



**Social Development  
Research Group**



**SCHOOL OF SOCIAL WORK**  
*UNIVERSITY of WASHINGTON*

# **Associations between County- and Individual-level Cannabis Norms and Adolescent Cannabis Use: a Cross-sectional, Multilevel Analysis of Oregon's Healthy Teen Survey**

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This research was supported by a grant from the National Institute of Drug Abuse (R21DA037341) to Dr. Guttmannova and grants from National Institute of Child Health and Human Development (R24HD042828, T32HD007543) to the Center for Studies in Demography & Ecology at the University of Washington



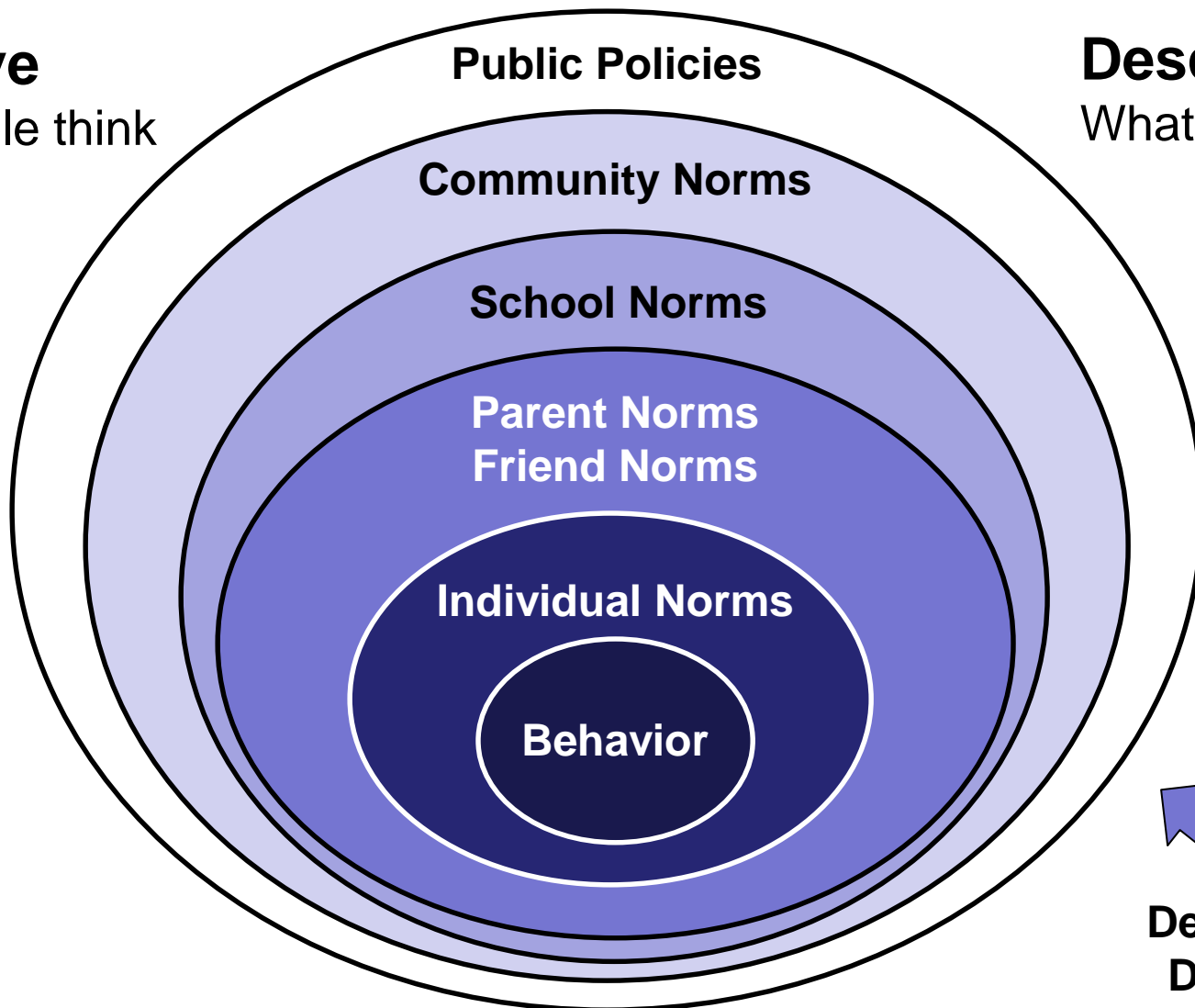
# Ecological Model of Social Norms

**Injunctive**

What people think

**Descriptive**

What people do



**Demographic Differences**



# Social Norms and Cannabis Use

**Pro-cannabis county-level cannabis norms** associated with **higher cannabis use** among adolescents in Montana (Friese & Grube, 2013)

- voting on cannabis initiatives
- number of medical cannabis patients / 1000

**Lower perceptions of risk from cannabis use** were associated with **higher cannabis use** across 32 European countries (Piontek et al., 2013)

**Parent** and **peer disapproval of cannabis** related to **lower cannabis use** after controlling for cohort, age, gender, family income / government assistance, depression, tobacco use, and alcohol use (Wu et al., 2015)

When compared to Whites:

- Asian-Americans showed **higher disapproval for cannabis**
- Mixed-Race showed **lower disapproval for cannabis**



# Goals & Research Questions

Do ***county-level cannabis norms*** predict  
***individual-level cannabis norms***  
and ***cannabis use***?

Do ***individual-level demographics*** predict  
***individual-level cannabis norms***  
and ***cannabis use***?



# Oregon Healthy Teens Survey (OHT)

OHT was conducted yearly from 2001–2009 and on odd years from 2009–2015

Monitors the ***health and well-being of adolescents*** on

Alcohol, tobacco, cannabis, and other drug use

Risk and protective factors

Violence

Sexual activity

Diet and exercise

Other health behaviors



Incorporates youth surveys that preceded it

**YRBS** (Youth Risk Behavior Surveillance)

**Student Drug Use Survey**

**Communities That Care**





# Survey Administration

OHT is conducted ***voluntarily and anonymously*** among 8th and 11th graders statewide within public schools

***Stratified random sample of 11<sup>th</sup> grade schools and their feeder middle schools*** is selected to obtain a representative sample for OHT statewide and county-level estimates

Parents are mailed a consent form in the weeks prior to administration and ***may refuse to give consent***

Each student also has the ***option to decline*** the survey, or to skip questions they don't want to answer

***County-level weights*** are calculated with enrollment data for all public schools

County Enrollment (by grade)  
weighted count for valid surveys (by grade) for schools within County



# Sample Characteristics

**14,036** 8<sup>th</sup> graders were included in the county sample

## Characteristics

Male: 50%

Age: 13.7 (SD: 0.52)

Range: 12 – 15.3

Receive Free or Reduced

Price Lunch: 40%

## Ethnicity

White:

American Indian / Alaska Native:

Asian:

Black / African American:

Native Hawaiian / Pacific Islander:

Multiethnic:

Hispanic:

%

72

6

4

4

2

13

24



# Measures

## Cannabis Use in Past 30 Days

“During the PAST 30 DAYS, how many times did you use marijuana?”

