobacco and alcohol, constitute the vast majority of health care costs related to drugs[^14]. Also, the price of marijuana may be much lower under a system of full, national legalization.</td>
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<td>prohibition model, and that availability has remained high among youth. Evidence</td>
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<td>does not suggest that cannabis availability among youth has increased under regulatory systems.</td>
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<td>“[I]f marijuana was legalized, the increase in users would be both</td>
<td>Evidence suggests that the policy environment (specifically legal status and</td>
<td>The claim seems to be taken out of context. Legal drugs are far more prevalent that illicit drugs, including marijuana, and research supports that full, national legalization of marijuana would substantially decrease prices and increase use.</td>
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<td>large and rapid...”</td>
<td>enforcement policy) has at most a marginal impact on the prevalence of drug use,</td>
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<td>thereby suggesting that regulating cannabis markets will not inevitably cause</td>
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<td>higher levels of cannabis use.</td>
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<td>Regulation will not reduce drug crime.</td>
<td>Given that the prohibition of cannabis has not been shown to reduce illegal supply, it is likely that cannabis regulation is more effective at minimizing criminal markets for cannabis, despite the fact that criminal markets will continue to represent a proportion of the total market.</td>
<td>The ICSDP authors provide weak evidence that “cannabis regulation is more effective at minimizing criminal markets” with deceptive percentages and creating a false dichotomy that only overly strict drug enforcement or full legalization can exist.</td>
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<td>“We are going to have a lot more people stoned on the highway and there will be consequences.”</td>
<td>While experimental studies suggest that cannabis intoxication reduces motor skills and likely increases the risk of motor vehicle collisions, there is not sufficient data to suggest that cannabis regulation would increase impaired driving, and thereby traffic fatalities.</td>
<td>In the face of overwhelming evidence, ICSDP admits that marijuana impairs motor skills, doubling the chance of a motor crash. Still, the report goes out of its way to downplay the connection, resorting to talking points that “alcohol is worse.”</td>
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| Regulation leads to a “Big Marijuana” scenario. | Available evidence regarding “Big Marijuana” is currently lacking, though regulatory controls can be introduced within regulatory systems to reduce the potential of profit maximization by cannabis retailers. | False. Big Tobacco has contemplated a takeover of a legal marijuana market since the 1960s. Leaked internal documents show that Big Tobacco considers marijuana as just “a natural expansion of current smoking habits which, if a more tolerant attitude were ever taken…would be a change in habit comparable to moving over to cigars.”  
Those in today’s marijuana industry recognize this, with the CEO of a hydroponics company commenting, “Ultimately, big alcohol or big tobacco is going to come into this space. I just can’t imagine that won’t happen.”  
Moreover, despite half a century of smoking regulation, Big Tobacco remains one of the most profitable industries in recent history. Marijuana would likely be no different. |

THE REPORT’S CLAIMS

Claim: Cannabis is as addictive as heroin.

ICSDP “Bottom Line”: A lifetime of cannabis use carries a low risk of dependence (9%), while the risk of cannabis dependence is very low among those who report using it for one year (2%) or even 10 years (5.9%). This is much lower than the estimated lifetime risk of dependence to heroin (23.1%).

Response:

This claim, which headlines the ICSDP report, is a quintessential example of a “Straw Man” argument. The Daily Telegraph, a popular U.K. newspaper and online publication, did run an article originally titled, “Cannabis as Addictive as Heroin, New Study Finds,” which is cited by the ICSDP. However, Telegraph editors quickly deemed this headline a mistake and updated it to the more factually accurate claim, “Cannabis can be highly addictive, major study finds.” The Daily Telegraph also added this remark:

“UPDATE: Amendments have been made to this report to reflect the fact that where Prof Hall’s study gave directly comparable figures, the risk of dependency among those who had ever used cannabis was 9%, as opposed to 23% for heroin and 15% for alcohol.”

So the claim that ICSDP is refuting is one that was corrected in the public record long ago.

Even so, the ICSDP report is overly dismissive of the addictive potential of marijuana. The report seems to agree with the claim, backed by several peer-reviewed studies, that “the lifetime probability of becoming cannabis dependent was estimated at 8.9%; that is, fewer than 9% of lifetime cannabis users report drug dependence.” It is true that a lifetime dependence rate of 8.9% for marijuana is lower than that for alcohol, cocaine, and heroin. Nonetheless, marijuana is more addictive than analgesics or psychedelic drugs, and shows an addiction rate similar to that of stimulants (~9% vs. 11%). And if use starts in adolescence, the rate rises to about 17% - or 1 in 6.

Moreover, due to a combination of high accessibility and low perceived risk compared with other illicit drugs, marijuana is the most commonly abused illicit drug. The 2013 National Survey on Drug Use and Health, which studied approximately 67,500 non-institutionalized civilians over the age of 12, found that 70.3% of those who initiated illicit drug use in 2013 began with marijuana, and estimated that 19.8 million Americans used marijuana in the past month (13 times the number of past-month cocaine users and 66 times the number of past-month heroin users). With the comparatively high prevalence of marijuana use, even a low addictiveness rate has the potential for significant public health consequences. For example, marijuana addiction accounts for the vast majority of adolescent treatment admissions.


