Using Social Media to Study Cannabis Use and Policy: A Pot-pourri of Findings

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Dartmouth College

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Center for Technology and Behavioral Health

Innovate · Evaluate · Disseminate

Disclosures

- supported by NIH-NIDA for over 25 yrs

- currently on DSMB for a clinical trial supported by Tilray, Inc

- consulted with GW Pharmaceuticals / Otsuka regarding abuse liability of Sativex (THC/CBD oromucosal spray)

Copy of Slides, Articles, or Other:

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My Background

Treatment Development for Substance Use Disorders (Cannabis) for over 25 years

Lab & Survey Studies

Cannabis Withdrawal, New Methods of Cannabis Administration, Legal Cannabis Laws

DSM-5 Substance Use Disorders Workgroup

Scientific Review Board: *Center for Medical Cannabis Research*, State of California – *Past*

Don't Currently Use Cannabis

– recreationally or therapeutically

Goals for Today

1. Illustrate how Social Media (e.g., Facebook) can be leveraged to expedite and advance research related to cannabis use, consequences, and policy

2. Provide snapshots of our work to date in this arena

3. Promote this type of research and provoke thought and contemplation -- caution

Digital Epidemiology

"Digital Epidemiology is the science of conducting epidemiological studies using data from digital tools and data sources through the internet."

http://www.slideshare.net/AngeloDAmbrosio/digital-epidemiology-55695051 https://www.facebook.com/notes/facebook-engineering/visualizing-friendships/469716398919/

Sampling and Collection?

facebook Sample Frame

- 191 million Facebook (Instagram) users in the United States
- 59% use it at least once per day
- Average of 20-25 minutes per day spent on FB

https://www.statista.com/statistics/324267/us-adults-daily-facebook-minutes/
https://www.statista.com/statistics/408971/number-of-us-facebook-users/
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Contribute to our cannabis (marijuana) research survey!
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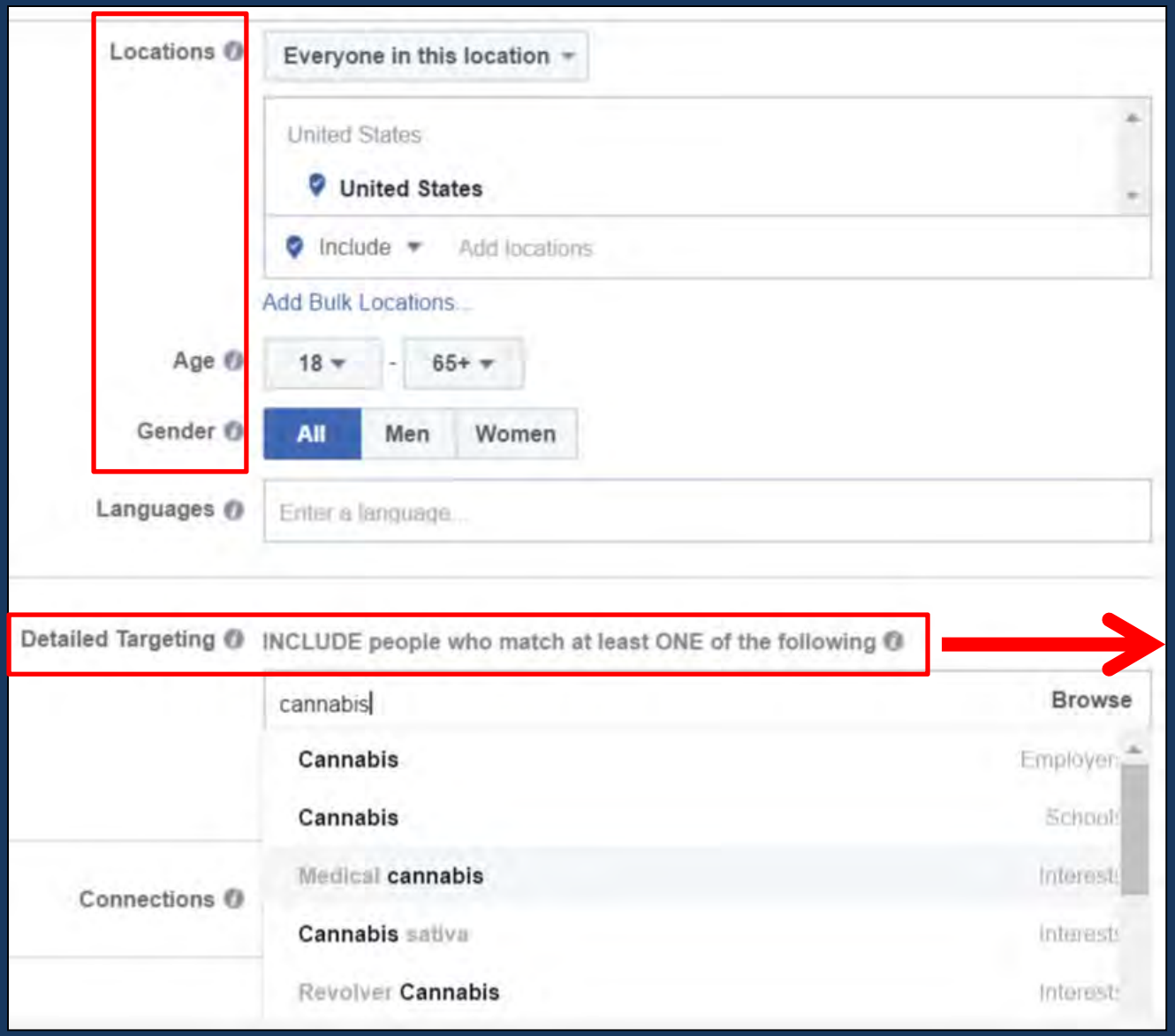
Targeted Advertising



Cannabis Landscape and Legal Cannabis Laws

Survey 1: Vaping/edibles

Survey 2: Vaping typology

Survey 3: Vaping/edibles (youth)

Survey 4: Home cultivation

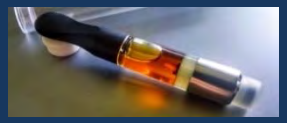
Survey 5: Anxiety sensitivity

Survey 6: Motives for use

Survey 7: Chronic Pain: Opioid & MJ use

Survey 8: Users vs. Non-Users:

driving, intoxication, perceived risk, medical use, perceived norms, knowledge (JB dsst.)



