

# **Association between Vaping and Hypertension among US Adult Electronic Cigarette (E- cigarette) Users**

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# Disclosure



- MLG received a research grant from Pfizer and served as a member of advisory board to Johnson & Johnson, manufacturers of smoking cessation medications.
- Other authors have no potential conflict of interest to declare.
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# Introduction

- Since E-cigarettes were introduced to the US in 2007, they were marketed as healthier alternatives to cigarettes, and as helpful for smoking cessation.
- E-cigarettes cannot be regarded as safe.
- Recent studies have demonstrated that vaping can acutely elevate blood pressure.
- But the association of vaping with hypertension is still inconclusive.



# Methods

- National representative Population Assessment of Tobacco and Health (PATH) Wave 3 dataset.
- Data for 28,148 adults from the PATH Study Wave 3, collected from October 2015 to October 2016, were analyzed.

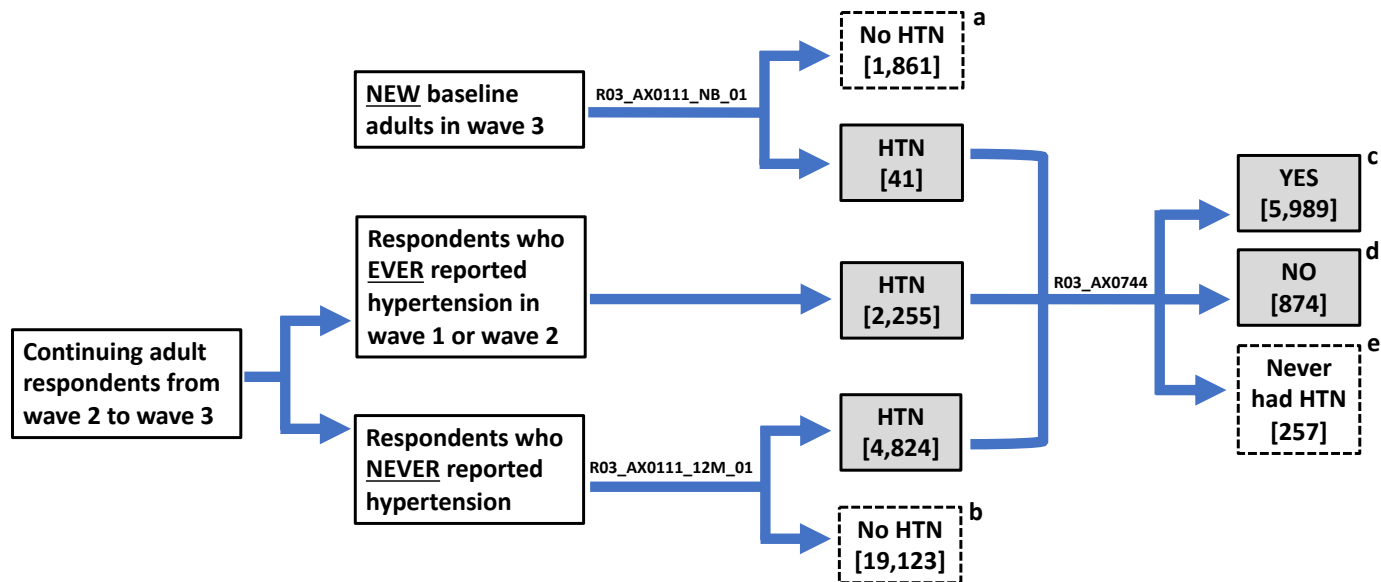


# Methods

- The prevalent adult hypertension cases in Wave 3 consist of three components:
  - Continuing adult respondents who reported being diagnosed with hypertension in Wave 1 and/or Wave 2;
  - Continuing adult respondents who did not have hypertension as of their last interview, but have been told they had high blood pressure in the past 12 months;
  - Newly enrolled respondents who have ever been told they had hypertension



# Methods



Notes:

1. HTN = hypertension;

2. HTN prevalent cases : non-HTN cases = (c + d) : (a + b + e)

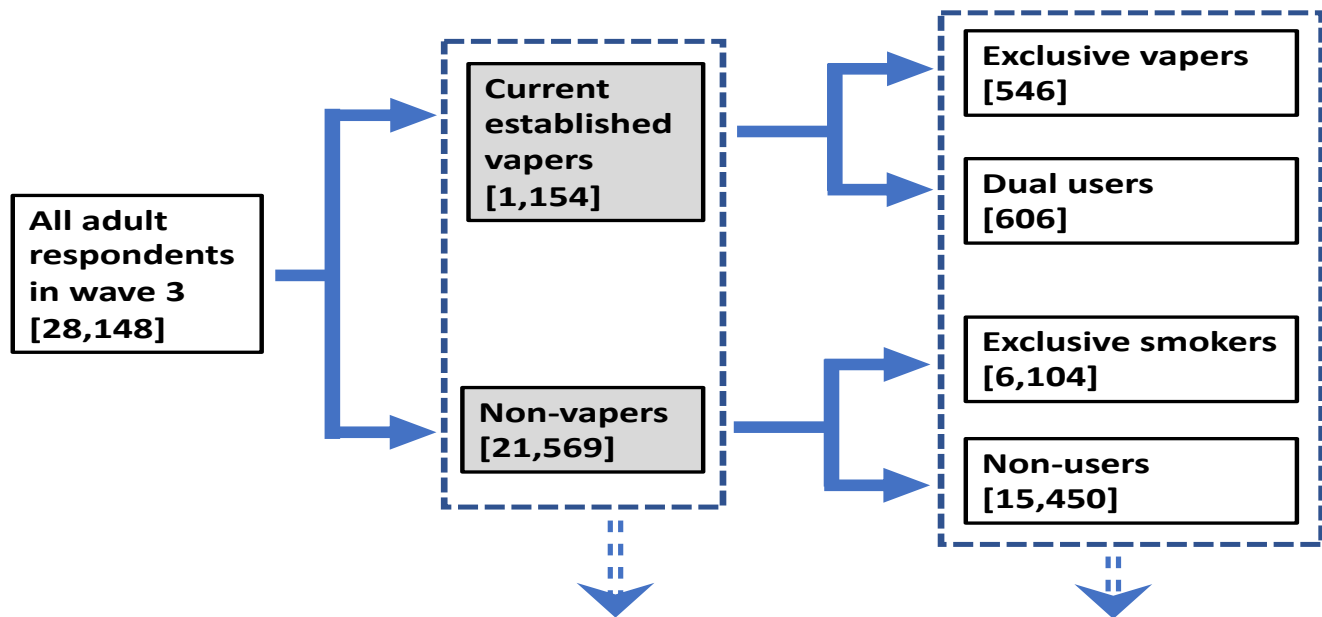


# Methods

- Weighted multivariable logistic regression models in different age groups;
- “Purified” the effects of vaping and smoking, excluding current established *traditional cigar smoker, hookah smoker, cigarillo smoker, filtered cigar smoker, cigar smoker, blunt only smoker, snus punch user, pipe user, smokeless tobacco user, or dissolvable tobacco user*;
- \*Covariates: *sex, ethnicity, race, marital status, education, income, insurance type, body mass index, physical activity, hypercholesterolemia and diabetes mellitus.*



# Methods

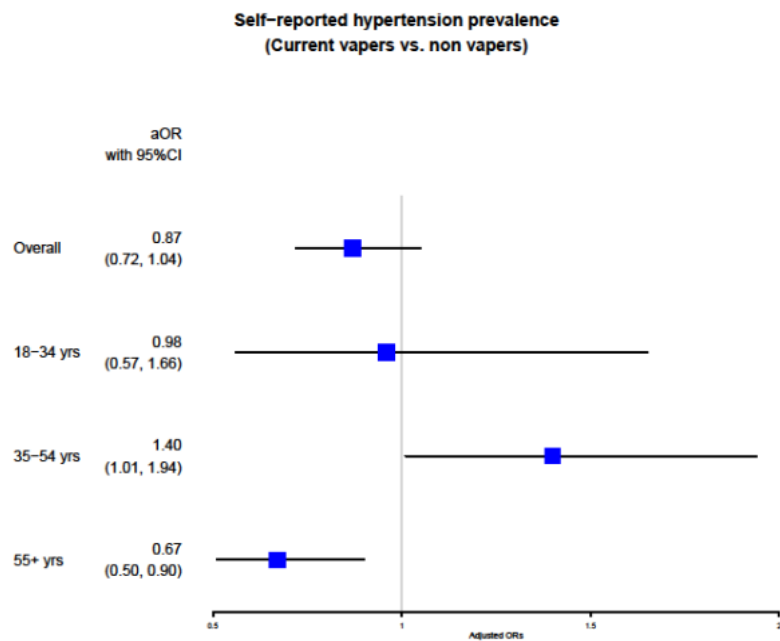


	Model 1	Model 2
Adjusted for smoking status:	Yes	N/A
Adjusted for other covariates*:	Yes	Yes