### Any Use

1 = 1 or 2, 3 to 9, 10 to 19, 20 to 39, 40 or more

0 = 0 times

**9.7%** of 8<sup>th</sup> graders report using any cannabis use

### 10+ Use

1 = 10 to 19, 20 to 39, 40 or more

0 = 0, 1 or 2, 3 to 9 times

**3.2%** of 8<sup>th</sup> graders report using cannabis 10+ times

\*Important to note that ***any use at age 13-14*** is considered ***early initiation of cannabis use*** and has been identified across studies as a risk factor for later heavy use as well as social, behavioral, and academic problems





# Measures

## Individual-level Norms (Risk Factors)

### Permissive Parent Norms

“How wrong do your parents feel it would be for you to smoke marijuana?”

1 = A little bit wrong or Not wrong at all **8%**

0 = Very wrong or Wrong **92%**

### Permissive Friend Norms

“How wrong do your friends feel it would be for you to smoke marijuana?”

1 = A little bit wrong or Not wrong at all **25%**

0 = Very wrong or Wrong **75%**

### Low Risk of Harm

“How much do you think people risk harming themselves (physically or in other ways) if they smoke marijuana once or twice a week?”

1 = No risk or Slight risk **36%**

0 = Moderate risk or Great risk **64%**



# Measures

## County-level Injunctive Norms

### **Oregon Cannabis Tax Act Initiative, Measure 80 (M80)** **November 6, 2012**

*Allows personal marijuana, hemp cultivation/use without license; commission to regulate commercial marijuana cultivation/sale.*

**Result of "Yes" Vote:** "Yes" vote allows commercial marijuana (cannabis) cultivation/sale to adults through state-licensed stores; allows unlicensed adult personal cultivation/use; prohibits restrictions on hemp (defined).

**Result of "No" Vote:** "No" vote retains existing civil and criminal laws prohibiting cultivation, possession and delivery of marijuana; retains current statutes that permit regulated medical use of marijuana.

<b>Results</b>	<b>NO</b>	<b>923,071</b>	<b>53.42%</b>
	<b>YES</b>	<b>801,538</b>	<b>46.58%</b>

***\*Individual counties ranged from 28% to 61% in favor***

Data are publically available from the Oregon Office of the Secretary of State



# Measures

## County-level Descriptive Norms

### Medical Cannabis Patients per 1000 April 2013

Oregon law requires medical cannabis patients to register with the Oregon Health Authority

Oregon Medical Marijuana Program (OMMP) tracks and publishes the number of medical cannabis patients by county approximately every four months

April 2013: **53,117** medical cannabis patients in Oregon or **13.7/1000** residents  
*\*Individual counties ranged from **6 / 1000** – **49 / 1000***

Gilliam, Sherman, and Wheeler counties were aggregated by OMMP for confidentiality due to lower numbers of patients (<70 across all three)

County population estimates taken from American Community Survey for 2013



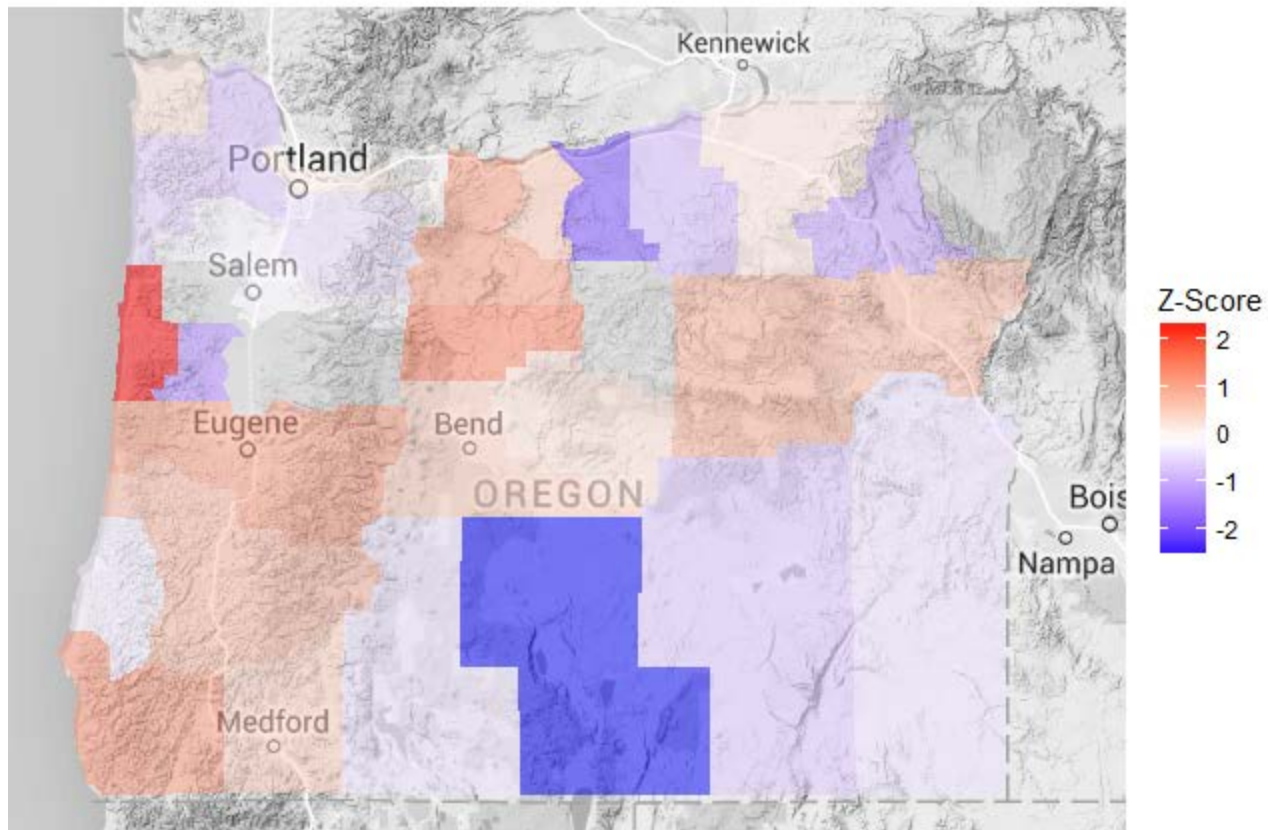
# Percent of 8<sup>th</sup> Graders Using Cannabis in Past 30 Days

