

Switching Away From Cigarette Smoking Among Menthol- and Tobacco-Flavored ENDS Users in the Population Assessment of Tobacco and Health Study

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Introduction

Under Section 910(c)(2)(A) of the Federal Food, Drug, and Cosmetic Act (FD&C Act), the FDA requires that any new tobacco product must demonstrate that its marketing is “appropriate for the protection of the public health” (APPH). Complete switching from combustible cigarettes to e-cigarettes is a heavily scrutinized endpoint pertaining to APPH. Data from Waves 6 and 7 of the Population Assessment of Tobacco and Health (PATH) Study—a nationally representative longitudinal survey of U.S. adults—were used to estimate odds of complete switching from cigarettes to pod-based ENDS by most-used/preferred flavor category.

Methodology

Test Cohorts

The analytic sample was based on those respondents who met the following criteria: (1) completed both the Wave 6 and Wave 7 PATH surveys; (2) reported smoking cigarettes in the 30 days prior to the Wave 6 survey and were not smoking in the 30 days prior to the Wave 7 survey; and (3) reported use of a menthol- or tobacco-flavored pod-based ENDS product in the 30 days prior to the Wave 7 survey (n = 167).

- Endpoints of Interest – Odds of reporting no past 30-day smoking at Wave 7.**
- Vuse Menthol users vs. all pod-based tobacco flavored ENDS users.
 - All pod-based menthol flavored ENDS users vs. all pod-based tobacco flavored ENDS users.

Data Management

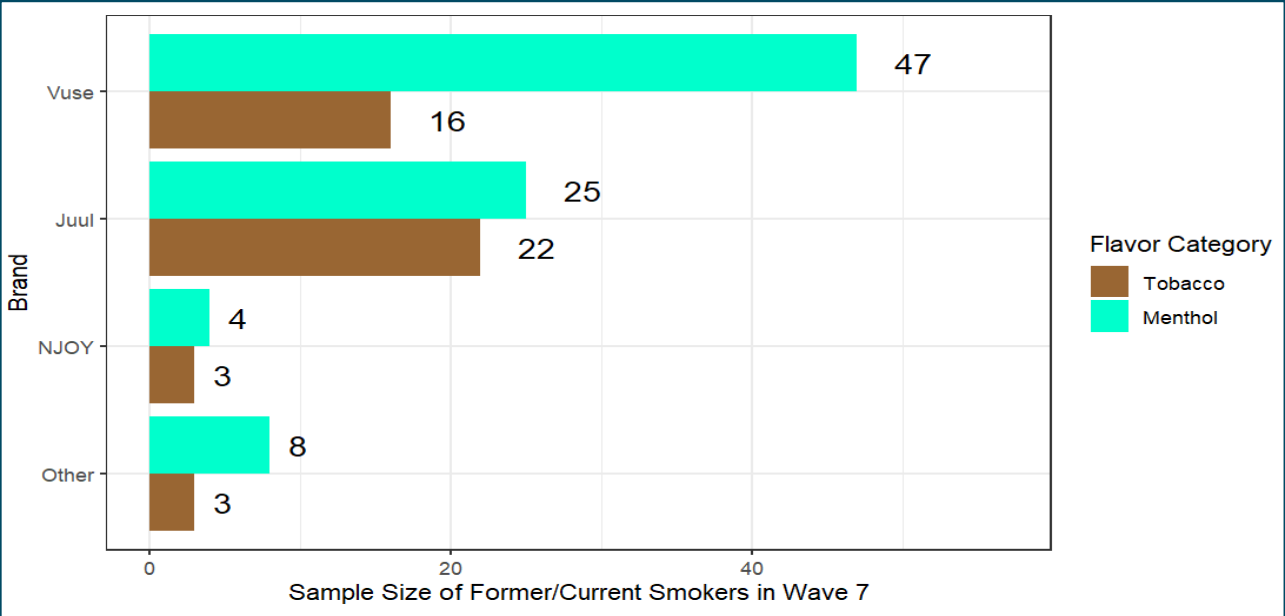
Participants who used only menthol- or tobacco-flavored pod-based ENDS in the 30 days prior to Wave 7, or reported one of these as their usual flavor, were categorized into subsequent cohorts. Analyses included only those who primarily used menthol (n = 109) or tobacco (n = 58) flavors. An additional cohort was created for those who primarily used Vuse Menthol (n=47) shown in **Table 1**. While not analyzed, further details on brand & flavor in Wave 7 are shown in **Figure 1**.

Table 1. Test Cohort Definitions

Test Cohort	Definition	Sample Size
Vuse Menthol Users	Wave 6 cigarette smokers who reported their most often used ENDS brand is Vuse and most often used ENDS flavor is menthol at Wave 7	47
All Menthol Pod-Based ENDS Product Users	Wave 6 cigarette smokers who reported their most often used pod-based ENDS flavor is menthol at Wave 7 regardless of brand (Vuse included)	109
All Tobacco Pod-Based ENDS Product Users	Wave 6 cigarette smokers who reported their most often used pod-based ENDS flavor is tobacco at Wave 7 regardless of brand (Vuse included)	58

Data Management - Misc

Figure 1. Analytic Sample – Number of Users by Brand/Flavor



*Respondents who failed to report a brand name are not included in Figure 1 but are represented in the final analytic cohort.