# Results: Two groups comparisons

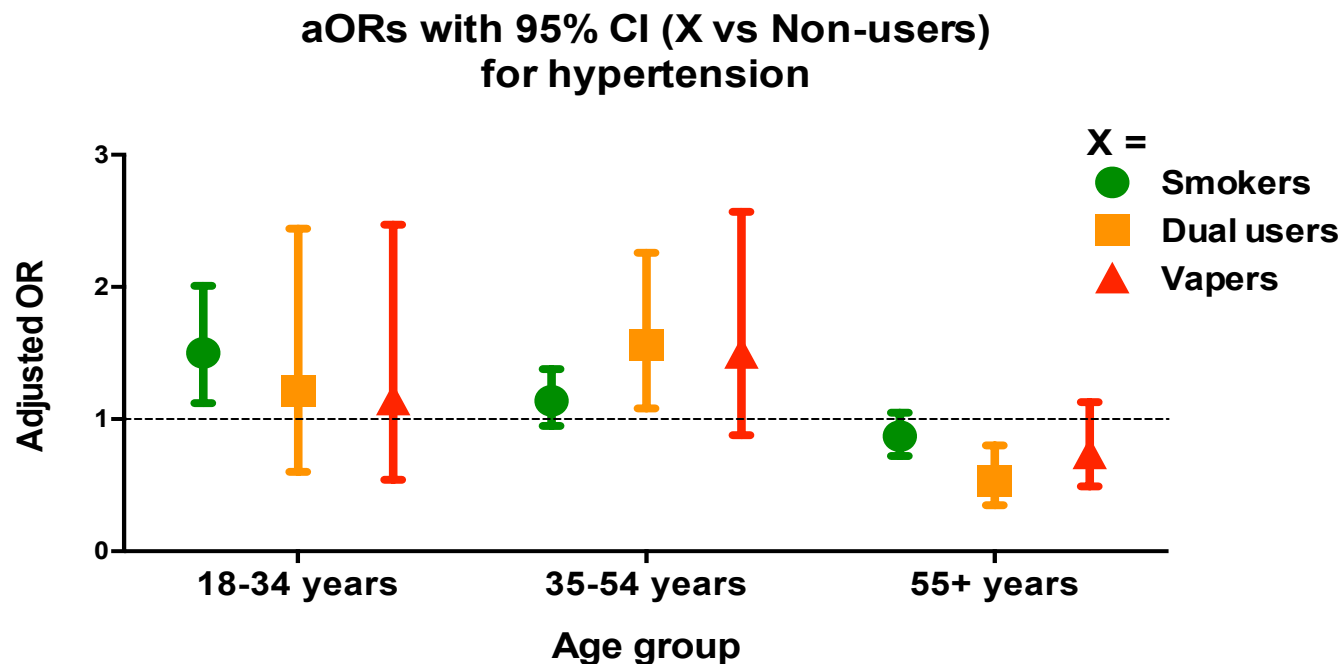


After adjusting for smoking status and other covariates, compared with **non-vapers**:

- the odds of reporting hypertension was significantly higher among **vapers** aged 35-54 years (aOR = 1.40; 95% CI 1.01-1.94)
- the odds of reporting hypertension was significantly lower among **vapers** ages 55+ (aOR = 0.67; 95% CI 0.50-0.90).



# Results: Four groups comparisons



- This indicated that dual users may contribute the most to the increased odds of self-reported hypertension associated with vaping.



# Discussion

- We observed no significant difference between vapers and non-vapers on the odds of hypertension among the overall participants
- After stratifying by age groups, we for the first time found that vapers aged 35-54 years have a significantly higher odds of reporting hypertension (34.63%) than non-vapers (24.46%) at the same age group.
- Among people aged 35-54 years, respondents who were dual users have a considerably higher odds of reporting hypertension (33.88%) than non-users (23.21%).



# Discussion

- Dual use seems to have a “protective” effect regarding the development of hypertension among people aged 55+ years.
  - Tobacco consumption reduction by switching to E-cigarettes may play a more important role than vaping per se.
  - Survivorship bias may contribute to the “lower” hypertension prevalence among smokers aged 55+ years.
  - BMI may serve as a mediator in the causal pathway from long-term smoking to hypertension.



# Limitation

- Cross-sectional study design
  - Lack of temporal variables made it impossible to calculate hypertension incidence
  - Insufficient for us to distinguish smokers who partially switched to E-cigarettes from vapers who added cigarettes smoking
- Outcome variable in this study, diagnosis of hypertension, is based on self-report by respondent



# Key message

- Among people aged from 35 to 54 years old, vaping was associated with increased odds of self-reported hypertension.
- Among people aged 35-54 years, dual users have a considerably higher odds of reporting hypertension than non-users.