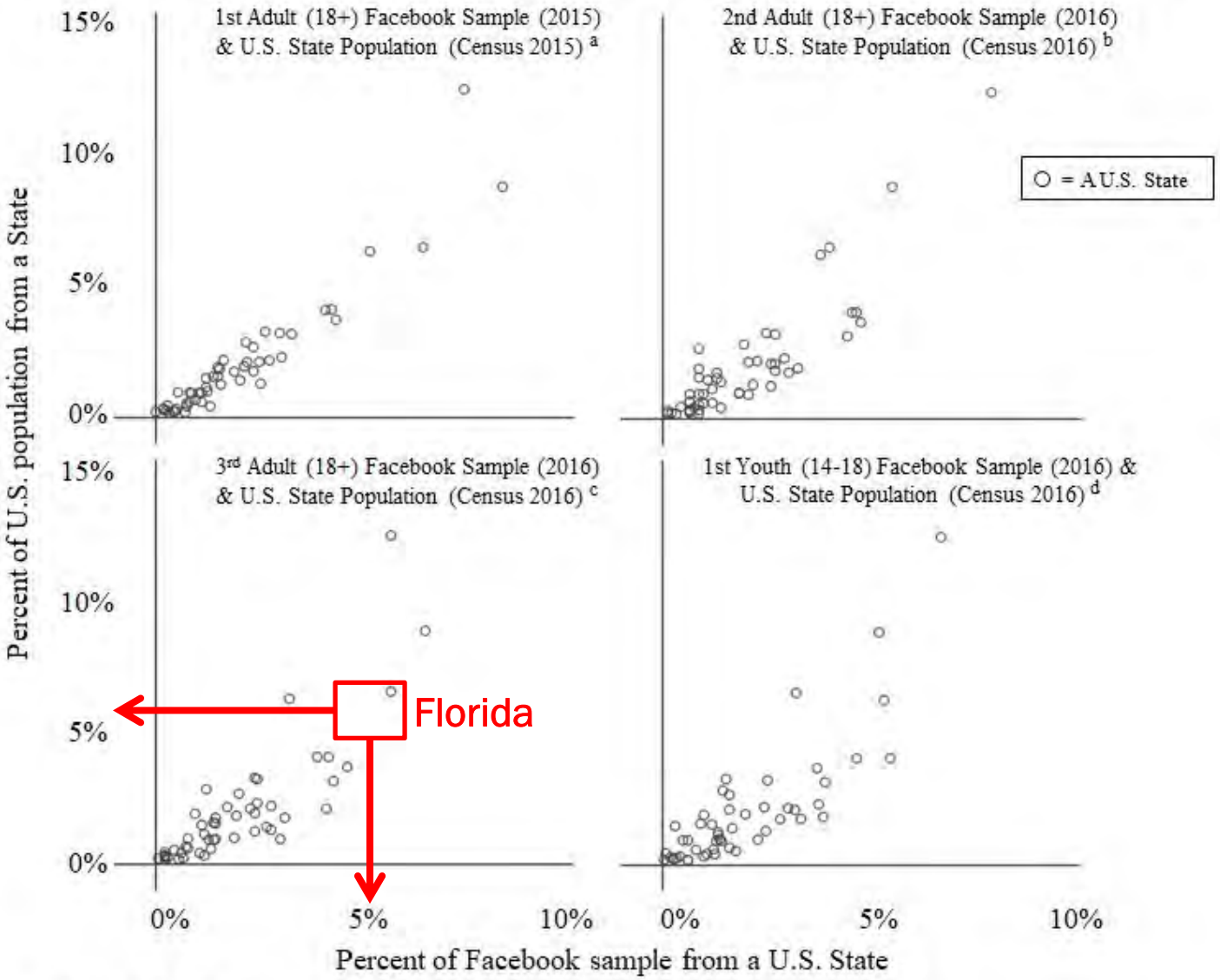
Cost and Time

First vaping survey	N=2983	$800 over 42 days
Second vaping survey	N=2073	$809 over 28 days
Youth vaping survey	N=3035	$350 over 20 days
Home cultivation survey	N=1813	$293 over 5 days
Anxiety, DD, UPPS survey	N=3024	$377 over 6 days
Motives for use / RTC	N=1155	$402 over 8 days
Chronic pain/opiate survey	N=403	$932 over 10 days
Intox, driving, norms, risks	N=8089	$4832 over 6wks
- cannabis users	n=6895	(usual ads / NPR)
- never users	n=2143	(usual ads / NPR)
		** incentive lottery

** no targeted project funding support

Geographic Representation

Figure 4. Percent of U.S. population in each State vs. percent of Facebook sample in each State



Pearson correlation coefficient: 0.94, p< .001[a]; 0.88, p< .001[b]; 0.83, p< .001[c]; 0.82, p< .001[d]
Spearman correlation coefficient: 0.95, p< .001[a]; 0.86, p< .001[b]; 0.86, p< .001[c]; 0.82, p< .001[d]

Cannabis use in past 30 days (5 studies)

Days used in past 30 days	# of responses	Percent
0 days	1,541	14.8
1 - 5 days	875	8.4
6 - 10 days	535	5.1
11 - 29 days	2,741	26.3
All 30 days	4,735	45.4
Total	10,427	100

Studies 1-3: Vaping

Harm Reduction? Clear harm reduction impact with respect to respiratory / lungs / carcinogenic factors. Could facilitate use of cannabis for medical purposes (more efficient, no smoke, etc.).

Concern: Nothing is known about long-term effects

Concern: Vaping may increase cannabis initiation, escalation and dependence

- perceived as safer, more discreet, better tasting, more efficient high, combined with flavors or nicotine

Preferred Route of Cannabis Administration Among those who have tried all 3 Methods

	Adolescents (N=959)	Adults (N=1,611)
Smoking	82%	82%
Eating	9%	6%
Vaping	9%	12%

Does vaping substitute for smoking?

Of the 1783 that ever vaped:

- 76% reported smoking as the most common route of administration
- Only 3% reported vaping more frequently than smoking

14% of vaporizer users reported that smoking cannabis rates decreased since initiating vaping

Suggests that dual use is prevalent among vaporizer users, may be some substitution