Perhaps the most callous claim in the ICSDP report is that marijuana addiction is not as harmful as other addictions because the withdrawal symptoms are not as dangerous as that for alcohol addiction withdrawal symptoms. It is true that different addictions have different withdrawal symptoms, but it is not true that withdrawal severity is correlated with the harmfulness of the addiction. For example, alcohol addiction withdrawal is often life-threatening, whereas opiate-related withdrawal (including heroin withdrawal) is rarely life-threatening. Addiction harms are far greater than just their related withdrawal symptoms.

Also, marijuana potency (e.g. levels of THC) has increased in Colorado’s legal marketplace. With higher marijuana potency in a legal regime, addiction rates may be higher than the 8.9% previously reported, especially considering that previous addiction rates were calculated from less potent marijuana from the 1990s. Right now, researchers do not know the addiction rate of higher potency marijuana and certainly not the addiction rate of extremely high potency products such as 98% THC butane hash oil. In the past, increased potency (between 1993 and 2005) has been correlated with increased addiction rates as measured by percentage of treatment admissions (the increase in treatment intakes outpace more modest increases in marijuana use).

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23 See http://www.cnn.com/2013/08/09/health/weed-potency-levels/
24 http://buyweedonline.ca/product/thc-weed-wax/
Claim: “[D]id you know that marijuana is on average 300 to 400 percent stronger than it was thirty years ago?”

ICSDP “Bottom Line”: Although this claim overstates the existing evidence, studies do suggest that there have been increases in THC potency over time in some jurisdictions.

Response:

Given overwhelming evidence, the ICSDP is forced to concede that marijuana potency has increased over the past several decades. The main argument is that marijuana has not increased in potency at the same rate across all jurisdictions; for example, the ICSDP authors claim that while THC has increased in the United States, the United Kingdom, and the Netherlands, it has not increased significantly in several other European countries.

Also, the original claim was made by Health Canada, a Canadian organization. We agree with the ICSDP that marijuana potency has increased substantially in the United States. Because of Canada’s geographic proximity to the United States, it does not seem unreasonable to believe that cannabis in Canada increased at a similar rate. Therefore, the claim seems to be correct, which is in line with ICSDP report’s own finding that U.S. marijuana potency increased approximately 300%. It is puzzling why the ICSDP still classifies the strength of evidence supporting the claim as “moderate,” when by its own admission, the research supports that cannabis in the United States has increased by 300%. Health Canada’s claim seems to be well supported by at least two peer-reviewed studies.

Additionally, as potency has increased, so has emergency room visits related to cannabis use.

Source: Volkow et al., 2014

**Claim:** “I’m opposed to legalizing marijuana because it acts as a gateway drug.”

**ICSDP “Bottom Line”:** Evidence to date does not support the claim that cannabis use causes subsequent use of “harder” drugs.

**Response:**

The assertion that correlation does not imply causation is a limitation of virtually all social scientific research. As such, it is a common excuse for politically driven organizations to dismiss mounting, opposing evidence. Take tobacco companies, for instance. In the 1950s and 1960s, scientific evidence accumulated that tobacco smoking was correlated with higher rates of lung cancer. Whenever a policy maker would imply that tobacco smoking actually causes lung cancer, however, Big Tobacco lobbyists would argue that causation and correlation are not equivalent. Big Tobacco used this as a powerful lobbying tool to dismiss mounting scientific evidence for more than forty years, and it seems that marijuana proponents are using their antecedent’s technique.

Unlike common correlation vs. causation examples (e.g., colder weather increases consumer purchases), there is a logical link between one type of illicit drug use and other types of illicit drug use.

The combination of correlation and a logical connection should give researchers pause before dismissing correlation evidence. Indeed, many big-data researchers, such as Chief Economist at the Bank of England Andy Haldane, are now advocating for researchers to take correlation evidence more seriously. Somewhat confusingly, the ICSDP report authors then use a correlation study to justify its own position while dismissing other correlation studies as irrelevant.

Completely ignored were Lynskey’s seminal 2003 study and 2006 studies finding that among twins discordant for cannabis use, the using twin was at a higher risk of opioids. These studies controlled for environmental and genetic factors, and the 2006 study was conducted in Holland.

Although the majority of marijuana users do not go on to try cocaine or heroin, marijuana generally precedes other illicit drug use. The question remains why marijuana precedes other forms of illicit drug use. Some argue that marijuana is simply the most accessible illicit drug, while more recent research suggests that marijuana use may prime the brain for future drug use. The reason for why marijuana precedes other forms of illicit drug use has not been conclusively studied. However, the ICSDP report only stated one hypothesis and users vs co-twin controls. Journal of the American Medical Association. 2003;289:427–433.


ignored studies relating previous marijuana use and future drug use effects.

Finally, marijuana need not be a gateway drug to be harmful. It is clear that marijuana is addictive—and by the ICSDP’s own claims, 9% of lifetime marijuana users become addicted to marijuana. Moreover, if use starts in adolescence, that rate jumps to about 17% - or 1 in 6.
Claim: Cannabis use “can cause potentially lethal damage to the heart and arteries.”

ICSDP “Bottom Line”: There is little evidence to suggest that cannabis use can cause lethal damage to the heart, nor is there clear evidence of an association between cannabis use and cancer.

