



## Brief report

# Adult Use of and Transitions From Nicotine and Non-nicotine-Containing E-cigarettes: Data From the Population Assessment of Tobacco and Health (PATH) Study, 2013–2016

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## Abstract

**Introduction:** Studies largely focus on nicotine-containing e-cigarettes (NiCE) though non-nicotine-containing e-cigarettes (NoCE) exist; NoCE prevalence and patterns of use are largely unknown. This study examines self-reported prevalence and patterns of NiCE/NoCE use.

**Methods:** We analyzed adult (18+ years) data from the Population Assessment of Tobacco and Health (PATH) study from Wave 1 (2013–2014,  $n = 32,320$ ), Wave 2 (2014–2015,  $n = 28,632$ ), and Wave 3 (2015–2016,  $n = 28,148$ ). We test associations between Wave 1 self-reported current NoCE/NiCE use status and demographic characteristics and assess the proportion of self-reported current NoCE/NiCE users at Wave 1 or Wave 2 who continue to use NoCE or NiCE, switch to NiCE or NoCE, discontinue e-cigarette use, switch to use other nicotine products (ONP), or add ONP use 1 year later (i.e., at Wave 2 or 3).

**Results:** Maintaining the same self-reported NiCE/NoCE and ONP use status 1 year later was the most common use pattern between waves. However, 15.65% of exclusive NoCE users in Wave 2 transitioned to NoCE plus nicotine product use in Wave 3. Also, some exclusive NoCE users transitioned to exclusive NiCE use (17.77% Waves 1–2; 11.55% Waves 2–3).

**Discussion:** Some exclusive NoCE users transitioned to NiCE or added nicotine product use, suggesting there may be other factors (e.g., familiarity with using an aerosolizing device) in addition to the presence of nicotine in influencing initiation or sustained use of nicotine products.

**Implications:** Studies largely focus on nicotine-containing e-cigarettes (NiCE) though non-nicotine-containing e-cigarettes (NoCE) exist; this study adds to the literature by describing demographic characteristics and tobacco use of adult self-reported NoCE users. In addition, the study examines transitions in self-reported NoCE/NiCE use, revealing that some exclusive NoCE users transition to other nicotine product use 1 year later.

## Introduction

Most studies on e-cigarette use do not differentiate between nicotine-containing e-cigarettes (NiCE) and non-nicotine-containing e-cigarettes (NoCE). One study estimated that among adult e-cigarette users, 69.2% reported usually using NiCE.<sup>1</sup> An analysis

of 2015 Nielson data reports that 99% of all U.S. e-cigarette sales are NiCE.<sup>2</sup> However, these data exclude purchases from tobacco specialty shops, vape-shops, and online sources, potentially resulting in underreporting of true NoCE market share. Additional research can shed light on NoCE use prevalence. In addition, demographic

characteristics of NoCE users are unknown, and it is unclear whether NoCE use is associated with later use of NiCE or other nicotine product use (ONP).

Product characteristics, including nicotine level, may determine risk for and severity of e-cigarette dependence<sup>3</sup>; thus, it is important to fully characterize likely NoCE user groups and their transitions to NiCE and ONP use. If exclusive NoCE users do not use nicotine, their likelihood of initiating later ONP use may be lower compared with exclusive NiCE users, yet this has not been previously examined. The aims of this study are to (1) describe the demographic characteristics and tobacco use of adult self-reported NoCE and NiCE users; (2) examine transitions in self-reported NoCE/NiCE use, including discontinuation and ONP use over 1 year; and (3) assess whether Wave 1 self-reported NoCE/NiCE status was associated with any new tobacco product use in Wave 2 or 3.

## Methods

The Population Assessment of Tobacco and Health (PATH) Study is an ongoing, nationally representative longitudinal cohort study of U.S. civilian, noninstitutionalized adults and youth ages >12 years. Additional study details are published elsewhere.<sup>4</sup> Adult (18+ years) PATH Study data for this analysis are from Wave 1 (2013–2014;  $n = 32,320$ ), Wave 2 (2014–2015;  $n = 28,632$ ), and Wave 3 (2015–2016;  $n = 28,148$ ). Only adults with data at all three waves were included in our analysis ( $n = 23,670$ ).