**County**  
**-level**

**Mean**  
9.73

**SD**  
3.85

**Range**  
0 –  
18.57





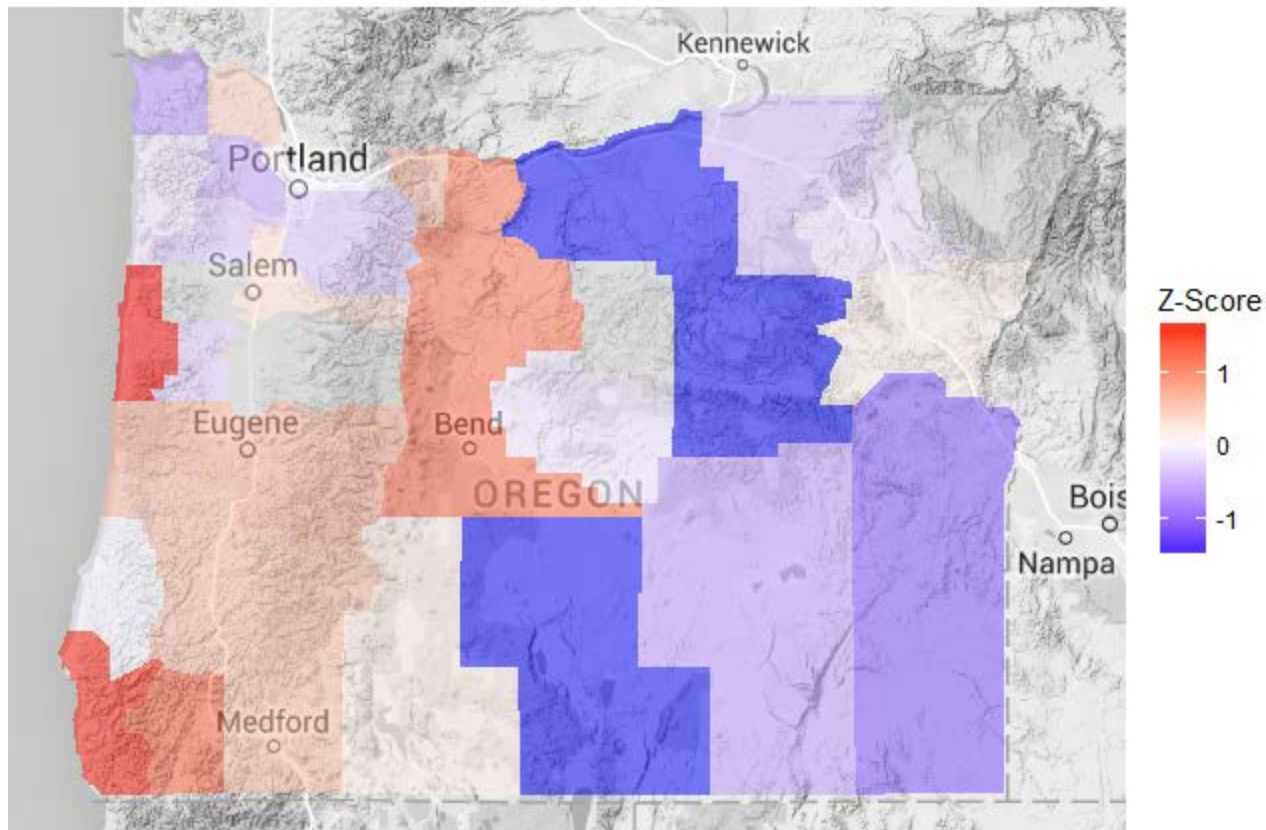
# Percent of 8<sup>th</sup> Graders Using Cannabis 10 or More Times in Past 30 Days

## County -level

Mean  
3.02

SD  
1.90

Range  
0 –  
6.33





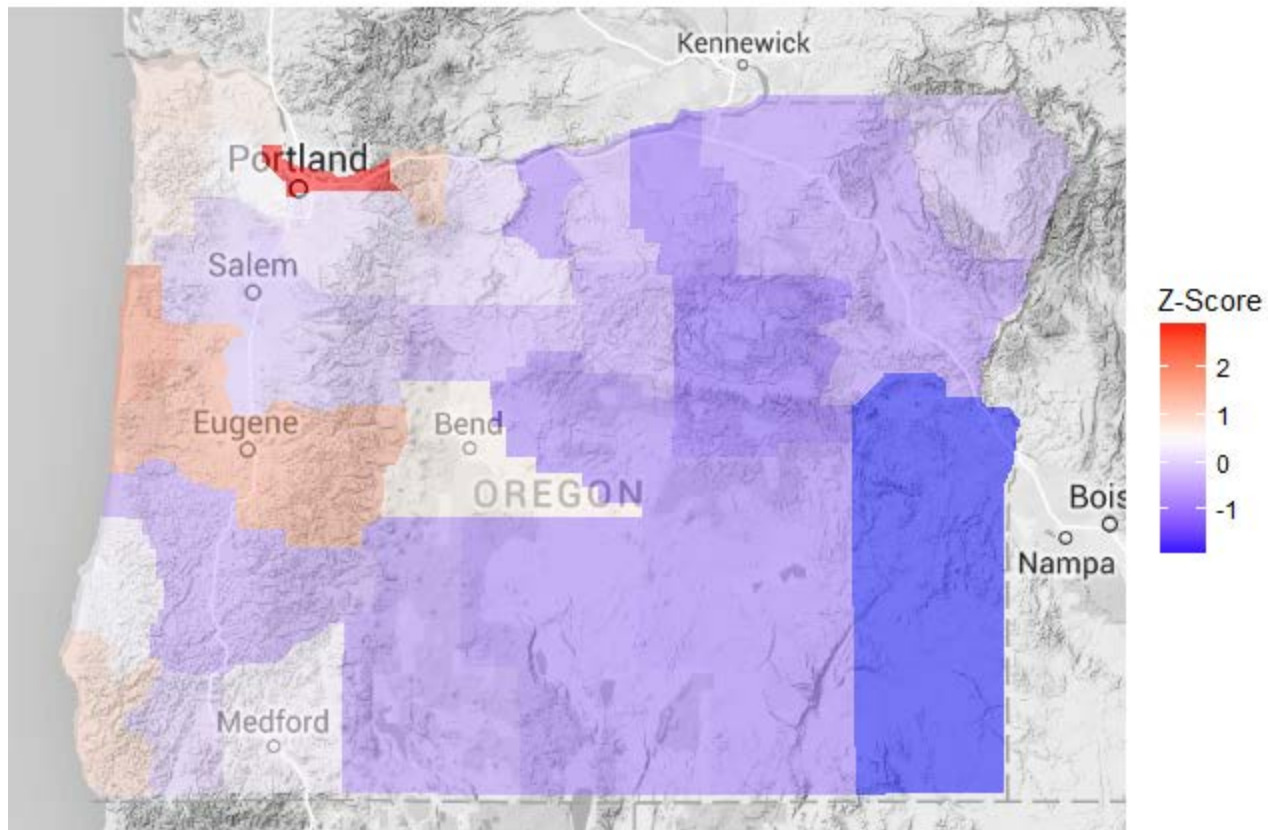
# Percent Voting YES on Measure 80 (M80) to Legalize Cannabis (Nov. 2012)

