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Marijuana and motor vehicle crash research: Current knowledge, challenges, and opportunities

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Outline

- Local policy context
- Marijuana use and driving impairment
  - Measurement challenges
  - Current evidence
    - Lab studies
    - Population studies
- Current research
  - MA Marijuana Baseline Health Study Design
- Future research needs

Marijuana DUI policy in MA

- Illegal to drive while impaired by marijuana or other drugs
- Implied consent law for alcohol only
  - Person suspected of DUI-MJ does not have to submit to chemical test
- No *per se* limit for THC
- In court, officers CANNOT use sobriety test as evidence of marijuana impairment
  - Can report observations including behavior, attitude, attention span, smell, smoke, etc.

DUI = Driving under the influence

Challenges of measuring marijuana-related impairment

- Invasiveness of blood collection
- Timing of matters for detecting THC
- Occasional vs. chronic frequent users
- Type of product consumed
- Product potency
- Large variability between individuals
  - Metabolism
  - Impairing effects

Measuring THC in blood

- CO study reported average time to blood draw was 2.32 h (SD=1.3h) in vehicular homicide and vehicular assault cases (Wood, Brooks-Russell, Drum 2016)
- THC detection window after smoking/vaporizing

  Chronic frequent users:

  - Above 25ng/mL for 30-45 mins
  - 5 ng/mL by 6-10 hours
  - A few show THC above 5ng/mL days after smoking (Huestis 2007)

  Occasional users:

  - Above 25ng/mL for 30 mins
  - 5 ng/mL by 1 hour

Measuring THC in oral fluid

- Oral fluid (saliva) and blood show similar cannabinoid profile ~8 hours after exposure
  - Edibles are different
- Oral fluid THC testing in final stages of approval for Federal workplace testing
  - 2ng/mL cutoff as evidence of use in past 24H
- Ratios between THC and other metabolites may allow more accuracy for determining exposure window (Newmeyer et al. 2017)