Adolescent Cannabis Initiation

First Route of Admin

- Smoking – 94%
- Vaping – 2%
- Eating – 4%

Second Route of Admin

- Smoking – 5%
- Vaping – 34%
- Eating – 61%

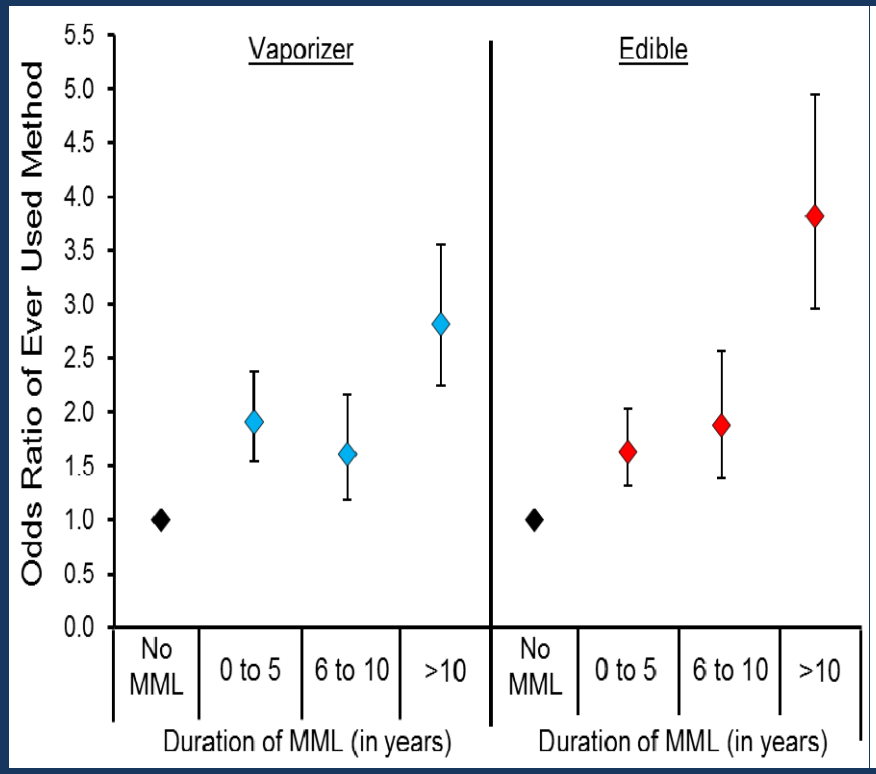
Third Route of Admin

- Smoking – 1%
- Vaping – 63%
- Eating – 36%

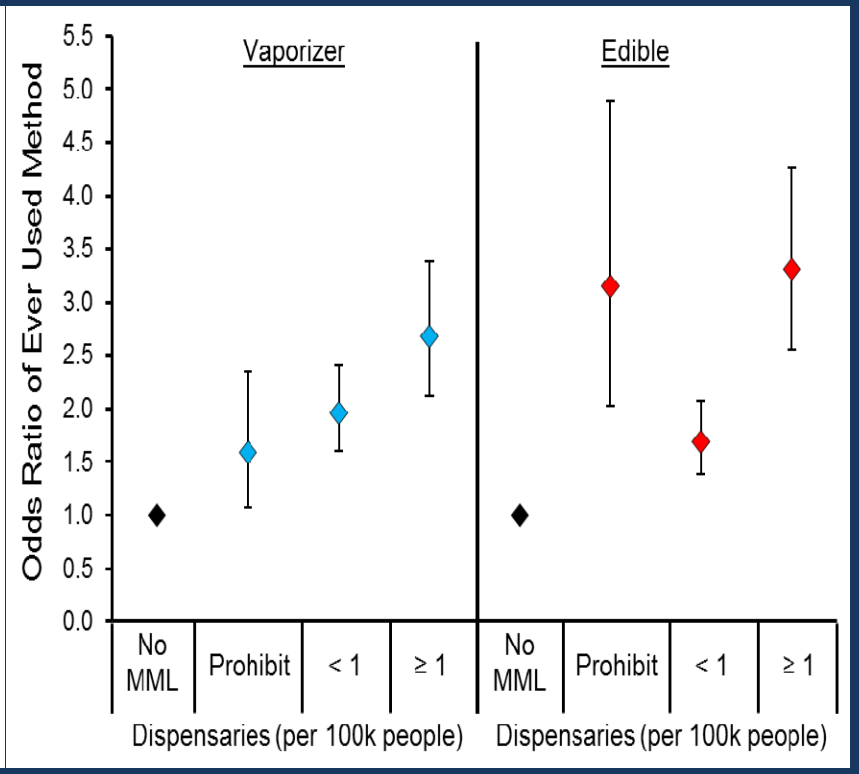
Youth Survey 2016: MMLs and Provisions relate to Methods of Use

(N=2630)

MML Status



Dispensary Status



* adjusted for age, gender, race, education, age onset, lifetime days used

Chronic Pain Management: Patient Self-reports on Opioid & Marijuana Use

- Patterns of marijuana / opioid for pain management

- Perceptions of marijuana and opioids' benefits and risks

** Naana Boachie, NIDA Minority Summer Intern

Facebook Advertising

Chronic pain target n=151

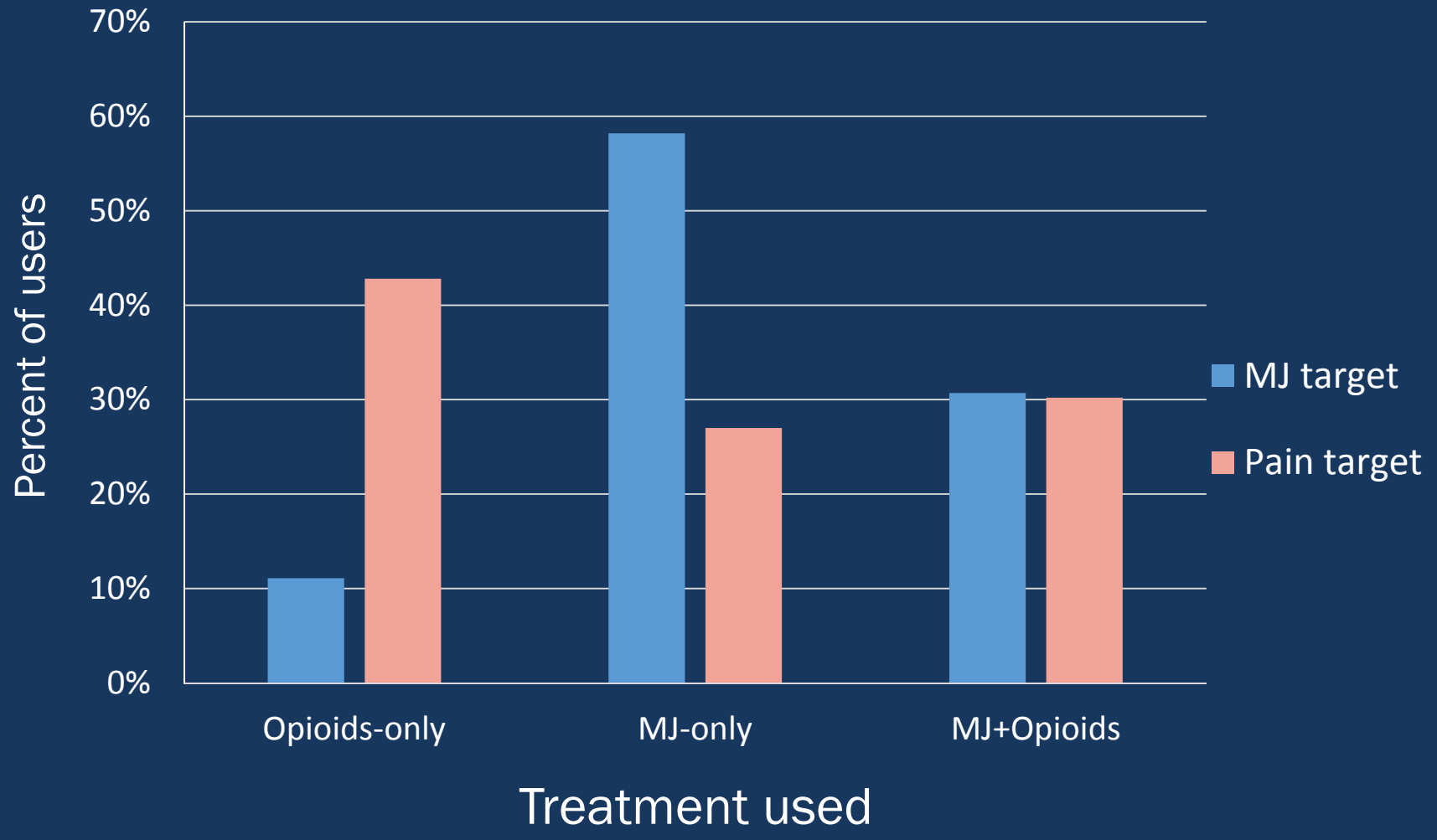
Marijuana target n = 251

Participants:

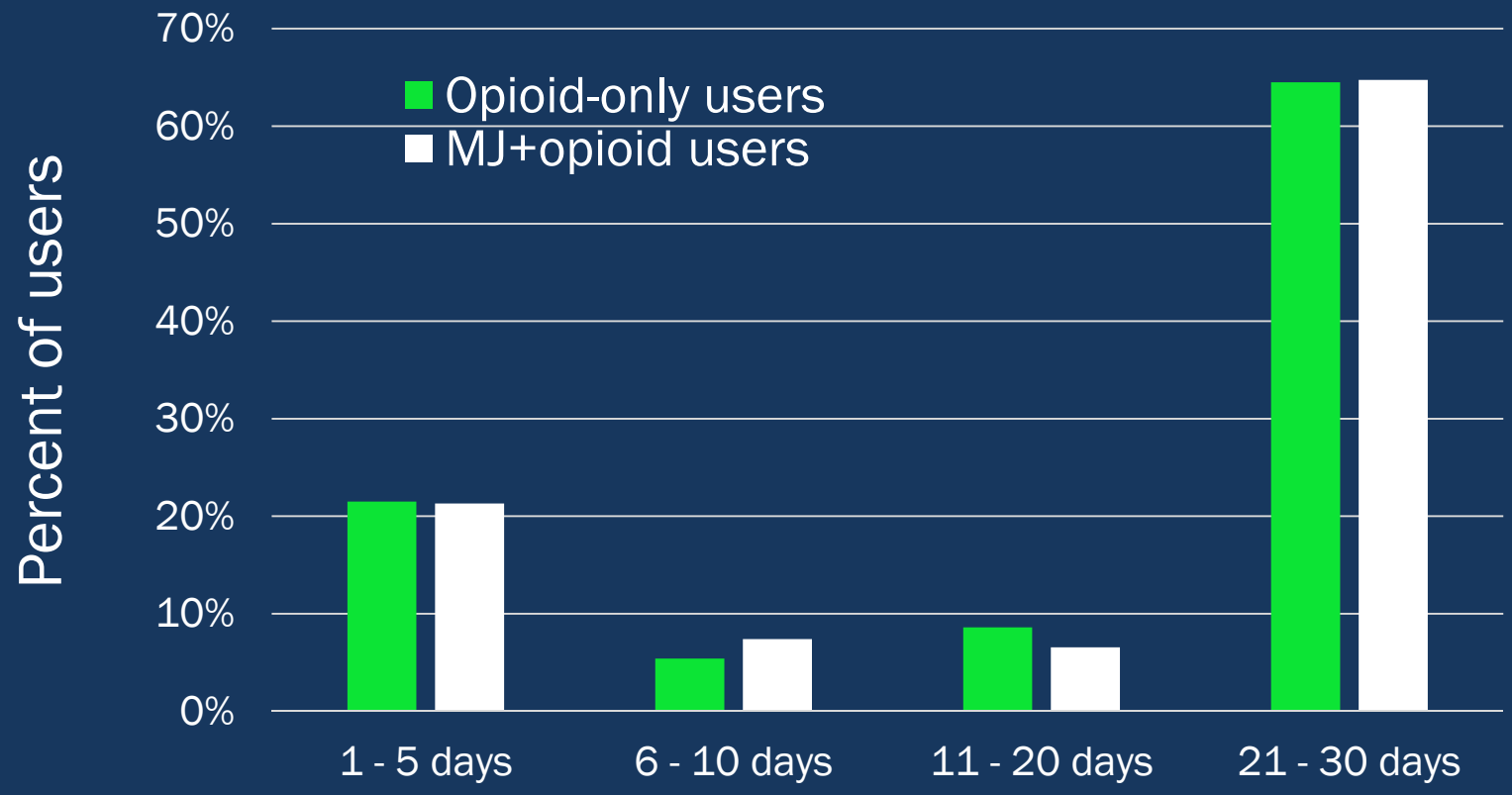
Inclusion: Chronic Pain, Used Opioids

- Average pain level: 7.2 (1.5)