**County**  
**-level**

**Mean**  
40.88

**SD**  
6.82

**Range**  
27.70 –  
60.80







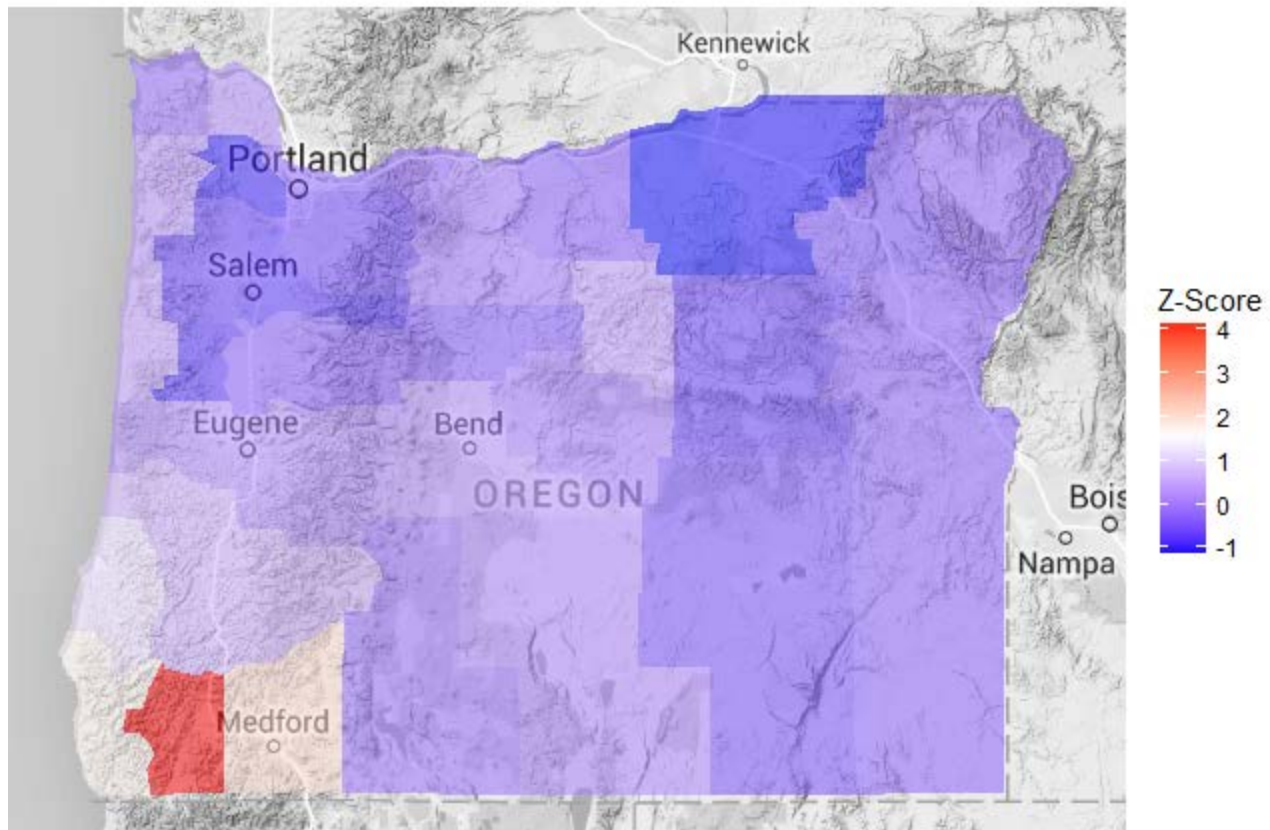
# Medical Cannabis Patients / 1000 (Apr. 2013)

**County**  
**-level**

**Mean**  
15

**SD**  
8

**Range**  
6 – 49





# Conceptual Model

**Community Descriptive Norms  
(Medical Cannabis Pt's / 1000)**

**Community Injunctive Norms  
(% Voting Yes on M80)**

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**Permissive  
Parent Norms**

**Permissive  
Friend Norms**

**Low Perceived  
Risk of Harm**

**Adolescent Cannabis Use**

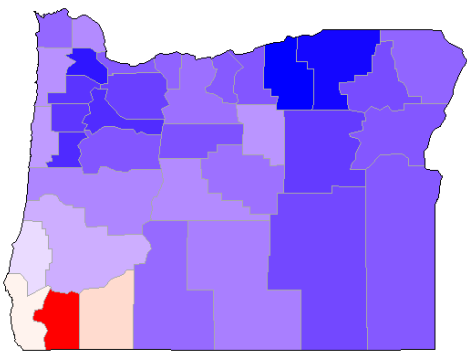
**Gender**

**Relative Age**

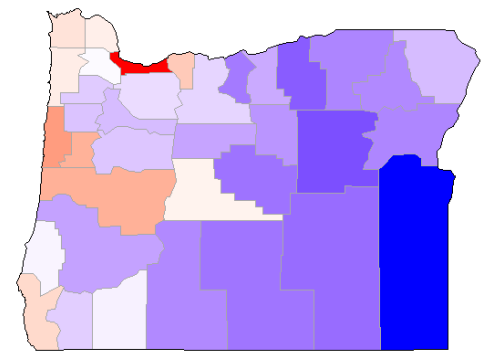
**Ethnicity**

**Socioeconomics**

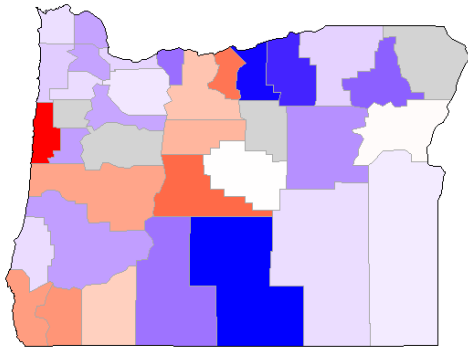




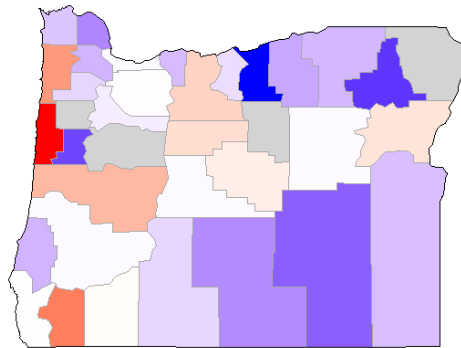
**Community Descriptive Norms  
(Medical Cannabis Pt's / 1000)**



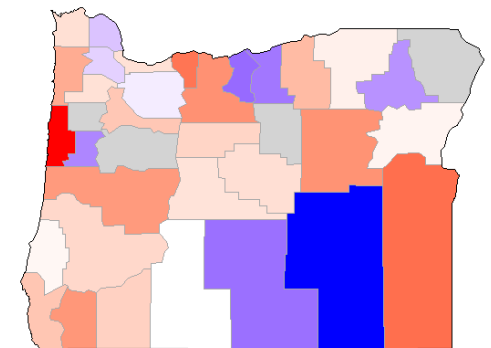
**Community Injunctive Norms  
(Voting Yes on M80)**