Response:

Surprisingly, the ICSDP authors hardly mention the study upon which the claim is based. The original claim indicates that marijuana use may trigger acute, potentially lethal cardiovascular events, but the ICSDP report defends the separate point that marijuana use over time does not contribute to poor cardiovascular health.

The study upon which the claim is based describes the French Addictovigilance Network, a system by which health practitioners are legally obliged to report when drug use is involved in serious medical cases. The authors claim that “spontaneous reporting (as, for example, in the field of pharmacovigilance) is the cornerstone to identify signals” for risk factors. The study found that the rate of cardiovascular events related to cannabis increased three-fold among 35 cases studied between 2006 and 2010 and that of those cases, 9 resulted in deaths, despite an exceptionally young average age of the victims (34.3 +/- 8.8). This death rate (25.6%) is evidence that cannabis-related cardiovascular adverse events are often extremely serious, which seems to be in line with the original “claim.” The authors conclude that, while it is difficult to draw any generalizable conclusions given the limitations of the French Addictovigilance Network, this may indicate that cannabis use is a trigger for severe cardiovascular events. This finding is in line with previous studies, for example one which found that 0.8% of myocardial infarction were attributable to marijuana smoking, and that the relative risk for a heart attack after using marijuana was higher than that from sexual activity.37

The crux of the ICSDP response is that correlation between negative health effects do not imply causation. As mentioned before, it is difficult to establish a causal relationship in social science research. It took scientists over forty years to confirm that cigarette smoke indeed causes lung cancer, and in that stretch of time, Big Tobacco used correlation versus causation arguments to persuade millions who later died of lung cancer to start smoking.

However, correlational evidence shows the negative cardiovascular and pulmonary effects of marijuana use. In a study in the Journal of Clinical Pharmacology, the researcher concludes that marijuana does not have a negative effect on healthy, young marijuana smokers, but poses a threat to those with cardiovascular disease because of the consequences of the resulting increased cardiac work, increased catecholamine levels, carboxyhemoglobin, and postural hypotension. Marijuana smoke is correlated with increased prevalence of bronchitis, cough, and phlegm and acts as a lung irritant, dilating

38 Jones, R. T. (2002). Cardiovascular system effects of marijuana. The Journal of Clinical Pharmacology, 42(S1), 58S-63S.
Evidence supports that fine particulate matter like that in marijuana or tobacco smoke has shown to be related with increases in lung cancer and other pulmonary illnesses.

Many claim, as does the ICSDP report that there is evidence that tobacco and marijuana smoke are not equally carcinogenic. The authors cite a case-control study by Hashibe et al. which states its limitations pertaining to selection bias, measurement error, and confounder history. To confirm its findings that marijuana smoking did not cause lung cancer, Hashibe’s team cites what seems to be a seminal work in the field, titled “Cannabis and tobacco smoke are not equally carcinogenic,” which was written by Dr. Robert Melamede. Closer investigation reveals that Dr. Melamede is the former CEO and president of publicly traded, for-profit company Cannabis Science Inc. (OTCMKTS: CBIS). There is evidence of a conflict of interest in Dr. Melamede’s research, a central piece of literature in the field, which demonstrates the role that marijuana companies will play in influencing drug policy and public health research.

Finally, the ICSDP’s laser focus on heart and artery problems seems strangely myopic, given that more conclusive research has been conducted on marijuana’s other health effects. For example, a significant amount of research has shown that marijuana has negative effects on men’s health. Marijuana causes a decrease in sperm motility and sperm count and is correlated with a two-fold increase in incidence rate of non-seminoma testicular tumors among cannabis users. While the correlation between cannabis use and testicular cancer does not imply causation, Wayne Hall of University of Queensland states, “It is… a biologically plausible effect, given that cannabinoid receptors are found in the male reproductive system.”

Finally, basic common sense supports the correlational evidence. If smoking cigarettes causes serious health problems, it should come as no surprise that smoking marijuana—which contains hundreds of compounds, many of which remain unstudied—may have similar effects.

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44 http://www.cannabisscience.com/
Claim: Cannabis use lowers IQ by up to 8 points.

ICSDP “Bottom Line”: There is little scientific evidence suggesting that cannabis use is associated with declines in IQ.

Response:

The claim that cannabis use reduces IQ is derived from a finding by Meier et al. (2012) in the study entitled, “Persistent cannabis users show neuropsychological decline from childhood to midlife.” In the study, Meier’s team used existing longitudinal data from the Dunedin Sample to find that “the most persistent adolescent-onset cannabis users evidenced an average 8-point IQ decline from childhood to adulthood.” The crux of the ICSDP rebuttal is that these IQ declines may be explained by difference in socioeconomic status (SES) rather than marijuana use. ICSDP references a critique conducted by Dr. Ole Rogeberg from the Ragnar Frisch Centre for Economic Research in Norway, who concludes the aforementioned study’s “conclusion seems premature in light of likely confounding from socioeconomic status.” Rogeberg’s study uses simulated (as opposed to actual) data to show that, if incidence of cannabis use is more prevalent among participants of lower SES, then that may eliminate the effect of cannabis use on IQ found in Meier’s study.