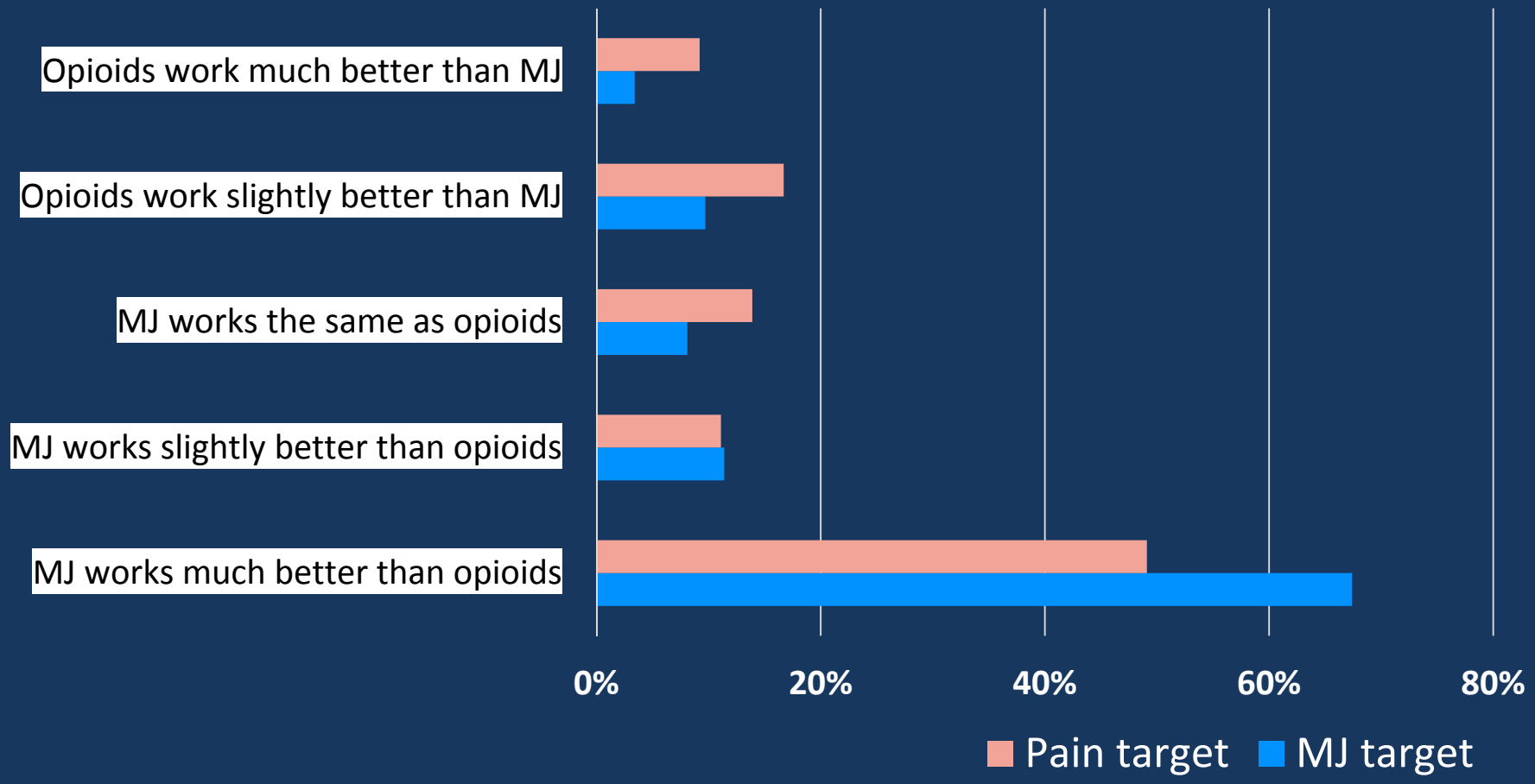
Pain treatment used in the Past 30 days



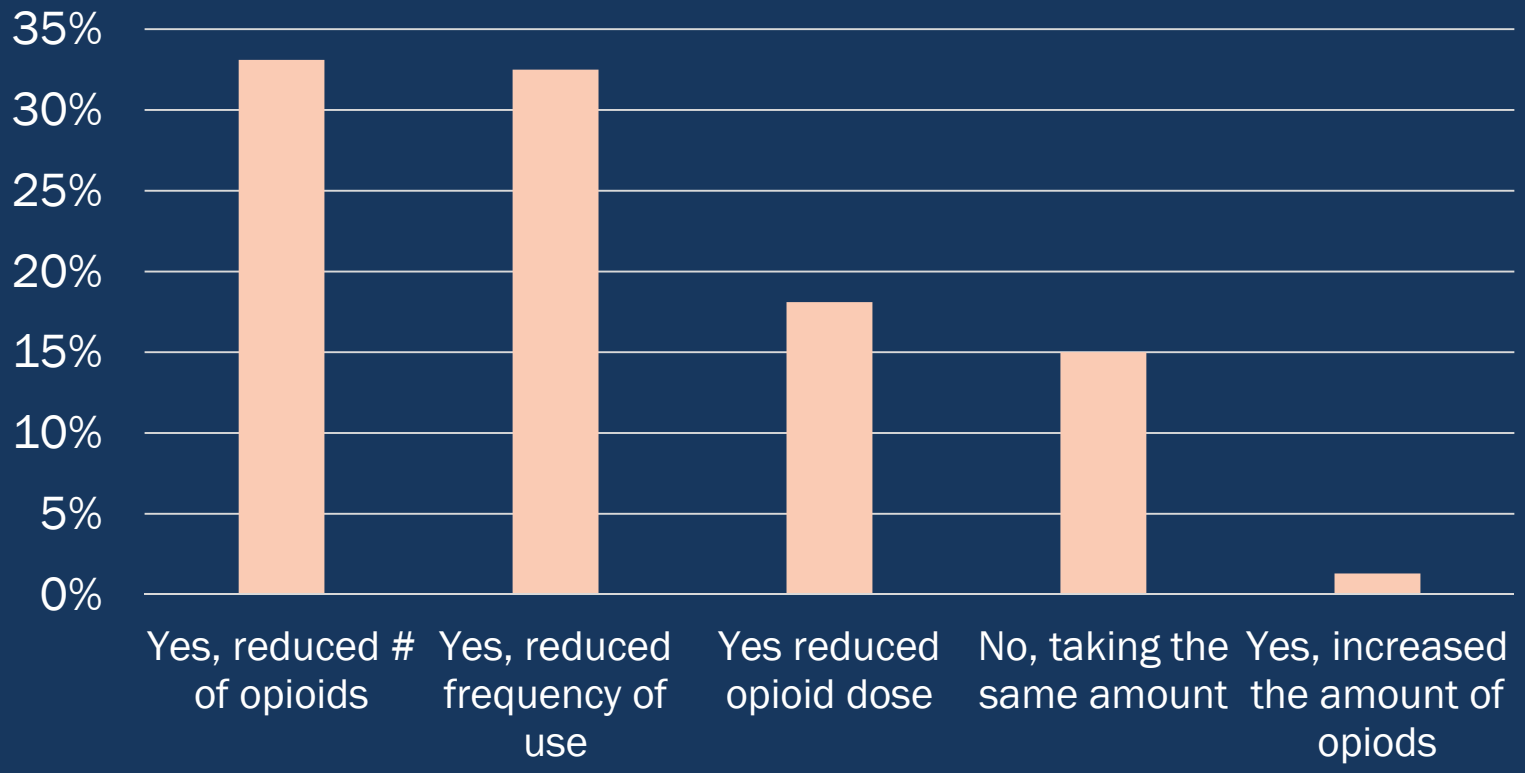
Past 30 days use of OPIOIDS among opioid-only users & MJ+Opioid users



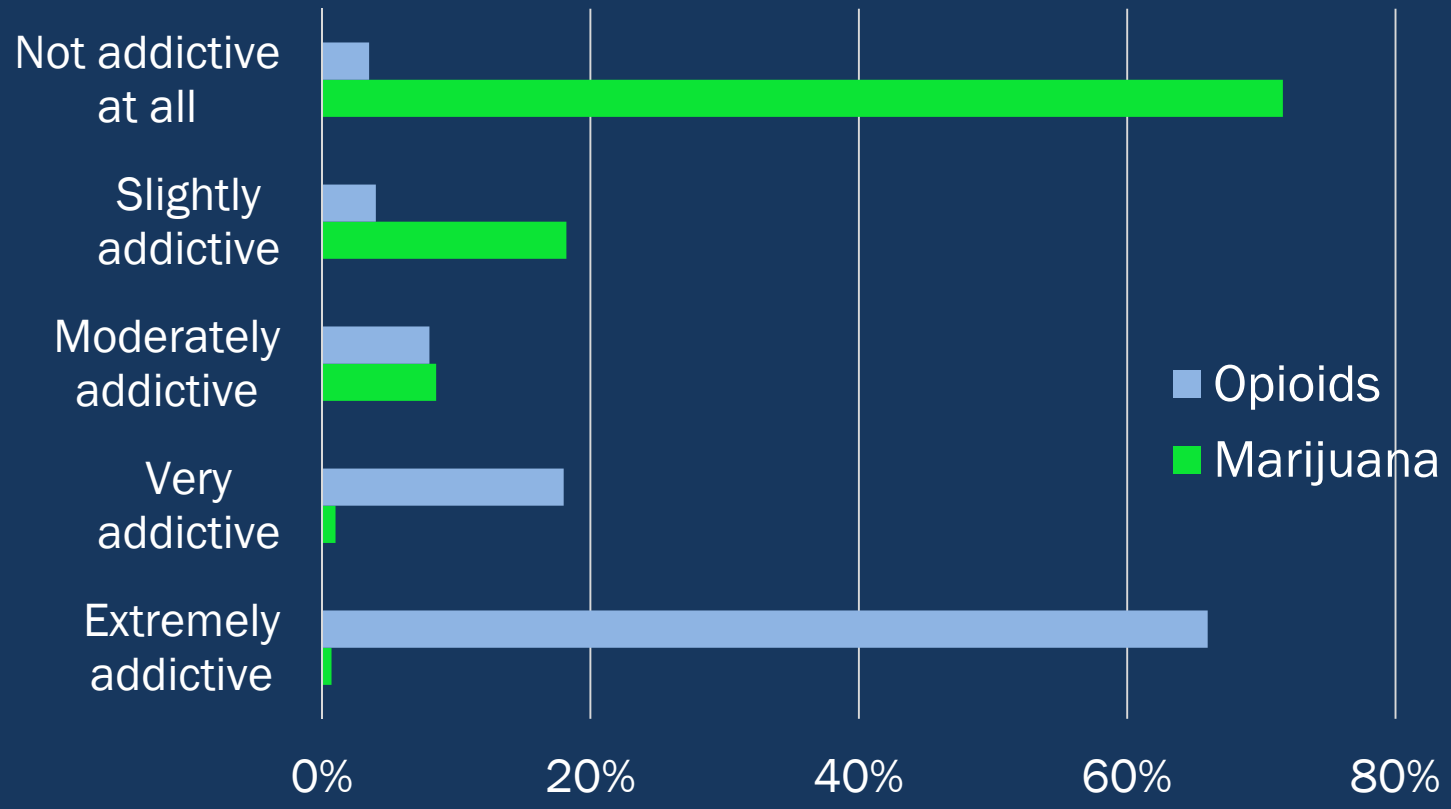
How MJ compares with opioids in relieving pain?