**Permissive Parent  
Norms**

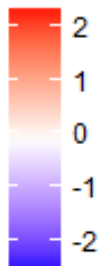


**Permissive Friend  
Norms**

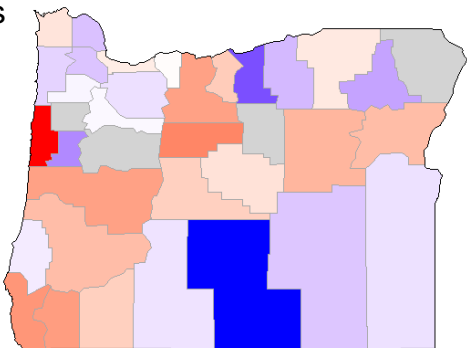


**Low Risk of  
Harm**

More pro-cannabis

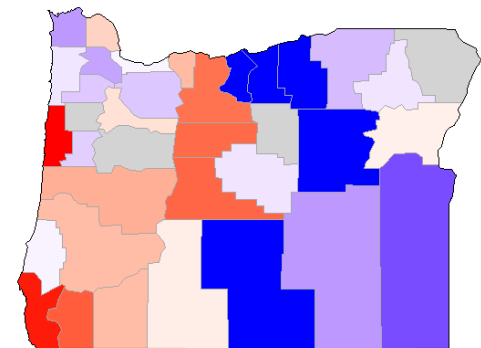


More anti-cannabis



**Any Use**

**Adolescent  
Cannabis Use**



**10+ Use**



# Cannabis Norms Multilevel Model

## Level 1

$$\log(\text{odds}[\text{Cannabis Norms}_{ij}]) = \pi_{0j} + \pi_{1j}(X_{ij}) + r_{ij}$$

## Level 2

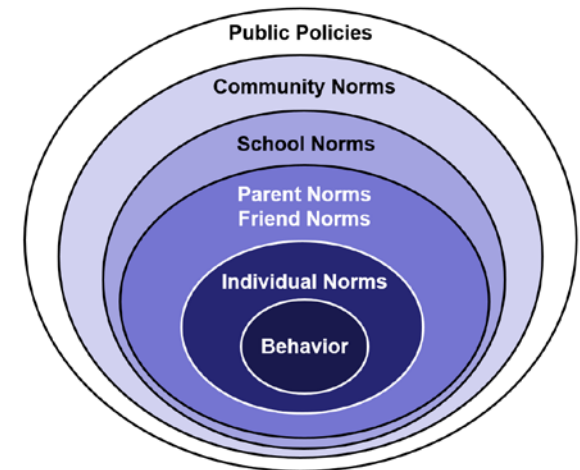
$$\pi_{0j} = \beta_{00} + \beta_{01}(W_j) + u_{0j}$$

where  $i$  represents an individual in county  $j$

$X$  represents a vector of individual-level covariates

$W$  represents a vector of county-level covariates

$\pi_{0j}$  represents a random intercept of the cannabis norm by county





# Cannabis Norms Multilevel Model

## Level 1

$$\log(\text{odds}[\text{Cannabis Norms}_{ij}]) = \pi_{0j} + \pi_{1j}(\text{Gender}_{ij}) + \pi_{1j}(\text{Ethnicity}_{ij}) + \pi_{2j}(\text{Free Lunch}_{ij}) + \pi_{3j}(\text{Age}_{ij}) + r_{ij}$$

## Level 2

$$\pi_{0j} = \beta_{00} + \beta_{01}(\text{M80 Voting})_j + \beta_{02}(\text{Medical Cannabis Patients})_j + u_{0j}$$

Analyses were conducted with Mplus v7.1

Missing data were handled with multiple imputation

Estimates are averaged over 40 imputed datasets



# Predicting Permissive Parent Norms

(Odds Ratios & 95% Confidence Intervals)

**LOWER ODDS OF PERMISSIVE PARENT NORMS**

**HIGHER ODDS OF PERMISSIVE PARENT NORMS**

% VOTING YES ON M80 (z)

0.99 1.11 1.24

MEDICAL CANNABIS PT's / 1000 (z)

