Driving Under the Influence of Cannabis and Traffic Fatalities

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Introduction

- Motor vehicle crashes are leading cause of death for ages 5-34\(^1\)

- 43% fatally injured drivers <24 had cannabinoids in system\(^2\)
  - 2005-2009

- ONDCP identified reducing “drugged driving” as primary goal
  - 10% reduction by 2015\(^2\)

1. CDC. 2013.
2. ONDCP. 2011.
Policy Context

• DUID laws are inconsistent across states

• Three types of DUID laws
  – *Per se* policies
  – Zero tolerance *per se* policies (recommended by ONDCP)
  – Effect based policies

• 16 states have a DUID cannabis policy

• Washington passed Initiative 502, November 2012
  – Legalized recreational cannabis
  – *Per se* law of 5 ng/mL of THC in the blood
  – Increase in cannabis lab tests, but no increase in overall impaired driving

Driving laws

- **ZERO-TOLERANCE PER SE CANNABIS LAWS**
  State's legal limit is set at zero nanograms (one-billionth of a gram) per milliliter

- **PERMISSIVE INFERENCE LAWS**
  Impairment inferred but not defined by blood THC levels

- **PER SE CANNABIS LAWS**
  Exceeding the state's legal THC limit can result in DUI, regardless of driver's behavioral impairment

- **EFFECT-BASED LAWS**
  Evidence of impairment by a recently ingested substance must be established

3. Hall and Diehm. 2014.
Introduction

• No consensus THC level correlating with behavioral impairment

• According to NHTSA⁶...
  – Chronic users can have plasma levels of 45 ng/mL THC 12 hours after using cannabis
  – Inadvisable to predict behavioral effects based on THC concentration alone

⁶. NHTSA. nd.
Rationale and Aim

- ONDCP recommends zero tolerance *per se* policies\(^2\)
- NHTSA highlights the drawbacks of *per se* policies\(^6\)
- Only one study examines *per se* policies and traffic fatalities\(^7\)

- Explore whether Washington’s *per se* law reduces fatal collisions
  - WSDOT Data: 2006-2013

2. ONDCP. 2011.
6. NHTSA. nd.
Background

• Cognitive studies
  – Cannabis impairs perception of time, attentiveness, motor coordination, tracking, and other complex driving tasks\textsuperscript{7-11}

• Experimental studies
  – Using driving stimulation equipment
  – Cannabis users show minimal impairment and tend to overcompensate for their perceived level of intoxication\textsuperscript{7-11}

• Epidemiologic studies
  – Mixed results\textsuperscript{8}
  – Using international data, two meta-analyses indicate a double increased risk of motor vehicle accidents associated with cannabis use\textsuperscript{12-13}

Background

• Drivers are driving under the influence of drugs\(^2\)
  – 1 in 8 weekend nighttime drivers tested positive for illicit substances
  – 1 in 8 high school seniors drove after using cannabis in 2010
  – 1 in 4 fatally injured drivers that tested positive for illicit substances were under the age of 25
  – 28% of males who tested positive for drugs used cannabis, compared to 17% of females

• Combination of cannabis and alcohol while driving
  – Combining the two increase risk of MV accident\(^8\)

• Substitutes or compliments?
  – Implementing MM policies decreased fatalities and alcohol consumption\(^{14}\)

2. ONDCP. 2011.
Background

• Limited Policy Literature

• One study, 2012\(^7\)
  – Fatality Analysis Reporting System data, 1990-2010
  – No evidence that per se laws reduced traffic fatalities

• One report, 2010\(^{15}\)
  – Summarizing the implementation of per se laws in 15 states
  – Could not obtain DUID data from states
  – Focuses on per se policy implementation utilizing discussions with law enforcement agents and governmental officials

15. Lacey et al. 2010.
The Washington Traffic Safety Commission codes and analyzes all traffic fatalities as part of the federal Fatality Analysis Reporting System.
Sample

- Washington State Department of Transportation

- Between 2006-2013
  - 2,195,487 collision reports filed for motor vehicle driver, passenger, pedestrian, etc.
  - Only motor vehicle driver reports analyzed ($n = 1,579,720$)

- Annual collision data 2006-2013, panel data set using county-level unit of analysis ($N = 39$)
Variables

• Dependent variable
  1. Traffic fatalities \( (n = 5,661) \)
     – The number of motor vehicle fatality reports in a given year
     – The same fatality can be reported more than once

• Main independent variable
• *Per se*
   – Indicator of whether Washington’s *per se* policy was in effect
   – Implemented in December 2012
Variables

- Individual-Level Covariates
  - age and sex of driver
  - month, day of the week, and time of day of the collision
  - number of motor vehicles involved
  - collision report type (state route, city street, or county road)
  - roadway type (two-way divided highway, two-way undivided highway, interchange, etc.)
  - vehicle type (passenger vehicle, truck, bus, motorcycle, taxi, etc.)
  - hit and run (yes or no)
  - contributing circumstances (DUI, DUID, following too close, failing to signal, exceeding speed limit, etc.)
  - posted speed limit
  - restraining system type (refers to seatbelt use)
Methods

(1) Fatalities\textsubscript{ct} = \beta 0 + \beta 1\text{Per se}_c + X_{ct} + m_c + \varepsilon_{ct}

- \textit{c} and \textit{t} index county and year
- \textit{Per se}: indicator for WA \textit{per se} cannabis driving policy
- \textit{X}: county-level covariates
- \textit{m}: county fixed effects
- \varepsilon: error term

- County-Level Fixed Effects Model
  - \beta 1 is the coefficient of interest and represents the effect of Washington’s \textit{per se} law on fatal collisions, \textit{Fatalities}
Methods

(2) \( \text{Fatalities}_i = \beta_0 + \beta_1 \text{Per se}_i + X_i + \epsilon_i \)

- \( i \) indexes individual
- \( \text{Per se} \): indicator for WA per se cannabis driving policy
- \( X \): individual-level covariates
- \( \epsilon \): error term

- Individual-Level Regression
  - \( \beta_1 \) is the coefficient of interest and represents the effect of Washington’s per se law on fatal collisions, \( \text{Fatalities} \)
Results

Fatalities

DRE Cannabis
Results

• Eq(1) County-level
  Adoption of *per se* law is associated with a statistically insignificant increase in traffic fatalities

• Eq(2) Individual-level
  Adoption of *per se* law is associated with a statistically insignificant increase in traffic fatalities

15. Lacey et al. 2010.
Discussion

• In 2012, WA become 16th state to implement a DUI cannabis policy.

• Added to limited body of driving under the influence of cannabis policy literature

• Supports the previous study and finds no evidence of a reduction in traffic fatalities
  – Cannot determine why policy is not working
  – Poor policy design?
  – Presence of law does not mean individuals are aware of the law
Discussion

• Main Limitation
  – One year follow-up period

• Conclusion

• What this means for Oregon...
  – Next month Oregonians will vote on recreational cannabis
  – “Drivers won’t face the driver impairment standards for THC imposed under Washington's recreational pot law.”17
  – Driving while under influence of cannabis will still remain illegal
  – Needed: a valid and reliable test to assess cannabis impairment

Thank you

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References