Despite the report’s stated intention to combat the “selective inclusion of research studies based on their support for a predetermined narrative” and stated methodology for the authors to “[undertake] a thorough review of all scientific peer-reviewed studies, as well as non-peer reviewed scientific studies... on these topics,” it seems the ICSDP authors conveniently missed the peer-reviewed response to Rogeberg’s study, published by members of Meier’s team in 201349. The response to Rogeberg states: “Rogeberg’s idea and simulated data are interesting, but actual data exclude the possibility that the IQ drop we observed was attributable to SES differences.” Instead, the actual data showed that cannabis use was not concentrated in participants of lower SES, which was the underlying premise of Rogeberg’s response.

The ICSDP authors also claim that the population size for Meier’s study is too small. They state “the major claim (i.e., an 8-point drop in IQ as a result of cannabis use) was observed among only a very small subsample (n = 38) of participants, representing 0.037% of the total sample.”

First, it should be noted that 38 subjects of the total Dunedin Study dataset participants (n=1,037) is not equal to 0.037%. It is 3.7%.

\[
\frac{38}{1037} \times 100\% = 3.7\%
\]

Second, the population of 38 only includes the study subjects with the absolute highest prevalence of marijuana use (3+ diagnosis for cannabis dependence over the course of the study). There are 632 total cannabis users in the Meier sample. The authors found that

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48 Rogeberg, O. (2013). Correlations between cannabis use and IQ change in the Dunedin cohort are consistent with confounding from socioeconomic status. Proceedings of the National Academy of Sciences, 110(11), 4251-4254.

49 Moffitt, T. E., Meier, M. H., Caspi, A., & Poulton, R. (2013). Reply to Rogeberg and Daly: No evidence that socioeconomic status or personality differences confound the association between cannabis use and IQ decline. Proceedings of the National Academy of Sciences, 110(11), E980-E982.
heavier users suffered greater declines in IQ, “up to 8 points” for the heaviest subset of users in the sample.

Third, the Meier study did not include all participants from the Dunedin sample. The Meier study had a full sample size of 874 participants from the Dunedin sample. Total cannabis users out of the sample size (n=632) represents 72% of this sample.

Finally, the statistical test conducted by Meier, the linear trend t test, accounts for sample size when producing results. A small sample size will have a higher standard error, but it is still possible to derive meaningful results if the difference between outcomes for cannabis users and non-users is large enough. The likelihood of there being no effect of cannabis use on full-scale IQ according to this test is p<0.0001. This means that, given the data analyzed by Meier, there is less than a 0.01% chance that cannabis use does not have an effect on full-scale IQ.

Perhaps most importantly, cannabis use does not merely affect IQ scores, which are not the best predictor of life success. For example, Dr. Amelia Arria of the University of Maryland found in a rigorous, longitudinal study that cannabis use was related to higher discontinuance in college (either taking a leave of absence or dropping out)\(^5\), even after adjusting for high school GPA and other demographic factors.

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Claim: “[Cannabis] is a drug that can result [in] serious, long-term consequences, like schizophrenia.”

ICSDP “Bottom Line”: While scientific evidence supports an association between cannabis use and schizophrenia, a causal relationship has not been established.

Response:

The ICSDP report concedes that marijuana use and schizophrenia are related, but continue that available evidence of correlation does not imply causation. The ICSDP writers use the rest of their refutation to challenge that marijuana use is likely to cause schizophrenia.

The foremost argument offered is “given that cannabis use has increased fourfold among the UK population between the early 1970’s to 2002, there should be a corresponding 29% increase in cases of schizophrenia among men, and 12% increase in schizophrenia among women between 1990 and 2010.” Just as correlation does not imply causation, a lack of correlation does not imply a lack of causation. For example, diagnostic practices could have changed significantly between 1990 and 2010. Indeed, in 1990, DSM-III-R was used as a diagnostic criteria guide for mental disorders including schizophrenia. In 1994, DMS-III-R was updated to DSM-IV, and in 2000, DSM-IV was updated to DSM-IV-TR. In the 20-year stretch studied, there were three different versions of the DSM, and potentially hundreds of scientific advances in schizophrenia and other mental disorders that could have improved doctors’ understanding of schizophrenia and artificially changed diagnosis rates. That diagnosis rates have not changed proportionally to marijuana use increases tells us little, if anything, about the relationship between marijuana use and schizophrenia. Incidence of marijuana and incidence of schizophrenia are too far removed to draw any meaningful conclusion from their correlation or lack thereof.

Still, there are some population-based studies that show an increase in schizophrenia correlated with an increase in marijuana use that were omitted from the ICSDP report. A 2007 study found that the incidence of psychotic disorders changed trends and increased strongly in the second half of the 1990’s, which the authors state “coincides with the increased use of cannabis among young Swiss in the 1990’s”. A study by Boydell et Al (2006) states:

“We found that cannabis use in the year prior to presentation to the psychiatric services in SouthEast London increased between 1965 and 1999 in both patients with schizophrenia and those with non-psychotic disorders. However, the increase in the former group was much greater than in the latter even after we controlled for age, sex and ethnicity. These findings are compatible with growing evidence that cannabis use is a contributory cause of schizophrenia, as evidenced by recent reviews and meta-analyses of epidemiological data (Arseneault et al. 2004; Henquet et al. 2005b; Semple et al. 2005).”