1.05 1.1 1.15

MALE

0.9 1.02 1.17

AGE

1.25 1.41 1.6

HISPANIC

0.55 0.69 0.88

AI / AN

1 1.33 1.78

ASIAN

0.19 0.36 0.68

BLACK / AA

0.93 1.37 2

NH / PI

0.65 1.09 1.83

MULTIETHNIC

1.22 1.49 1.81

FREE LUNCH

1.56 1.81 2.1

1

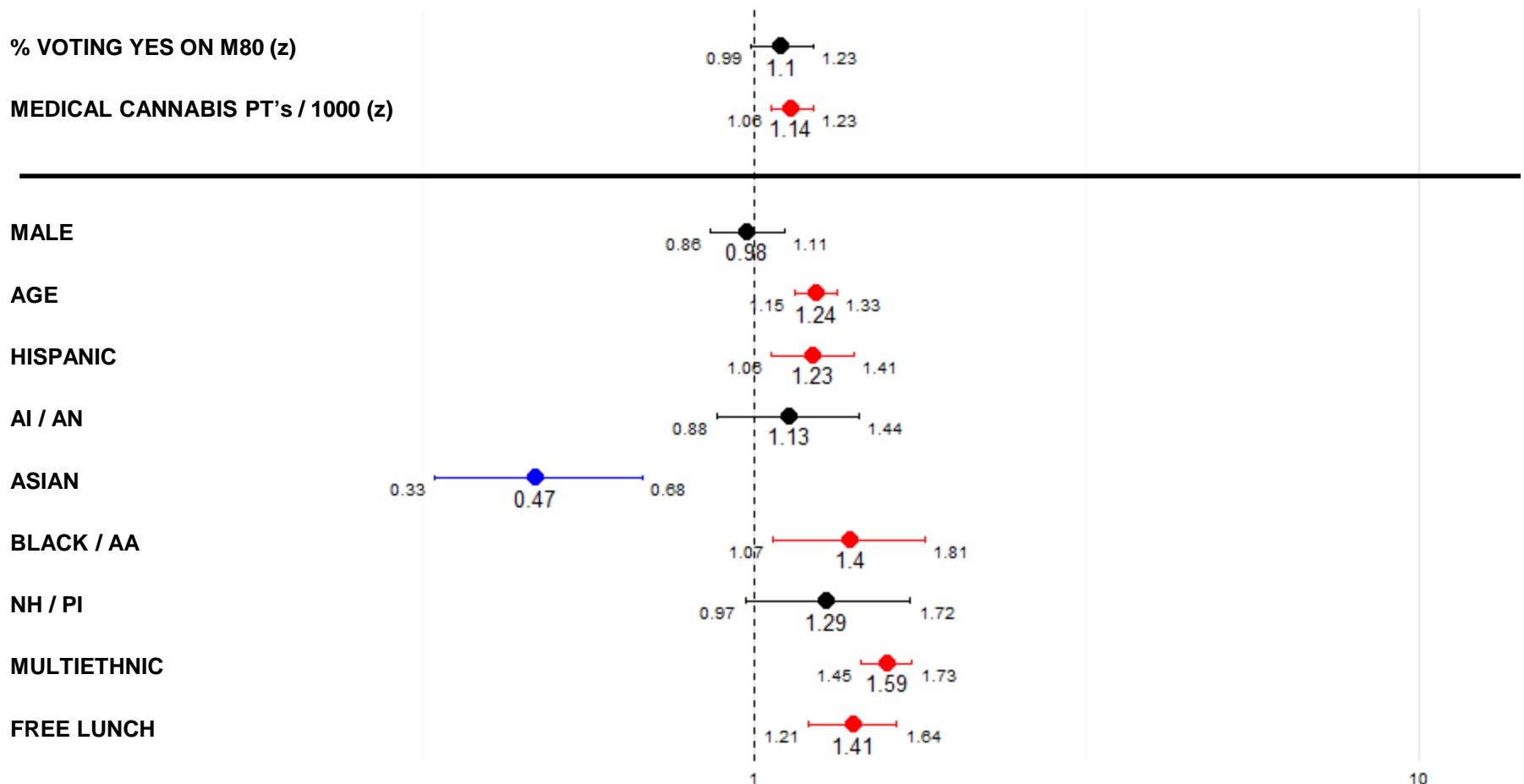


# Predicting Permissive Friend Norms

(Odds Ratios & 95% Confidence Intervals)

**LOWER ODDS OF PERMISSIVE FRIEND NORMS**

**HIGHER ODDS OF PERMISSIVE FRIEND NORMS**



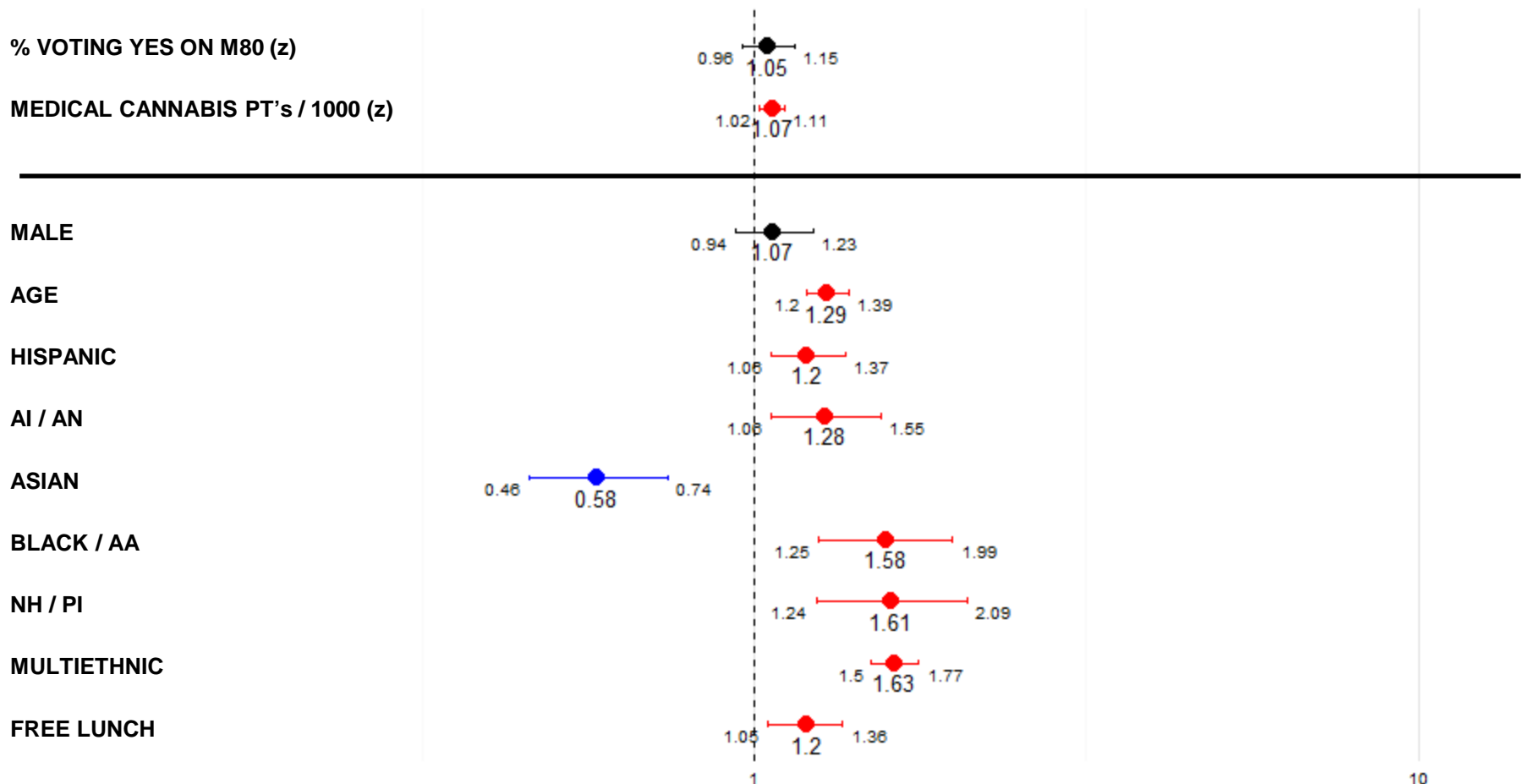


# Predicting Low Perceived Risk of Harm

(Odds Ratios & 95% Confidence Intervals)

**LOWER ODDS OF LOW PERCEIVED RISK OF HARM**

**HIGHER ODDS OF LOW PERCEIVED RISK OF HARM**





# Cannabis Use Multilevel Model

## Level 1

$$\log(\text{odds}[\text{Cannabis Use}_{ij}]) = \pi_{0j} + \pi_{1j}(X_{ij}) + r_{ij}$$

## Level 2

$$\pi_{0j} = \beta_{00} + \beta_{01}(W_j) + u_{0j}$$

where  $i$  represents an individual in county  $j$

$X$  represents a vector of individual-level covariates

$W$  represents a vector county-level covariates

$\pi_{0j}$  represents a random intercept of cannabis use by county



# Cannabis Use Multilevel Model

## Level 1

$$\log(\text{odds}[\text{Cannabis Use}_{ij}]) = \pi_{0j} + \pi_{1j}(\text{Gender}_{ij}) + \pi_{2j}(\text{Ethnicity}_{ij}) + \pi_{3j}(\text{Free Lunch}_{ij}) + \pi_{4j}(\text{Age}_{ij}) + r_{ij}$$

## Level 2

$$\pi_{0j} = \beta_{00} + \beta_{01}(\text{M80 Voting})_j + \beta_{02}(\text{Medical Cannabis Patients})_j + u_{0j}$$





# Cannabis Use Multilevel Model

## Level 1

$$\log(\text{odds}[\text{Cannabis Use}_{ij}]) = \pi_{0j} + \pi_{1j}(\text{Gender}_{ij}) + \pi_{2j}(\text{Ethnicity}_{ij}) + \pi_{3j}(\text{Free Lunch}_{ij}) + \pi_{4j}(\text{Age}_{ij}) + \pi_{5j}(\text{Parent Norms}_{ij}) + \pi_{6j}(\text{Friend Norms}_{ij}) + \pi_{7j}(\text{Risk of Harm}_{ij}) + r_{ij}$$

