Menthol & Smoking Cessation Disparities

Biostatistics 699 Project #3

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Background

Population Assessment of Tobacco and Health (PATH) Study

- Conducted by the National Institutes of Health (NIH) and the US Food and Drug Administration (FDA) between 2013 and 2016
- In an effort to better understand tobacco use behaviors and how its use affects health over time

Overview of PATH Dataset

- Longitudinal design with 3 waves:
  - Wave 1: 2013-14 (32,320 participants)
  - Wave 2: 2014-15 (28,362 participants)
  - Wave 3: 2015-16 (28,148 participants)
- Sample is representative of civilian, non-institutionalized US population age 12 and older
- Some demographics were oversampled
  - Tobacco Users
  - Young Adults (18-24)
  - African Americans
- Survey weights were also provided to ensure representativeness

Aims

Primary Aims

1. Does smoking **menthol cigarettes** make a smoker less likely to quit smoking altogether?
2. Does using **flavored electronic cigarettes** make someone more or less likely to quit cigarette smoking altogether?

Secondary Aims

- Are there differential effects by population subgroups, from a health disparities perspective?
- These subgroups being based on gender, age, race, education, income, and region

Primary Aims

Methodology

- Even though the PATH study consists of longitunal data, we took a non-longitudinal approach
- Performed logistic regression to try and predict outcomes in Waves 2 and 3 with characteristics in Wave 1
- Only used subjects who participated in every wave (23,670)
- Defined **smokers** as those who reported as current smokers in Wave 1 (yes or no)
- Defined **menthol users** as those who reported using menthol cigarettes in Wave 1 (yes or no)
- Defined **e-cigarette users** as those who reported using e-cigarettes in Wave 1 with two levels (yes-flavored, yes-unflavored, or no)

Defining Quitting (1 of 3)

Prioritize reported **quit status** over reported **smoking status** to deal with contradictions.

1. The established smoker responds as quitting in Wave 3: QUITTER
2. The established smoker is missing a response for quit status in Wave 3, but responds as a former smoker as of Wave 3: QUITTER
3. The established smoker is missing a response for quit status in Wave 3, but responds as a current smoker as of Wave 3: NOT A QUITTER

Defining Quitting (2 of 3)

4. The established smoker responds as not quitting in Wave 3 and responds as a current smoker as of Wave 3: NOT A QUITTER
5. The established smoker responds as not quitting in Wave 3, but responds as a former smoker as of Wave 3 and responds as quitting in Wave 2: QUITTER
6. The established smoker responds as not quitting in Wave 3 and responds as a former smoker as of Wave 3, but responds as not quitting in Wave 2: NOT A QUITTER

Defining Quitting (3 of 3)

7. The established smoker responds as not quitting in Wave 3. but responds as a former smoker as of Wave 3, has a missing response for quit status in Wave 2, and responds as a former smoker as of Wave 2: QUITTER
8. The established smoker responds as not quitting in Wave 3, responds as a former smoker as of Wave 3, has a missing response for quit status in Wave 3, and responds as a current smoker as of Wave 2: NOT A QUITTER
9. Any other case is put as a missing value and not included in the analysis