The ICSDP writers report on several studies that show a correlation between marijuana use and schizophrenia. Two such studies (Zammit

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et al., 2002\textsuperscript{53} and Moore et al., 2007\textsuperscript{54}) showed a dose-respondent correlation controlling for factors such as personality traits, other psychotic drug use, and acute intoxication. Moore and colleagues, whose study is a systematic review of the literature, go on to conclude “that there is now sufficient evidence to warn young people that using cannabis could increase their risk of developing a psychotic illness later in life.” Other studies omitted in the ICSDP report have similar findings: A population based study\textsuperscript{55} using the data from the National Epidemiological Survey on Alcohol and Related Conditions by Davis et al. (2013) found a dose-dependent relationship for psychosis and schizotypal traits with cannabis use, abuse, and dependence. A 2002 population based study\textsuperscript{56} in the American Journal of Epidemiology found a dose-response relationship that relates exposure with psychosis outcome. While these studies cannot account for all possible confounding variables and conclusively prove causation, they are a strong indication that increased cannabis use may put a person at greater risk for schizophrenia.

As Dr. Volkow has stated in the past, conclusive evidence on whether marijuana causes schizophrenia is “unlikely to be resolved in the near future.” However, strong correlations between cannabis use and schizophrenia incidence, especially those in a dose-dependent fashion, should give pause to public health officials and legislators.

The ICSDP report neglects other well designed pieces of research that further support a link between cannabis use and schizophrenia and psychosis risk. For example, Giordano and colleagues’ 2015 study\textsuperscript{57} show a persistent increase in schizophrenia associated with cannabis abuse that was present after controlling for genetic effects. A 2012 review\textsuperscript{58} in the Australian & New Zealand Journal of Psychiatry found that those with newly onset psychotic illness were able to improve their positive symptoms by ceasing cannabis use.

Dr. A. Eden Evins, MD, MPH, Chair of the Center for Addiction Medicine at Harvard Medical School states, “Patients often think that cannabis makes them feel better or more relaxed, but they come back clinically worse. Clinicians should alert patients to this.”\textsuperscript{59}


\textsuperscript{58} Mullin, K., Gupta, P., Compton, M. T., Nielsen, O., Harris, A., & Large, M. (2012). Does giving up substance use work for patients with psychosis? A systematic meta-analysis. \textit{Australian and New Zealand Journal of Psychiatry}, 46(9), 826-839.

Claim: Legalization / regulation increases the availability of cannabis.

ICSDP “Bottom Line”: “Evidence suggests that the supply of illegal cannabis has increased under a prohibition model, and that availability has remained high among youth. Evidence does not suggest that cannabis availability among youth has increased under regulatory systems.”

Response:

The ICSDP report claims that decreasing prices and increasing potency of illicit drugs in the United States, after years of strict drug enforcement (sometimes referred to as “The War on Drugs”), constitutes proof that the illegal status of drugs has increased the price of drugs. The writers then point to the Netherlands, a country “where cannabis has been de facto legalized for decades,” as an example where legalization has not led to increased use or decreased prices of cannabis.

The issue with this finding is its lack of a logical connection. How did an increase in drug enforcement lead to an increase in supply? This question goes unanswered in the ICSDP report, and indicates that external factors, unrelated to drug enforcement, likely decreased prices. Still, it seems clear that harsh drug enforcement between 1990 and 2010 was ineffective at curbing decreasing marijuana prices.

Marijuana proponents often paint their opposition with a wide brush – that all those in favor of keeping marijuana illegal want to maintain the status quo in terms of harsh drug enforcement, including mandatory minimum sentencing laws and unforgiving criminal offenses and prison sentences for first-time possession offenders. Instead, the science behind marijuana policy supports maintaining the illegal status of marijuana and adopting more moderate and less costly enforcement approaches.

For example, even at its current low prices, marijuana is still significantly more expensive than it might be under a legalized regime. Competition in a legal marketplace generally pushes prices towards marginal cost – meaning that the price of a legal commodity tends towards its cost of production. However, researchers indicate that marijuana’s illegal status makes it far more expensive than its input costs. According to researchers from the RAND Corporation60, legal cannabis could be produced for a tenth of what it sells for today:

“High-potency marijuana (known as “sinsemilla”) sells in the United States for $300–$450 per ounce, or 20 times the price of silver. By comparison, even very fancy tea rarely sells for as much as $300 per pound [16 ounces = 1 pound], and marijuana is easier to grow than tea.”

So why, then, did harsher drug enforcement fail to decrease the price of marijuana? Many researchers in the field subscribe to the idea that a small amount of enforcement (i.e. keeping drugs illegal) makes drugs far more expensive, while added enforcement has a smaller effect (i.e. diminishing returns). In the following graph produced by the RAND researchers, notice that with no drug enforcement (i.e. legal

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status), drugs are far less expensive than they are with any non-zero amount of enforcement.

Drugs which criminalizes the production and sale of marijuana (and other internationally illegal drugs), and so cannabis is nominally illegal in the Netherlands. However, there are several hundred “coffee shops” that overtly sell small quantities of marijuana (5 grams) without enforcement of the drug laws.