Marijuana's influence on opioid use among those using MJ+Opioids in past 30 days



Perceived addictiveness of marijuana and opioids



Study 7. Users / Never Users: intoxication, driving, norms, medical marijuana, knowledge, perceived risk, etc.**

** Borodovsky dsst.


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Table 1b. Cannabis use patterns of entire sample

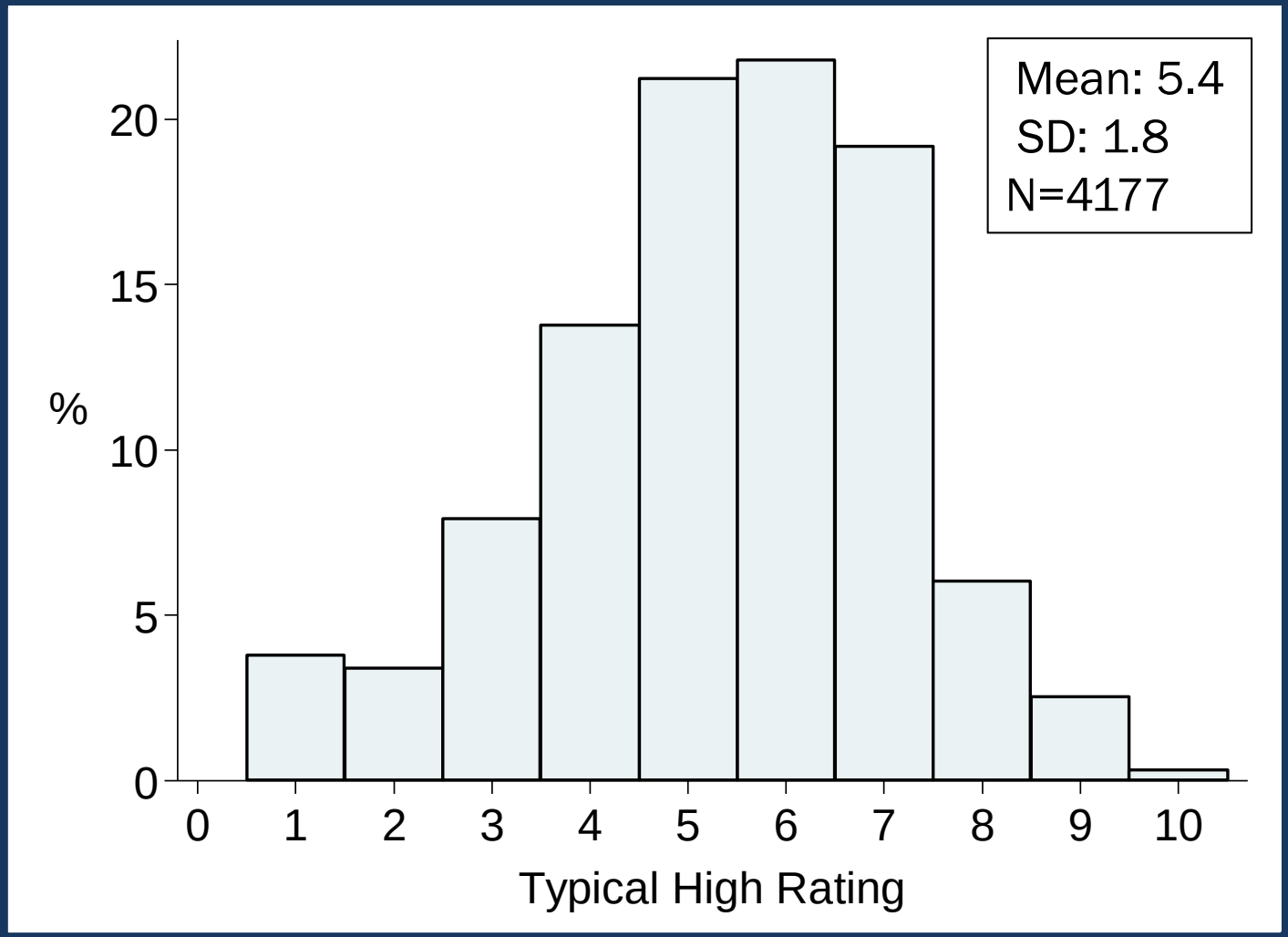
Ever used cannabis, n (%)	
No	2143 (24)
Yes	6895 (76)
Lifetime days cannabis use, n (%)	
1-10 days	1106 (17)
11 – 99 days	1025 (16)
100 – 499 days	1380 (21)
500 or more days	3107 (47)
Cannabis use recency, n (%)	
Never used	2143 (25)
Used >1 year ago	1503 (17)
Used within past year but not past month	720 (8)
Used within past month	4378 (50)
# days used cannabis in past 30 days, n (%)	
0 days	2240 (34)
1-19 days	1548 (23)
20-29 days	1123 (17)
All 30 days	1707 (26)
Age first use cannabis, mean (SD)	17.0 (5)

Survey question:
"When you use cannabis how high do you typically get?"

0 = SOBER
1 = light buzz
2
3
4
5
6
7
8
9
10 = So high that you VOMIT / THROW UP

van der Pol P, Liebregts N, Brunt T, et al. Cross-sectional and prospective relation of cannabis potency, dosing and smoking behaviour with cannabis dependence: an ecological study. Addiction. 2014;109(7):1101-1109.

Current (past 30 day) users



How much do you agree/disagree with the statement below?

"I can drive safely under the influence of cannabis"

	N	%
Strongly agree	1,498	23.5
Agree	1,184	18.6
Somewhat agree	929	14.6
Neither agree nor disagree	677	10.6
Somewhat disagree	534	8.4
Disagree	745	11.7
Strongly disagree	811	12.7

Cannabis users only (at least once)

"A person can drive safely under the influence of cannabis"

	N	%
Strongly agree	15	0.7
Agree	33	1.6
Somewhat agree	144	6.9
Neither agree nor disagree	199	9.6
Somewhat disagree	318	15.3
Disagree	554	26.6
Strongly disagree	821	39.4

Never-cannabis users only

How much do you agree/disagree with the statement below?