## Level 2

$$\pi_{0j} = \beta_{00} + \beta_{01}(\text{M80 Voting})_j + \beta_{02}(\text{Medical Cannabis Patients})_j + u_{0j}$$



# Predicting Any Cannabis Use

(Odds Ratios & 95% Confidence Intervals)

**LOWER ODDS OF CANNABIS USE**

**HIGHER ODDS OF CANNABIS USE**

% VOTING YES ON M80 (z)

0.98 1.08 1.19

MEDICAL CANNABIS PT's / 1000 (z)

1.07 1.13 1.2

PARENT NORMS

FRIEND NORMS

RISK OF HARM

MALE

0.73 0.84 0.97

AGE

1.31 1.48 1.67

HISPANIC

0.95 1.14 1.37

AI / AN

0.92 1.34 1.95

ASIAN

0.22 0.47 0.98

BLACK / AA

1.44 1.86 2.41

NH / PI

0.97 1.45 2.16

MULTIETHNIC

1.44 1.68 1.97

FREE LUNCH

1.58 1.8 2.07

1

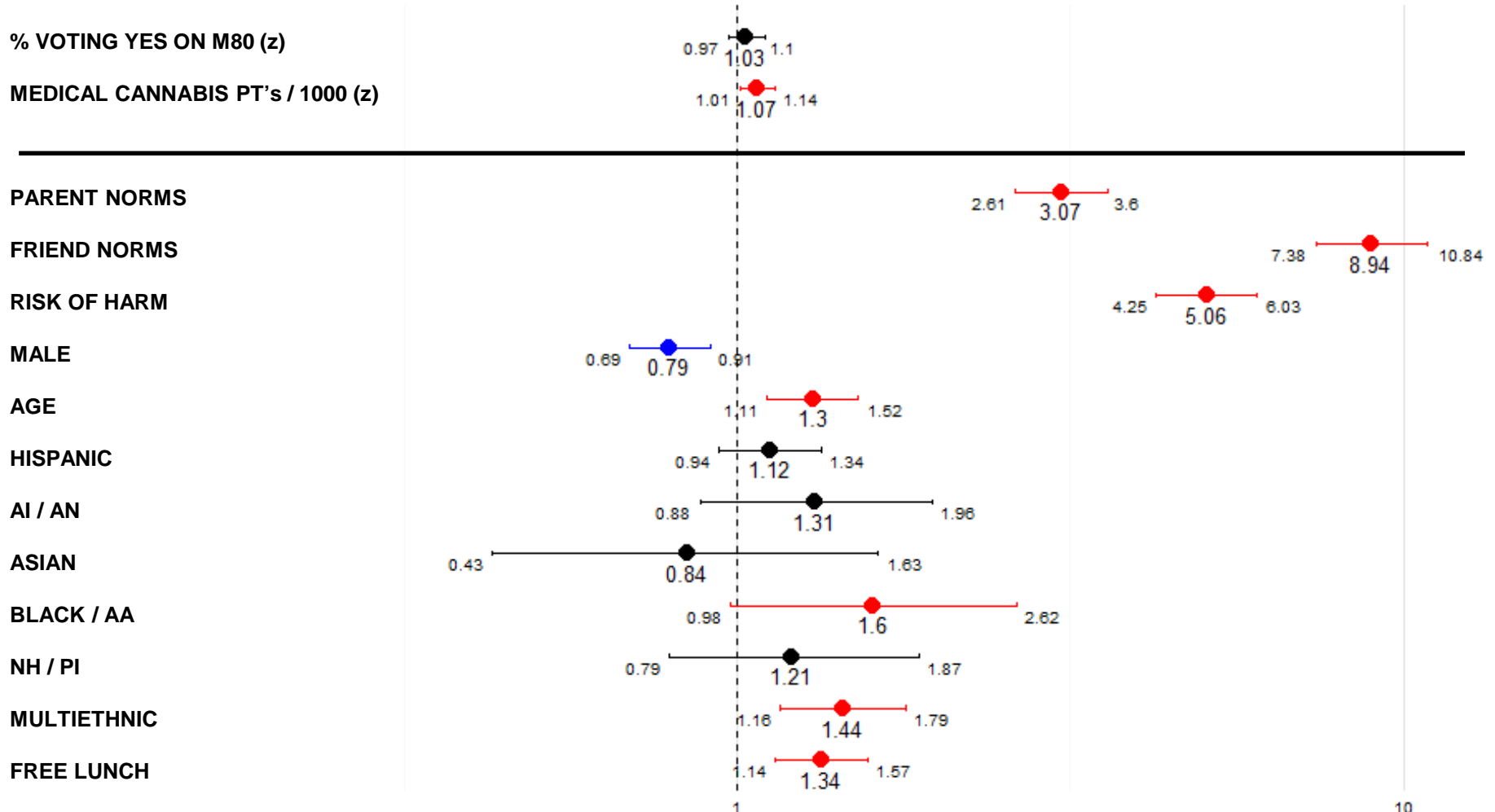


# Predicting Any Cannabis Use

(Odds Ratios & 95% Confidence Intervals)