The major difference between this legal structure and full cannabis legalization is that production and distribution of marijuana is still illegal and forcefully enforced in the Netherlands, which keeps marijuana prices roughly in line with international rates. In the words of the RAND researchers’ report, “By keeping production and wholesale distribution illegal, the Dutch have kept their cannabis prices high and marketing to a minimum. That situation is a far cry from full legalization.” The RAND researchers’ report predicts that, following full legalization (including legalization of production and distribution), cannabis prices may decrease threefold and use rates would increase by as much as four to six times:

“Full legalization would involve both increased availability, as in the Netherlands, and also much lower prices. If the likely price effect on consumption is about threefold, and we add in some additional growth due to increased availability and decreased stigma and personal risk (such as arrest and the loss of employment) for users, we might expect something like four to six times as much cannabis to be consumed after legalization as is consumed now.”

The question remains: why, then, didn’t the Netherlands, which “legalized” marijuana, witness a drastic decrease in marijuana prices?

The authors refer to the Netherlands for their example of legalization. However, Holland is a signatory to the Single Convention on Narcotic

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Claim: “If marijuana was legalized, the increase in users would be both large and rapid…”

ICSDP “Bottom Line”: Evidence suggests that the policy environment (specifically legal status and enforcement policy) has at most a marginal impact on the prevalence of drug use, thereby suggesting that regulating cannabis markets will not inevitably cause higher levels of cannabis use.

Response:

First, the claim itself seems to be taken out of context. Here is the full paragraph of the referenced text:

“If the U.S. were to legalize marijuana, the number of marijuana users would increase. Today there are 15.2 million current marijuana users in comparison to 129 million alcohol users and 70.9 million tobacco users. Though the number of marijuana users might not quickly climb to the current numbers for alcohol and tobacco, if marijuana was legalized, the increase in users would be both large and rapid with subsequent increases in addiction.”

The ICSDP’s first argument is that “overall, countries known to have stringent or punitive drug policies did not exhibit lower levels of drug use compared to countries with less stringent or more liberal policies.” This is a curious statement for two reasons: First, countries with the harshest drug policies (e.g. Singapore, Malaysia) have some of the lowest drug use rates in the world. Second, the production and distribution of marijuana are still illegal even in countries with the most liberal drug policy, i.e. Holland, which prevents a massive price increase. In all countries referenced, marijuana is illegal, and production and distribution of marijuana still results in criminal offenses. The evidence presented does not support that legalization does not increase use. Instead, the evidence suggests that limited and smart control of drugs decreases drug use, and that additional drug enforcement has some returns.

A better analogy for marijuana legalization is not jurisdictions where marijuana is more or less legal, but those in which drugs are truly legalized and regulated. In this context, the claim about tobacco and alcohol makes sense. These legal drugs both have large corporate industries supporting sales and widespread distribution channels. Even the ICSDP admits that “alcohol and tobacco are legally regulated and… commonly used substances in many countries including Canada and the U.S.”

Moreover, legalization will allow corporations to employ large-scale marketing campaigns to increase use. Given that legal drug companies (e.g. tobacco and marijuana) make the vast majority of their profits from addicts rather than casual users and also that addiction rates for marijuana are much higher among adolescent marijuana users than adult marijuana users, can expect that for-profit marijuana companies will target adolescent use in order to increase profits. Anyone who has seen an alcohol commercial (or an old tobacco commercial) can discern that the target audience is likely younger than the legal consumption age.


Claim: Regulation will not reduce drug crime.

ICSDP “Bottom Line”: Given that the prohibition of cannabis has not been shown to reduce illegal supply, it is likely that cannabis regulation is more effective at minimizing criminal markets for cannabis, despite the fact that criminal markets will continue to represent a proportion of the total market.

Response:

The ICSDP authors' conclusion is confusing. On one hand, they admit: “Overall, there is a lack of high quality empirical investigations to substantiate how much drug crime thrives under regulatory systems for recreational cannabis.” Still, the authors conclude that “it is likely that cannabis regulation is more effective at minimizing criminal markets for cannabis,” presumably based on conjecture rather than research (which, they admit, does not exist). It is puzzling that they are able to form such a strong “research-based” conclusion without any “high quality empirical investigations.”

Instead of using empirical evidence, the ICSDP authors make an argument with misleading percentages:

“Although illegal drug crime is still likely to continue under a regulated market, under prohibition-based systems, criminal markets control 100% of the cannabis market. By contrast, regulatory markets will divert at least a proportion of revenue towards legal mechanisms.”

This argument is illogical and misleading. Clearly, a smaller percentage of a larger market could be greater than a larger percentage of a smaller market. If, in a completely hypothetical example, marijuana sales doubled and the legal marketplace took in 10% of the new total marijuana marketplace, the black market would still be larger than it was before (i.e. 90% of 200 is more than 100% of 100). This is not rhetoric or politics – it is math.

The ICSDP authors’ other argument is that harsher enforcement of drug laws has not decreased marijuana supply enough, and so removing all drug enforcement is the only logical solution to decrease marijuana supply. This is a false dichotomy. As stated before, it only seems logical that some sort of law enforcement is beneficial to decreasing supply. If enforcement did nothing to decrease supply, than by the laws of basic, competition-based economics, the price of marijuana would be close to the cost of its inputs. Marijuana costs more than 10 times what it costs to produce, so we know that drug law enforcement has done something to drive the price up. We do not know how fully-legal, recreational marijuana will impact supply because such a system has not existed long enough for substantive research. The ICSDP report’s evidence supports that more drug enforcement (i.e. stricter penalties) have a limited effect on curbing drug supply. As mentioned before, this evidence points not towards recreational legalization or overly-strict penalties – it supports an intermediate approach where marijuana is still illegal.