Menthol Results

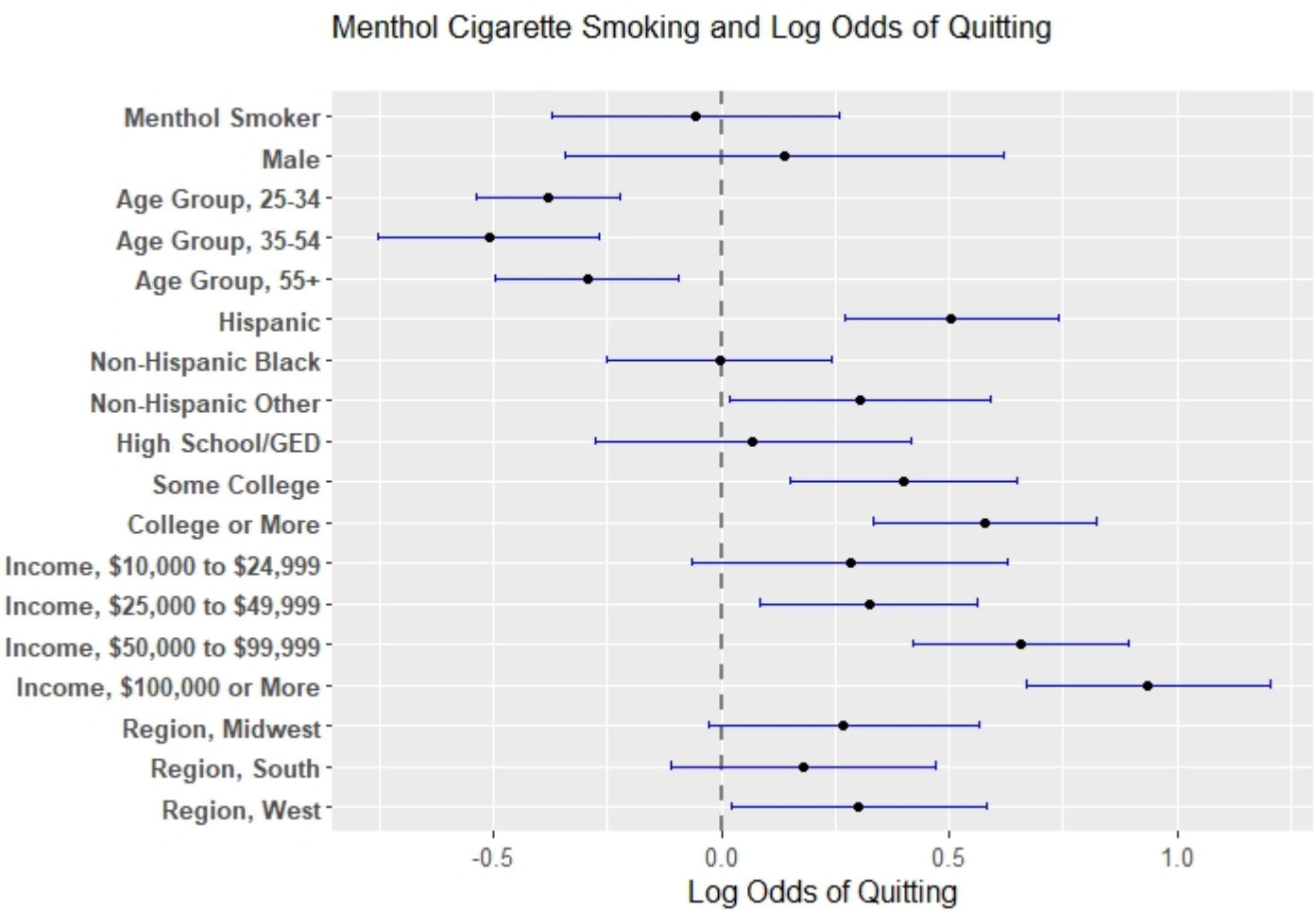
Unadjusted Association

- Log odds of quitting is 0.056 lower for those who smoke menthol cigarettes compared to those who do not.
- 95% CI: (-0.202, 0.089) Statistically insignificant

Adjusted Association

- Log odds of quitting is 0.055 lower for those who smoke menthol cigarettes compared to those who do not, *after adjusting for gender, age, race, education, income, and region*.
- 95% CI: (-0.230, 0.120) Statistically insignificant

Forest Plot


Menthol Cigarette Smoking and Log Odds of Quitting
Menthol Smoker
Male
Age Group, 25-34
Age Group, 35-54
Age Group, 55+
Hispanic
Non-Hispanic Black
Non-Hispanic Other
High School/GED
Some College
College or More
Income, $10,000 to $24,999
Income, $25,000 to $49,999
Income, $50,000 to $99,999
Income, $100,000 or More
Region, Midwest
Region, South
Region, West
-0.5
0.0
0.5
1.0
Log Odds of Quitting

Flavored E-Cig Results (1 of 2)