When biological measurement is challenging…

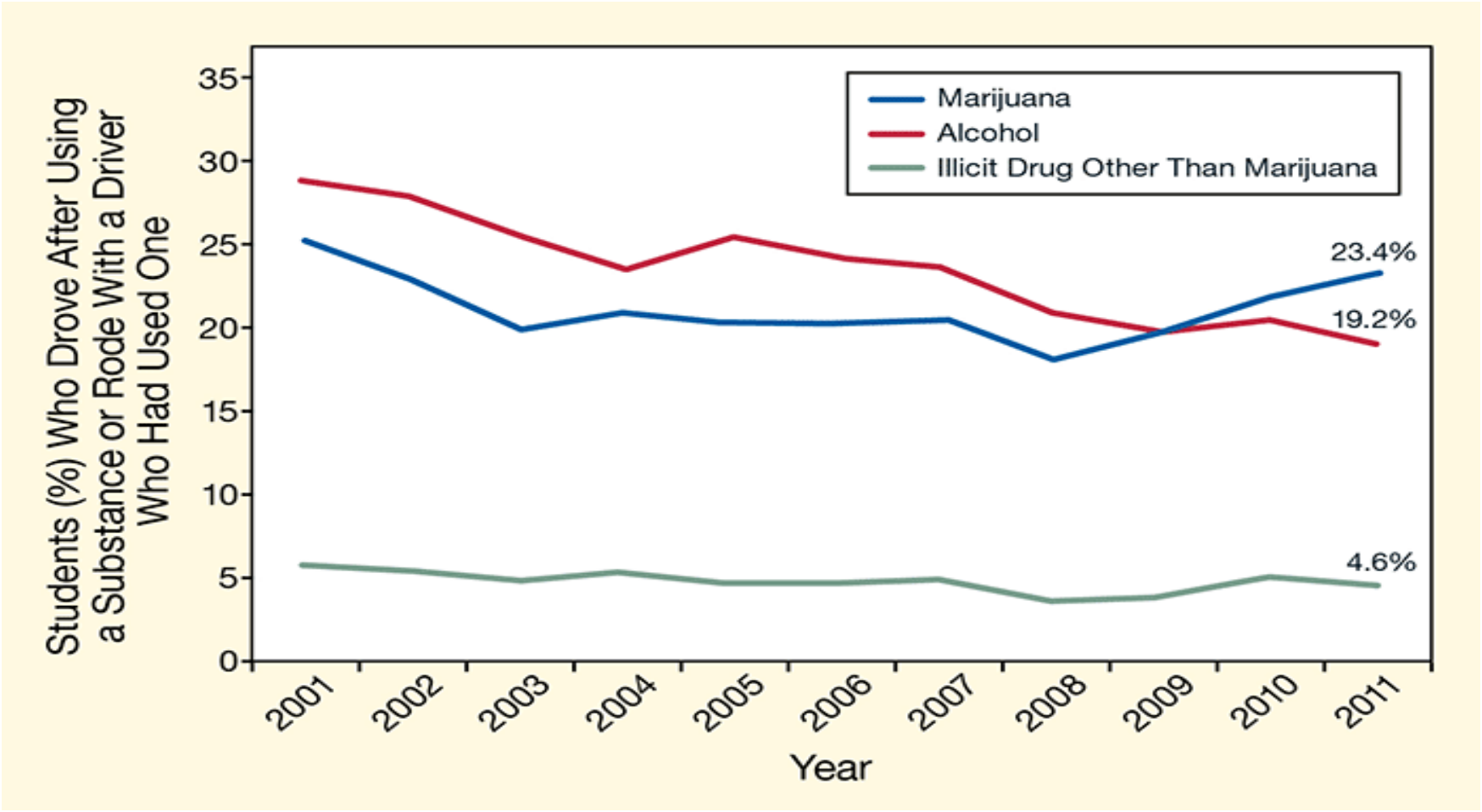
Survey data matter even more

Survey of adult marijuana users in CO & WA

- 43.6% reported past year driving under the influence of marijuana (DUIM).
- 23.9% reported driving within 1 hour of marijuana use 5 or more times/month
- Safety perceptions were related to DUIM willingness
- Knowledge of DUI laws not associated with DUIM
- Males more likely to DUIM than females

Davis et al. 2016

More teens drive after marijuana than after alcohol



O'Malley & Johnston, 2013

Risk factors for driving or riding after marijuana (college student survey)

	Relative Risk (95% CI)[a]	
Variable	Driving after marijuana use (n =64)	Riding with a marijuana-using driver (n= 315)
Rode with marijuana using driver	5.7 (1.8 – 17.8)	…[b]
Drove after marijuana use	…[b]	4.4 (2.4 – 8.1)
Drove after drinking	2.5 (1.4 – 4.3)	…[c]
Reported always wearing seat belt	…[c]	0.55 (0.33 – 0.91)
Age at first marijuana use	0.8 (0.6 – 1.0)	…[c]
Proportion of friends using marijuana %	…[c]	1.02 (1.01 – 1.03)

[a] Initial multivariable models were also adjusted for sex, university, riding with a drinking driver, and the number of days of marijuana use in past 28 days. These covariates were non-significant and were excluded from the final models

[b] Variable omitted because it is the outcome for this model

[c] Variables that were not significant in the initial multivariable models were not retained in the final model

Whitehill, Rivara & Moreno, 2014

Marijuana Baseline Health Study

- MA Dept. of Public Health commissioned a study of:
  1. Prevalence and perceptions of use
  2. Incidents of impaired driving and hospitalization
  3. Economic impact
- Report to legislature in Summer 2018
- Thank you to my collaborators
  - David Buchanan, Liz Evans, Cole Fitzpatrick, Tyler Jette, Calla Harrington, Eva Goldwater, Penny Brierley-Bowers

Marijuana Baseline Health Study

- Bringing together multiple existing and new data sources, including:
  - State of the science on measuring marijuana exposure and effects relevant to driving
  - Statewide, representative survey
    - Prevalence of use and DUI-marijuana
  - Analysis of marijuana-involvement in fatal crashes & non-fatal crashes
  - Health system contacts
    - Substance use treatment, poison center calls

Next steps for research

- Consistent measurement and appropriate data coding of marijuana use in fatally injured drivers.
- Measurement of recent marijuana use in drivers involved in non-fatal crashes.
  - Related policy changes to improve data collection on drugged driving in crashes
- Policy studies to understand impact of changing marijuana policy on MVCs
  - Roadside studies conducted to determine prevalence in non-crash involved drivers
  - NHTSA opportunity to fund this if MA acts fast!

Next steps for research - continued

- Continued development of measurement approaches for quantifying marijuana-related impairment
- Examine substitution vs. combination effects at individual and population level.
- Collaboration between medical, legal, public health sectors to bring different types of data together.
- Follow up the baseline study with ongoing measurement during and after implementation of legal marijuana sales
- Evaluation of messaging campaigns to know what is effective

THANK YOU

Follow up questions? Contact me at jmw@umass.edu

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