Further, up until this point in the ICSDP report, the authors have claimed that marijuana in the Netherlands is de facto legal. However, in this section, they refute their own claim: “Unfortunately, the situation in Netherlands is not very instructive since, due to their unusual legal approach, whilst the sales of cannabis from the ‘coffee shops’ is tolerated, supply to the ‘back door’ remains via criminal producers and suppliers.” It is interesting that, for the ICSDP authors, the Netherlands is an example of legal marijuana in some cases and illegal marijuana in others.
Finally, ICSDP ignores the close relationship that drug traffickers have with governments in many parts of the world. The probability of “capture” of a legalized drug market by traffickers in those areas is very real. Indeed, in such markets, legalization may simply expand the market for traffickers through better distribution channels, a larger pools of consumers, and the ability to overtly leverage law enforcement and the judicial system to the traffickers’ benefit.
Claim: “We are going to have a lot more people stoned on the highway and there will be consequences.”

ICSDP “Bottom Line”: While experimental studies suggest that cannabis intoxication reduces motor skills and likely increases the risk of motor vehicle collisions, there is not sufficient data to suggest that cannabis regulation would increase impaired driving, and thereby traffic fatalities.

Response:

The ICSDP report correctly finds that marijuana use impairs motor skills, doubling the chance of a motor crash.

The ICSDP report uses a complicated graph to demonstrate that fatalities have not increased since more liberal marijuana policies were adopted in 2012. This graph only shows fatalities in seven months of the year, and matches up data from different years in a confusing way. It is unclear why the graph is set up the way it is.

As car safety (as well as media campaigns encouraging people to adopt safer driving tactics) improves, it should be expected that fatality rates would decrease over time; this makes comparing year-over-year motor fatalities confusing. Consider the following graph that maps out fatalities between 2002 and 2015 (years marked with an asterisk are preliminary data):

Source: Colorado Department of Transportation

As expected, between 2002 and 2011, the number of fatalities decreased all but two years. In 2012, however, the number of fatalities has begun to rise, increasing every year since. These results do not account for 2014 and 2015, the first two years with a recreational marijuana marketplace (data for both these years are preliminary).

The ICSDP report also completely ignores data showing that marijuana-related driving incidents have risen in Colorado cities such as Denver and Aurora, and in Washington state as a whole.64

The ICSDP authors seem to claim that cannabis use makes drivers more cautious, though this research finding seems to be taken out of context. The author of the original review65 clarifies:

64 Denver Police Department, Data from Aurora and Denver through Dec 1, 2014. Washington State Toxicology Report Release August 18, 2015.

“Cannabis drivers appeared to be aware of impairment and attempted to compensate by driving more slowly and taking fewer risks. Perceived driving effort increased under the influence of THC. Others reported that it was not possible to fully compensate because of a control cost. THC’s impairing effects increase with task complexity, so a realistic driving task involves subtasks requiring simultaneous attention.”

It is important to note that the conclusion of the review cited by ICSDP is: “Evidence suggests recent smoking and/or blood THC concentrations 2–5 ng/mL are associated with substantial driving impairment, particularly in occasional smokers.”

The ICSDP authors also compare marijuana-related motor fatalities with alcohol-related motor fatalities, claiming that driving drunk is more dangerous than driving high. However, this claim is hardly sound evidence that driving while high is safe. Drunk driving has killed thousands, and just because driving high is less dangerous than driving drunk does not mean it is not still quite harmful.

Indeed, research published in the British Medical Journal concludes that marijuana intoxication plays a significant role in motor fatalities66: “Acute cannabis consumption is associated with an increased risk of a motor vehicle crash, especially for fatal collisions,” the research team found. “Rates of driving under the influence of cannabis have also risen in recent years... cannabis is consistently one of the most frequently detected psychoactive substances (second after alcohol) and individuals who drive within two hours of using cannabis have raised rates of collision.”

We are also very concerned about the mix of alcohol and marijuana with driving. Research has become clear that using alcohol in combination with alcohol is more dangerous than using either drug alone.67

The negative externality that increased drug use may not just affect the user but also others is one of the most compelling reasons for restricting the use of marijuana.


67 For example, see Hartman et al. (2015). Cannabis effects on driving lateral control with and without alcohol. Drug and Alcohol Dependence. 154. 25-37 http://dx.doi.org/10.1016/j.drugalcdep.2015.06.015
Claim: Regulation leads to a “Big Marijuana” scenario.

ICSDP “Bottom Line”: Available evidence regarding “Big Marijuana” is currently lacking, though regulatory controls can be introduced within regulatory systems to reduce the potential of profit maximization by cannabis retailers.