"When I am high, I can drive better than when I am sober"

	N	%
Strongly agree	460	7.2
Agree	479	7.5
Somewhat agree	602	9.4
Neither agree nor disagree	1778	27.9
Somewhat disagree	571	9.0
Disagree	1041	16.3
Strongly disagree	1447	22.7

Cannabis users only (at least once)

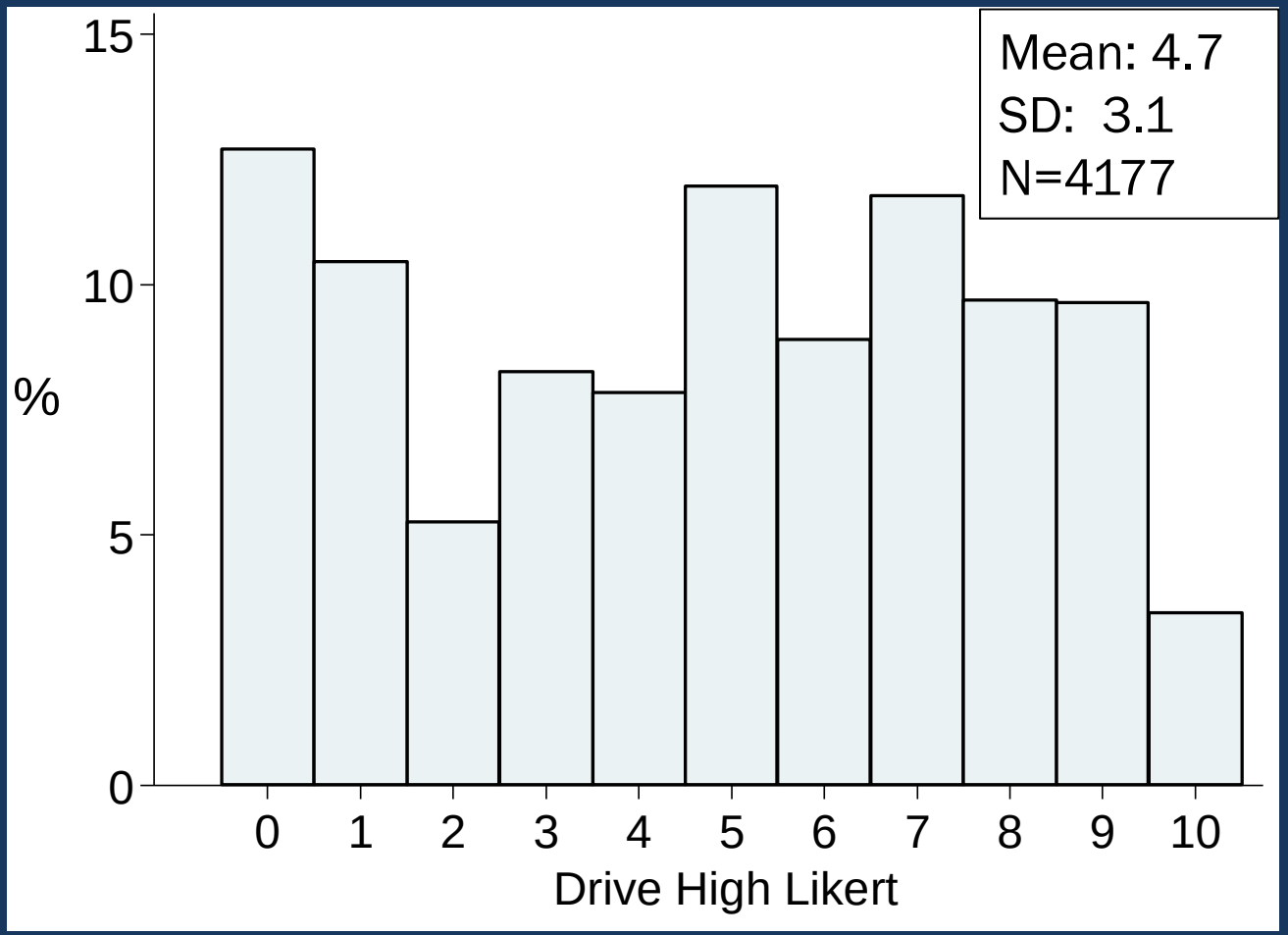
"Some people can drive better when they are high than when they are sober"

	N	%
Strongly agree	17	0.8
Agree	39	1.9
Somewhat agree	89	4.3
Neither agree nor disagree	291	14.0
Somewhat disagree	176	8.5
Disagree	498	23.9
Strongly disagree	974	46.7

Never-cannabis users only

How high could you get and still drive safely?"

Current (past 30 day) users



"Think about how high you typically get when you use cannabis. In the past 30 days have you driven a car within 2 hours after getting that high?"

	N	%
Have	2353	76.4
Have not	727	23.6

Mixed effects adjusted logistic regression model:

	OR (95% CL)
No Legal Cannabis Laws	Ref
Medical Cannabis Laws Only	0.75 (0.60, 0.94)
Recreational Cannabis Laws	0.51 (0.53, 0.90)

Corrected for: age, age onset of marijuana, # of days used in life, race, education, employment, # of years living in current state, # of days used marijuana in past 30 days, # times used marijuana per day FB targeting strategy

"Think about how high you typically get when you use cannabis. In the past 30 days how many days have you driven a car within 2 hours after getting that high?"

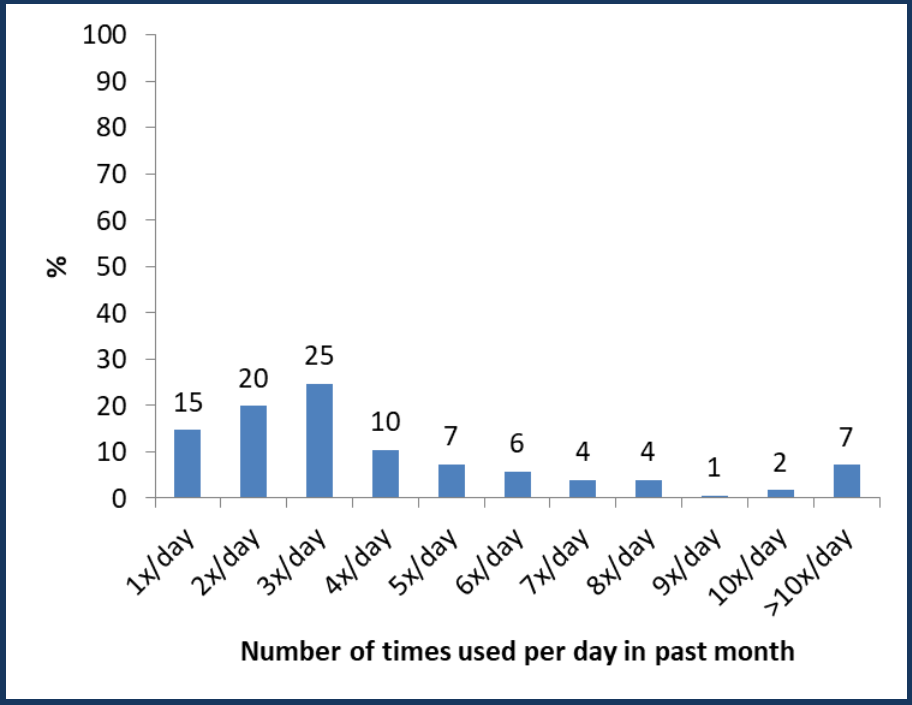
	N	%
0 days	727	23.6
1-2 days	533	17.3
3-5 days	350	11.4
6-9 days	284	9.2
10-19 days	401	13
20-25 days	243	7.9
26-29 days	121	3.9
All 30 days	421	13.7

Medical Cannabis Approvals vs. Medical Use
(States with MMLs only)