## Measures

*Current NoCE and NiCE use* was assessed among current e-cigarette users (used e-cigarettes “fairly regularly” and “some days or every day”) in Waves 1 and 2 with the self-reported item, “Do/Did the [e-cigarette products] you usually use/used contain nicotine?” Adults responding “no” were defined as NoCE users and those responding “yes” were defined as NiCE users. For consistency across waves, our analytic sample is restricted to adult current e-cigarette users in Wave 1 ( $n = 1137$ ), Wave 2 ( $n = 1464$ ), and Wave 3 ( $n = 1440$ ) who responded to the NoCE/NiCE item.

*E-cigarette discontinuation* was defined as respondents who reported current e-cigarette use at an earlier wave and reported not using 1 year later.

*Current users of ONP* were adults using any of the following products “fairly regularly” and “some days/every day”: cigarettes, cigars (traditional cigars, cigarillos, and filtered cigars), hookah, smokeless tobacco (pouched snus, loose snus, moist snuff, dip, spit, and chewing tobacco), dissolvables, or pipe tobacco. Categorization of current smoking also required lifetime smoking of at least 100 cigarettes.<sup>5,6</sup> Respondents who answered “yes” to “Are you currently using a nicotine patch, gum, inhaler, nasal spray, lozenge or pill?” were also categorized as current users of ONP.

*Any new tobacco product use* was assessed by first asking respondents if they had used a particular product in the past 12 months at each time point. New tobacco product use was defined as any use at wave 2 or wave 3, where no use of that product had been reported previously. Any new tobacco product use was determined if respondents reported new tobacco product use for any of the following: cigarettes, cigars, hookah, smokeless tobacco, dissolvables, or pipe tobacco (does not include nicotine replacement therapy products, as past 12-month use is not captured).

Sociodemographic measures included sex (male or female), age in years (18–24; 25–44; 45–64; 65+), education (less than high

school/GED; high school graduate; some college or associate’s degree; bachelor’s degree, and beyond), urban/rural, annual household income (<\$25,000; \$25,000–49,999; \$50,000–74,999; and \$75,000+), and sexual orientation (lesbian/gay/bisexual/something else; straight).

## Analysis

We conducted analyses using replicate weights and balanced repeated replication methods to account for the PATH Study’s complex survey design.<sup>4</sup> We conducted descriptive analyses on demographic characteristics stratifying by Wave 1 current NoCE/NiCE use status. We report chi-square analyses to test associations between Wave 1 current NoCE/NiCE use status and demographic characteristics. Next, we describe patterns of transitions for current NoCE/NiCE use to e-cigarette discontinuation or ONP use. Specifically, we report the proportion of current NoCE/NiCE users at Wave 1 or Wave 2 who continue NoCE or NiCE use, switch to NiCE or NoCE use, discontinue e-cigarette use, switch to use ONP, or add ONP use 1 year later (i.e., at Wave 2 or 3). Transitions for Wave 1 to Wave 2 follow adult current e-cigarette users at Wave 1 who responded to NoCE/NiCE and ONP use items during at least Waves 1 and 2 and remained in the study through Wave 3. Transitions for Wave 2 to Wave 3 follow adult current e-cigarettes users who responded to NoCE/NiCE and ONP use items during Waves 2 and 3 but also had participated in Wave 1. Due to changes in the wording and participant routing of the item assessing NiCE/NoCE use ([Supplementary Table A](#)) as well as low or zero counts associated with transitions across all three waves, these transitions were limited to two waves. Finally, we conducted unadjusted logistic regression analyses of Wave 1 adult current e-cigarette users to assess whether Wave 1 NoCE status was associated with any new tobacco product use; we stratified analyses by ONP use.

## Results

### Sociodemographic Characteristics of NoCE and NiCE Users

[Table 1](#) presents sociodemographic characteristics comparing NiCE and NoCE users. Compared with NiCE users, a higher proportion of NoCE users were non-Hispanic (NH) Black (15% vs. 7%), Hispanic (19% vs. 9%), and have an income less than \$25,000 (55% vs. 41%). Compared with NoCE users, a higher proportion of NiCE users were aged 25–44 years (49% vs. 29%) and NH White (78% vs. 52%). Also, a higher proportion of NoCE users were females (60%) compared with males (40%).

### Transitions to Nicotine-Containing Product Use Over a 1-Year Period

As shown in [Table 2](#), some exclusive NoCE users transitioned to NoCE plus nicotine product use (15.65% Waves 2–3). In 1 year, more than 17% of exclusive NoCE users transitioned to exclusive NiCE use (17.77% Waves 1–2; 11.55% Waves 2–3).