## LOWER ODDS OF CANNABIS USE

## HIGHER ODDS OF CANNABIS USE



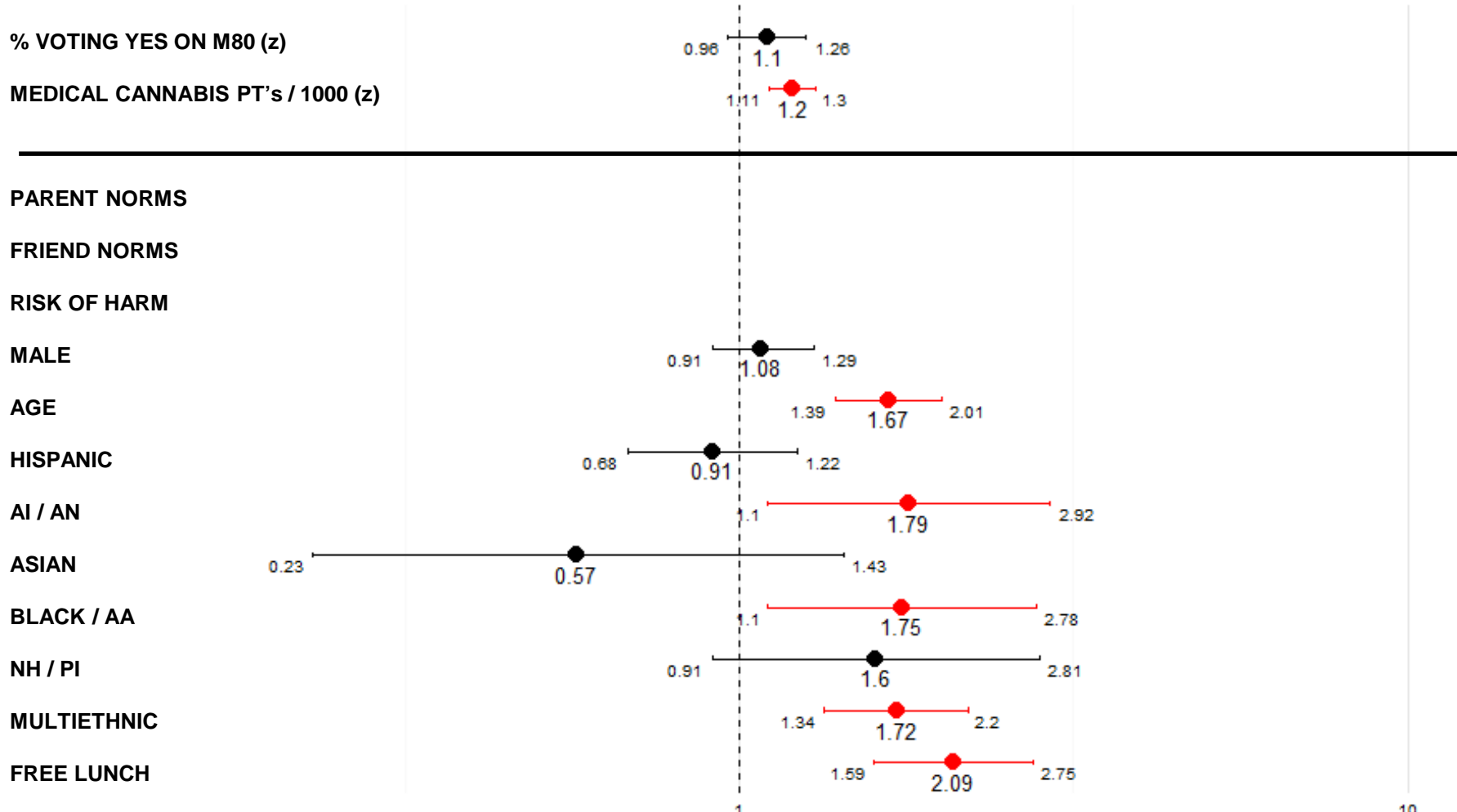


# Predicting 10+ Cannabis Use

(Odds Ratios & 95% Confidence Intervals)

**LOWER ODDS OF CANNABIS USE**

**HIGHER ODDS OF CANNABIS USE**



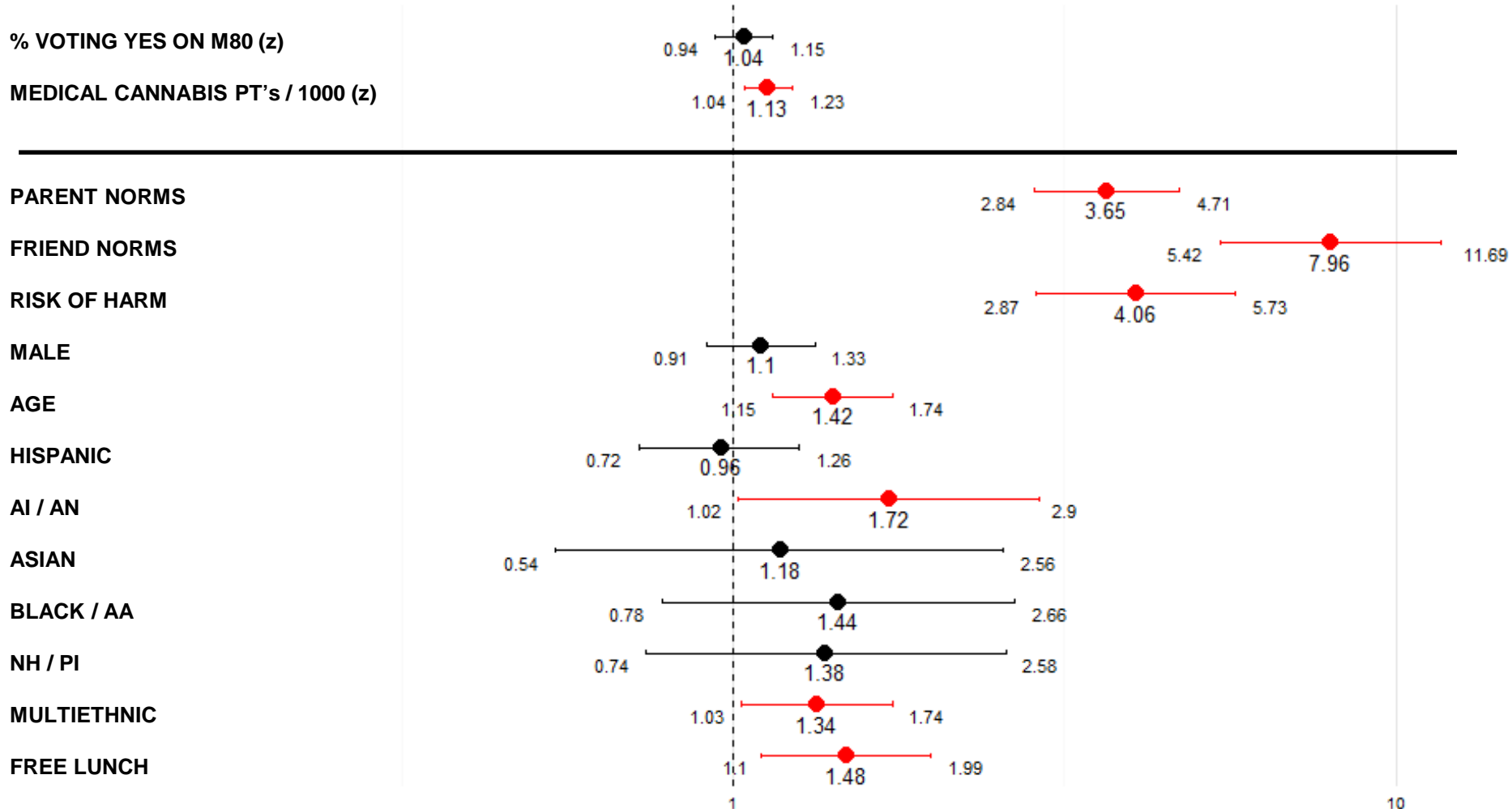


# Predicting 10+ Cannabis Use

(Odds Ratios & 95% Confidence Intervals)

## LOWER ODDS OF CANNABIS USE

## HIGHER ODDS OF CANNABIS USE





# Take Away

**County-level descriptive norms** are important for predicting **adolescent cannabis use**

Since we are considering 8<sup>th</sup> graders, **county-level descriptive norms** are also important for predicting **early initiation of cannabis use**

**Gender differences** in **adolescent cannabis use** and **early initiation of cannabis use** are important and should be more closely investigated

Findings with respect to **Hispanic** 8<sup>th</sup> graders warrant more attention from a prevention perspective

Are **less permissive parents norms** offsetting the relationship of **more permissive friends' norms** and **lower perceived risk of harm** on cannabis use?



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