Unadjusted Association

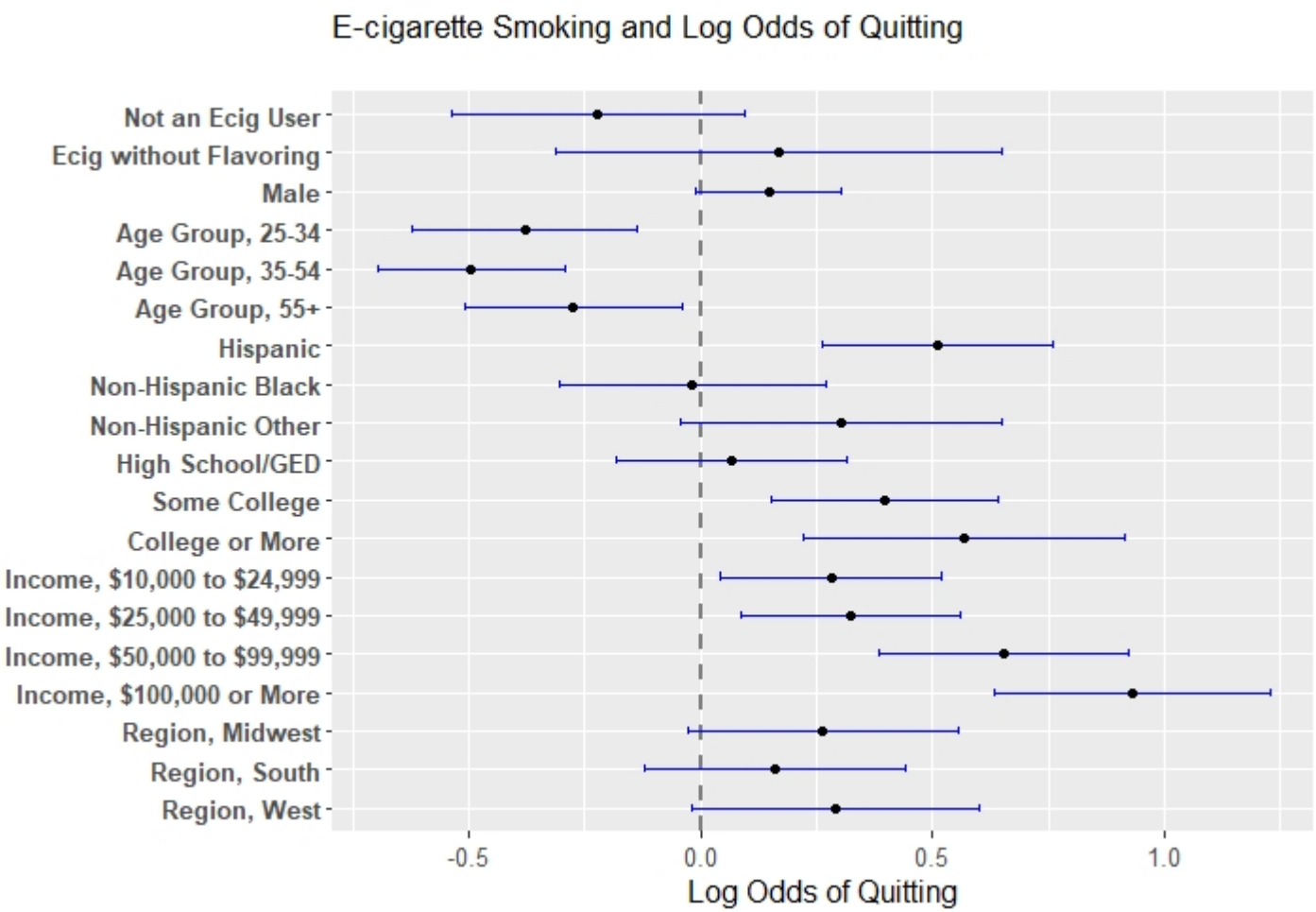
- Log odds of quitting is 0.379 higher for those who smoke flavored e-cigarettes *compared to those who do not smoke any e-cigarettes*.
- 95% CI: (-0.664, -0.093) Statistically significant
- Log odds of quitting is 0.035 lower for those who smoke flavored e-cigarettes *compared to those who smoke e-cigarettes without a flavor*.
- 95% CI: (-0.422, 0.492) Statistically insignificant

Flavored E-Cig Results (2 of 2)

Adjusted Association

- Log odds of quitting is 0.222 higher for those who smoke flavored e-cigarettes compared to those who do not smoke any e-cigarettes, *after adjusting for gender, age, race, education, income, and region*.
- 95% CI: (-0.538, 0.094) Statistically insignificant
- Log odds of quitting is 0.168 lower for those who smoke flavored e-cigarettes compared to those who smoke e-cigarettes without a flavor, *after adjusting for gender, age, race, education, income, and region*.
- 95% CI: (-0.314, 0.649) Statistically insignificant

Forest Plot


E-cigarette Smoking and Log Odds of Quitting
Not an Ecig User
Ecig without Flavoring
Male
Age Group, 25-34
Age Group, 35-54
Age Group, 55+
Hispanic
Non-Hispanic Black
Non-Hispanic Other
High School/GED
Some College
College or More
Income, $10,000 to $24,999
Income, $25,000 to $49,999
Income, $50,000 to $99,999
Income, $100,000 or More
Region, Midwest
Region, South
Region, West
-0.5
0.0
0.5
1.0
Log Odds of Quitting

Secondary Aims

Methodology

- To determine if there were differential effects between subgroups, we looked at possible interactions
- Fit logistic regression models that start with the adjusted model (fit previously) and adds a single interaction between the exposure of interest and subgroup characteristic of interest
- Conducted likelihood ratio test to determine if the interaction term improves the fit of the model

Menthol Results

Likelihood Ratio Tests for Menthol Cigarette Interactions

Characteristic	Test Statistic (Df)	P-Value
Sex	2.415 (1)	0.120
Age Group	1.372 (3)	0.712
Race/Ethnicity	6.539 (3)	0.088
Education	1.036 (3)	0.792
Household Income	5.418 (4)	0.247
Region	2.249 (3)	0.522

Flavored E-Cig Results

Likelihood Ratio Tests for Flavored E-Cig Interactions

Characteristic	Test Statistic (Df)	P-Value
Sex	0.143 (2)	0.931
Age Group	7.009 (6)	0.320
Race/Ethnicity	11.71 (6)	0.069
Education	6.410 (6)	0.379
Household Income	4.556 (8)	0.804
Region	4.959 (6)	0.549

Summary

Summary

- Insufficient evidence that either menthol cigarettes or flavored e-cigarettes make a smoker more or less likely to quit smoking
- Insufficient evidence there are differential effects by population subgroups
- Questions?