Maintaining the same NiCE/NoCE and ONP use status 1 year later was the most common use pattern. Of exclusive NoCE users, 25% of Wave 1 users and 27.30% of Wave 2 users remained exclusive NoCE users 1 year later. Of exclusive NiCE users, 60.09% of Wave 1 users and 58.59% of Wave 2 users remained exclusive NiCE users 1 year later. Also, 20.78% of Wave 2 users remained NoCE plus ONP users at Wave 3, whereas 39.69% of Wave 2 NiCE plus ONP users remained NiCE plus ONP users at Wave 3.

**Table 1.** Demographic Characteristics of Wave 1 (2013–2014) PATH Adults by Non-nicotine-Containing E-cigarette (NoCE) or Nicotine-Containing E-cigarette (NiCE) Use<sup>a</sup>

	Wave 1 non-nicotine-containing e-cigarette (NoCE) users		Wave 1 nicotine-containing e-cigarette (NiCE) users		$\chi^2$ <sup>c</sup>
	Count (weighted %) [SE]				
	133 (10.80%) [0.95]		1004 (89.20%) [0.95]		
Weighted population	436,640		3,604,883		
	% <sup>b</sup>	95% CI	% <sup>b</sup>	95% CI	
Sex					5.66, <i>p</i> = .03
Male	39.96	31.12; 49.51	51.33	47.94; 54.70	
Female	60.04	50.49; 68.88	48.67	45.30; 52.06	
Age group (years)					18.12, <i>p</i> = .004
18–24	27.96	20.99; 36.20	18.76	16.31; 21.49	
25–44	29.28	21.02; 39.18	48.84	45.28; 52.40	
45–64	34.87	25.97; 44.97	27.91	24.77; 31.29	
65+	7.88†	3.92; 15.21	4.49	2.93; 6.81	
Race/ethnicity					37.64, <i>p</i> < .0001
NH White	52.13	42.62; 61.49	77.59	74.85; 80.10	
NH Black	15.46	9.92; 23.29	6.92	5.46; 8.74	
Hispanic	18.86	12.14; 29.08	8.77	7.15; 10.71	
NH Asian	5.5†	1.98; 14.35	2.43	1.40; 4.19	
NH other/multirace <sup>d</sup>	8.04	4.51; 13.96	4.29	3.20; 5.74	
Education					8.13, <i>p</i> = .15
< hHigh school diploma	13.46	8.02; 21.71	9.48	7.66; 11.66	
GED	8.13 <sup>f</sup>	4.09; 15.51	8.06	6.44; 10.02	
HS diploma	33.33	26.26; 42.14	24.64	21.26; 28.37	
Some college/associate degree	33.14	24.36; 43.27	42.54	38.77; 46.39	
Bachelor's + advanced degree	11.95	6.92; 19.85	15.29	12.98; 17.94	
Urban–rural status					0.03, <i>p</i> = .86
Urban	78.71	70.18; 85.31	79.38	74.89; 83.24	
Rural	21.29	14.69; 29.82	20.62	16.76; 25.11	
Sexual orientation					3.11, <i>p</i> = .10
Straight	83.99	70.18; 85.31	89.34	86.93; 91.35	
Lesbian, gay, bisexual, something else	16.01	14.69; 29.82	10.66	8.65; 13.07	
Household income					8.68, <i>p</i> = .04
< \$25,000	54.69	45.29; 63.77	41.14	37.61; 44.76	
\$25,000–49,999	18.28	12.44; 26.03	26.90	23.70; 30.37	
\$50,000–\$74,999	9.86	5.74; 16.40	14.06	11.98; 16.43	
≥\$75,000	17.18	10.73; 26.37	17.90	15.28; 20.87	
Other current nicotine product use <sup>e</sup>					3.10, <i>p</i> = .08
Does not currently use other nicotine products	28.83	21.44; 37.54	21.48	19.36; 25.91	
Currently uses other nicotine products	71.17	62.46; 78.56	77.53	74.06; 80.64	

The Wave 1 cross-sectional weights were used for analyses presented in this table.

<sup>a</sup>Current e-cigarette use is defined as having ever used, has regularly used, and using every day or some days.

<sup>b</sup>Proportions and 95% confidence intervals are weighted.

<sup>c</sup>Chi-square analyses test the association between Wave 1 NoCE/NiCE user status and sociodemographic items.

<sup>d</sup>Other race/ethnicity includes American Indian/Alaskan Native, non-Hispanic; Native Hawaiian or Other Pacific Islander, Non-Hispanic; and more than one race, Non-Hispanic.

<sup>e</sup>Other nicotine product use includes current use of cigarette, cigars (traditional, filtered, and cigarillos), smokeless tobacco (including snus), hookah, pipe, dissolvables, and nicotine replacement therapy.