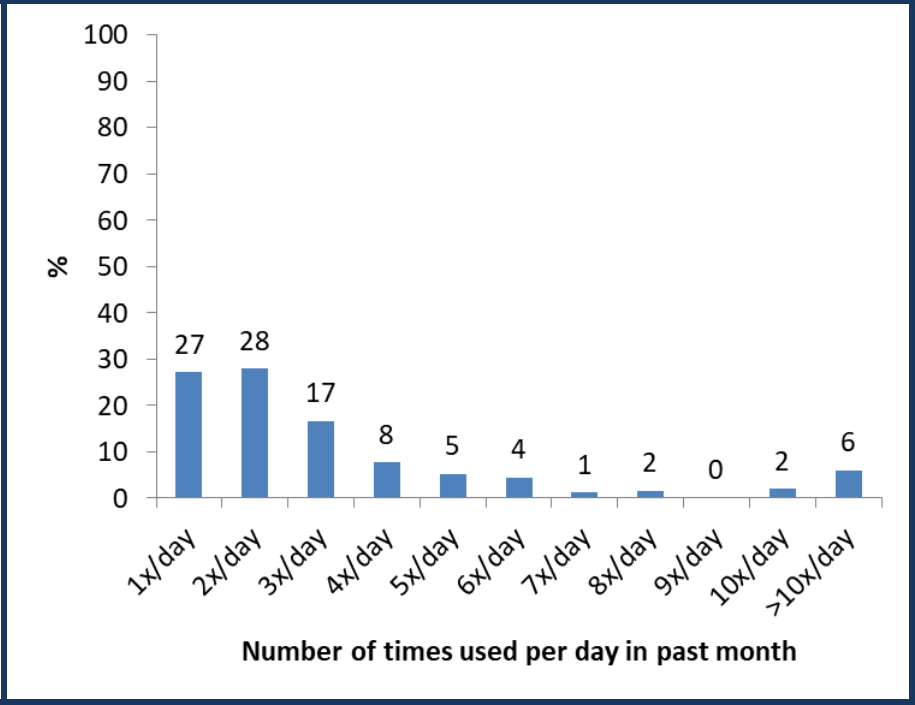
Why do you use Cannabis?	Yes Have Approval	No
-- Medical Reasons Only	17%	3%
-- Recreat. Reasons Only	2%	25%
-- Medical and Recreational	81%	71%

of Times used per day - past-30 day users

medical cannabis card holders

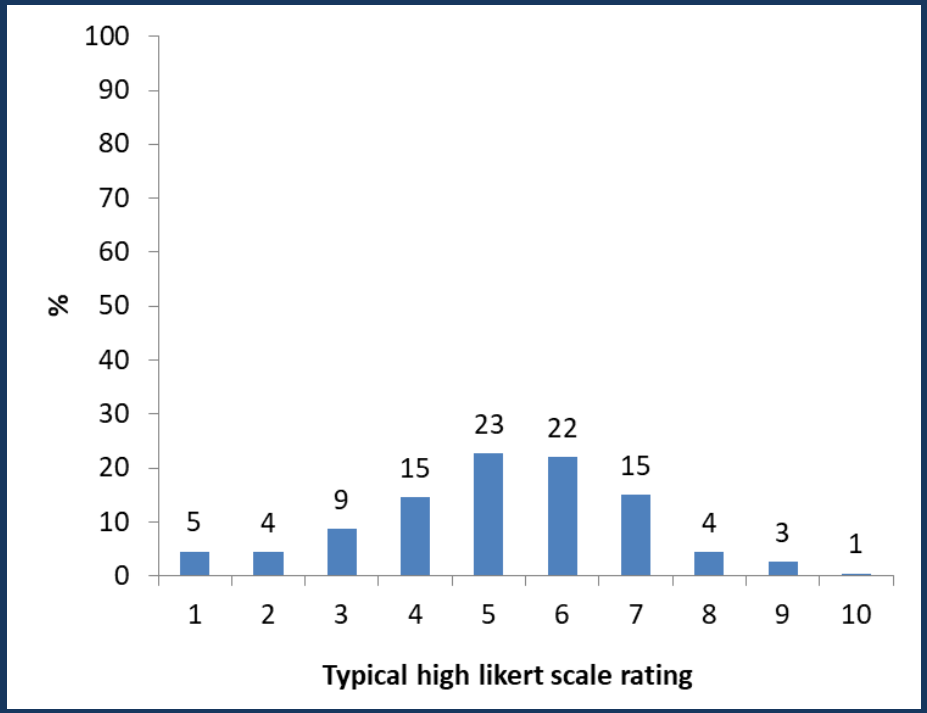


only for medical reasons

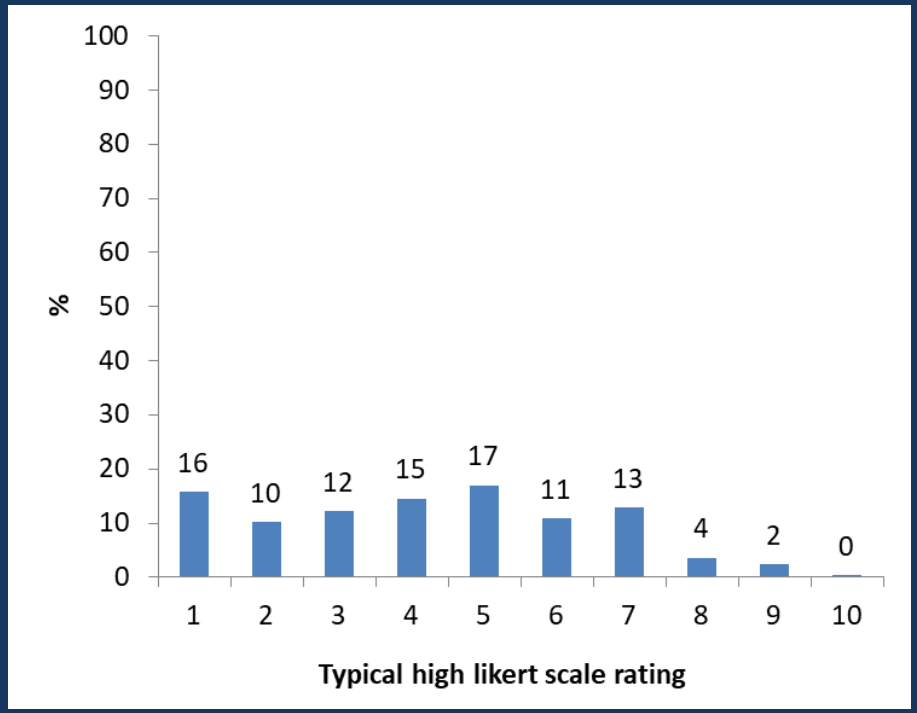


Typical High

medical cannabis card holders



only for medical reasons



Other Uses: Develop Cannabis Risk Index

- Use social media to develop a measure(s) that can help **define low risk and high risk use patterns**.
- Large, diverse samples of cannabis users; provide detailed information about their use and consequences.
- e.g., frequent daily use with low level intoxication may be a profile for true therapeutic use, or evening stress reduction pattern (low risk?)
- frequent daily use with high levels of intoxication (high risk) would seem high risk

Strengths and Limitations

- Large and Diverse Samples
- Cost Effective
- Rapid / Repeat / Correct / Follow up
- Time-limited (less than 10-12 minutes)
- Other drugs?
- Sampling bias

Where does social media sampling fit into the drug epidemiology toolbox?

How Science Works

Priorities

- Regulatory Science: mitigate harm
  - Industry/marketing, dose/content control, access
- Protect Populations Vulnerable to Addiction
  - Youth, pregnant women, disadvantaged/poor, mental and physical health disorders
- Communication Science
  - How do we best communicate about potential positive effects and potential harmful effects?
- Develop Cannabis Use Risk Measure
  - What level of use is low risk? High risk?

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