Statistical Modeling

Group differences were assessed using chi-square tests. Logistic regression models—both unadjusted and adjusted for demographic variables—were used to estimate odds of switching from cigarettes to menthol- vs. tobacco-flavored pod-based ENDS. Variance estimation utilized a balanced repeated replication technique to account for the sampling design.

Results

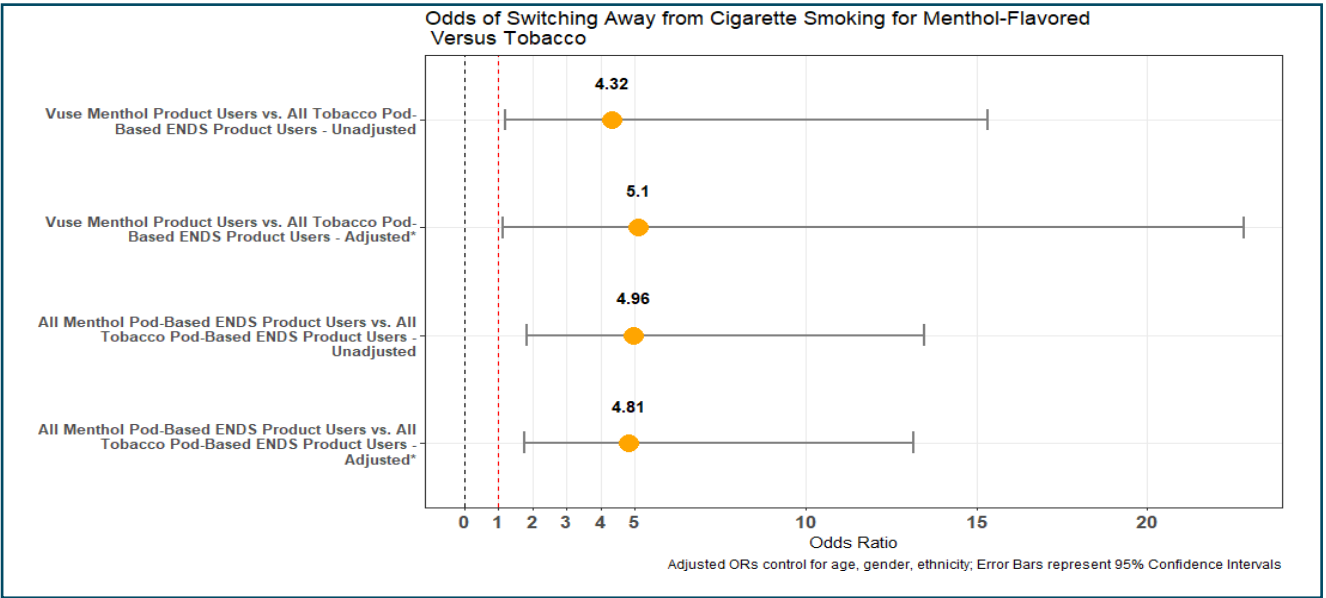
Among respondents who switched from cigarettes and used either menthol- or tobacco-flavored pod-based ENDS (N = 167), switching was significantly more common among menthol users (35.9%, **Table 2**) than tobacco users (10.1%; $\chi^2 = 19.3$, $p < 0.0001$). Vuse Menthol users showed similarly elevated switching rates (32.8%) compared to tobacco users ($\chi^2 = 8.9$, $p < 0.003$). Logistic regression confirmed higher odds of switching for menthol users, both unadjusted (ORs ≈ 4.3 – 5.0) and adjusted for demographics (aORs ≈ 4.8 – 5.1) (**Figure 2**).

Table 2. Proportion of Respondents Reporting Switching

Test Cohort	Proportion of Respondents Who Reported Switching at Wave 7	Proportion of Respondents Who Were Still Smoking Cigarettes at Wave 7
Vuse Menthol Users	32.8%, [15.4–50.1] (n = 11)	67.2%, [49.9–84.6] (n = 36)
All Menthol Pod-Based ENDS Product Users	35.9%, [24.3–47.5] (n = 32)	64.1%, [52.5–75.7] (n = 77)
All Tobacco Pod-Based ENDS Product Users	10.1%, [2.1–18.2] (n = 7)	89.9%, [81.8–97.9] (n = 51)

*Brackets represent 95% confidence intervals of proportion estimates

Figure 2. Odds Ratio Estimates with 95% Confidence Intervals



Limitations

Limitations include a small sample size, particularly among tobacco-flavored Vuse users—which could not be reliably estimated due to the sample size being under 30 (NCHS, 2015) and reliance on self-reported data. The inclusion criteria excluded some former smokers who may have used ENDS earlier in the study period. Despite these limitations, the use of nationally representative PATH data strengthens the findings.

Conclusion

- Analyses of data from the nationally representative, longitudinal PATH study show that a significantly higher proportion of Vuse Menthol Users and All Menthol Pod-Based ENDS Product Users reported switching from cigarettes (i.e., no use of cigarettes in the 30 days prior to the Wave 7 survey) compared to All Tobacco Pod-Based ENDS Product Users.**
- From adjusted logistic regression analyses find that Vuse Menthol Users and All Menthol Pod-Based ENDS Product Users have approximately five times greater odds of switching completely from cigarettes compared to All Tobacco Pod-Based ENDS Product Users.**



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