Response:

The ICSDP report does not provide any data that a “Big Marijuana” industry will not come about as a result of marijuana legalization. Rather, the authors use the Netherlands as an example of a state where de facto legalization has not led to a Big Marijuana industry. As mentioned before, marijuana is still illegal in Holland, and while law enforcement turns a blind eye to “coffee shop” sales, Dutch residents still face legal penalties and prison time for production and distribution of the drug. These consequences naturally prevent a burgeoning “Big Marijuana” industry. If marijuana were made legal, however, then these consequences would no longer exist.

The ICSDP authors claim that regulation could control the influence of a “Big Marijuana” industry that could make profit to the detriment of public health. If this were true, however, then why do the tobacco and alcohol lobbies continue to have immense power in American politics? Smoking is the leading cause of preventable deaths in the United States, the public health costs of tobacco far outweigh its tax revenues, and the tobacco companies continue to appeal to underage populations (nine out of ten smokers began before they turned 18\textsuperscript{68}, and 9.3% began before they turned 13\textsuperscript{69}). Yet, the tobacco lobby is so powerful that tobacco companies continue to bring in tremendous profits, even though they make hundreds of thousands of teenagers into tobacco addicts per year\textsuperscript{70} while 85% of smokers state they wish they could quit or had never started\textsuperscript{71}. If regulations – including many cited in the ICSDP report – has been unable to control Big Tobacco, how could we possibly expect to control a Big Marijuana industry?

Researchers should not forget that tobacco and alcohol companies thrive not on “occasional” drinkers or smokers but addicts. 80 percent of the total volume of alcohol is consumed by 20 percent of drinkers – drinkers who consume more than two drinks per day – and these are the people on whom the alcohol industry makes a profit. As noted by the RAND researchers:

“That [problem users consume the vast majority of addictive substances] has a chilling implication: when we create a licit industry selling an abusable drug, the resulting businesses will have a strong profit incentive to create and sustain abusive consumption patterns, because people with substance-abuse disorders consume most of the product.” (Kleiman, Caulkins, & Hawkin, 2011).


\textsuperscript{71} http://www.gallup.com/poll/163763/smokers-quit-tried-multiple-times.aspx
The only reasonable argument against a Big Marijuana industry is that an industry would have trouble accumulating capital in the midst of regulation. Unfortunately, big companies are already making investments in marijuana. The third largest tobacco company in the world, Japan Tobacco (owner of Camel and Winston cigarettes), has already invested in marijuana vaporizer products coming out of Silicon Valley. Big Tobacco has researched the marijuana market since at least the 1970s. Leaked internal documents show that Big Tobacco considers marijuana as just “a natural expansion of current smoking habits which, if a more tolerant attitude were ever taken…would be a change in habit comparable to moving over to cigars.”

A 2014 report by researchers at the University of California, San Francisco and the University of Helsinki demonstrate the interactions between Big Tobacco and marijuana in the fledgling e-cigarette market:

“E-cigarettes are another nexus between tobacco and marijuana. E-cigarettes can be used as marijuana-delivery devices using hash oil and are difficult to distinguish from conventional e-cigarettes. In 2014, Altria (formerly Philip Morris) purchased Florida-based Green Smoke, an e-cigarette company whose logo and website suggests crossover marijuana use, and as of 2014, NORML [National Organization for the Reform of Marijuana Laws] was assisting the tobacco and e-cigarette companies in opposing efforts to include e-cigarettes in clean indoor air laws.”

It is foolish and naïve to believe that political powerhouses like Japan Tobacco and Altria (formerly Philip Morris), which have supported a Big Tobacco lobby for decades, will be unable to create a Big Marijuana industry. Indeed, Big Tobacco has contemplated a takeover of a legal marijuana market since the 1960s. Indeed, leaked internal documents show that Big Tobacco considers marijuana as just “a natural expansion of current smoking habits which, if a more tolerant attitude were ever taken…would be a change in habit comparable to moving over to cigars.”

Those in today’s marijuana industry recognize this, with the CEO of a hydroponics company commenting, “Ultimately, big alcohol or big tobacco is going to come into this space. I just can't imagine that won’t happen.”

Moreover, despite half a century of smoking regulation, Big Tobacco remains one of the most profitable industries in recent history. Marijuana would likely be no different.

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73 http://www.bloombergview.com/articles/2015-02-20/big-tobacco-s-future-big-pot
75 http://www.bloombergview.com/articles/2015-02-20/big-tobacco-s-future-big-pot
Conclusion

This critique finds several factual, logical, and even mathematical errors in the ICSDP report. Despite the report’s stated intention to combat the “selective inclusion of research studies based on their support for a predetermined narrative,” the inclusion and exclusion of different studies suggests that more consideration was given to data supporting a certain narrative.

And although the ICSDP report claims to be a systematic review of peer-reviewed and “gray literature,” many valuable studies were omitted (and peer-review would seem to mean that some external institution with an established, transparent process reviewed the article – not fellow legalization activists with an agenda).

The report’s findings remain curious for a trend of reporting results supporting their conclusion, and omitting high-impact journal publications of opposing views.

This critique is not a systematic review of the literature. Instead, this critique is only intended to highlight the shortfalls of the ICSDP report.

Authors’ Note

A response to a few claims was omitted because the evidence was repetitive or there was insufficient evidence to formulate an informed, research-based position.

Source: Fortune.com

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http://fortune.com/2013/03/21/the-big-business-of-marijuana-inc/