<sup>f</sup>Estimate should be interpreted with caution because it has low statistical precision. It is based on a denominator sample size of less than 50, or the coefficient of variation of the estimate or its complement is larger than 30%.

Overall, a higher proportion of NoCE users discontinued use of all products (including e-cigarettes) 1 year later at Wave 2 (11.88% NoCE vs. 5.32% NiCE) and Wave 3 (17.46% NoCE vs. 6.65% NiCE) compared with NiCE users. This finding is especially pronounced among exclusive NoCE users. Compared with other e-cigarette user status groups (NoCE plus nicotine product users, exclusive NiCE users, and NiCE plus ONP users), exclusive NoCE

users had the highest proportion of discontinuation of all products. Among Wave 1 exclusive NoCE users, 27.13% discontinued all products in Wave 2. Among Wave 2 exclusive NoCE users, 38.80% discontinued all products in Wave 3. Overall, a higher proportion of NiCE users used NiCE plus ONP 1 year later at Wave 2 (19.75% NoCE vs. 44.27% NiCE) and Wave 3 (14.81% NoCE vs. 33.46% NiCE) compared with NoCE users.

**Table 2.** Transitions to Non-nicotine-Containing E-cigarette (NoCE) and Nicotine-Containing E-cigarette (NiCE) Current Use and Discontinuation 1 Year Later among Adults

a. Non-nicotine-containing e-cigarette (NoCE) and nicotine-containing e-cigarette (NiCE) current use, discontinuance, and other nicotine product use 1 year later, between Wave 1 (2013–2014) and Wave 2 (2014–2015)

Wave 1 e-cigarette current use status <sup>a</sup>	Wave 2 non-nicotine containing e-cigarette use + current ONP use		Wave 2 nicotine containing e-cigarette use + current ONP use		Wave 2 nicotine containing e-cigarette use + no current ONP use		Wave 2 e-cigarette discontinuance + current ONP use		Wave 2 e-cigarette discontinuance + no current ONP use			
	n (%) <sup>b</sup>	95% CI	n (%) <sup>b</sup>	95% CI	n (%) <sup>b</sup>	95% CI	n (%) <sup>b</sup>	95% CI	n (%) <sup>b</sup>	95% CI		
Wave 1 non-nicotine e-cigarette current use	24 (23.64)	16.30; 32.99	12 (12.26) <sup>e</sup>	6.54; 21.83	24 (19.75)	12.66; 29.47	10 (10.74) <sup>e</sup>	5.28; 20.62	24 (21.71)	14.98; 30.38	14 (11.88)	6.99; 19.48
Current use of other nicotine product (ONP) <sup>f</sup>	— <sup>f</sup>	—	3 (4.65) <sup>e</sup>	1.49; 13.58	— <sup>f</sup>	—	4 (8.4)	3.05; 21.09	20 (25.31)	16.63; 36.55	4 (4.78) <sup>e</sup>	1.76; 12.30
No current use other nicotine product	— <sup>f</sup>	—	8 (25.00) <sup>e</sup>	12.68; 43.32	— <sup>f</sup>	—	6 (17.77) <sup>e</sup>	7.59; 36.22	4 (15.23) <sup>e</sup>	5.74; 34.62	9 (27.13) <sup>e</sup>	14.67; 44.63
Wave 1 nicotine-containing e-cigarette current use	28 (2.68)	1.81; 3.97	9 (0.95) <sup>e</sup>	0.44; 2.03	416 (44.27)	40.89; 47.58	173 (19.55)	17.04; 22.58	253 (27.23)	24.13; 30.49	53 (5.32)	4.05; 6.94
Current use of other nicotine product (ONP) <sup>f</sup>	28 (3.5)	2.35; 5.18	3 (0.40) <sup>e</sup>	0.12; 1.38	377 (51.94)	47.84; 56.02	53 (7.39)	5.57; 9.74	234 (32.50)	28.94; 36.28	31 (4.26)	2.94; 6.13
No current use other nicotine product	0.00	— <sup>d</sup>	6 (2.90) <sup>e</sup>	1.31; 6.31	36 (18.58)	13.04; 25.78	115 (60.09)	53.10; 66.69	18 (9.39)	5.65; 15.21	21 (9.04)	5.71; 14.02

b. Non-nicotine-containing e-cigarette (NoCE) and nicotine-containing e-cigarette (NiCE) current use, discontinuance, and other nicotine product use 1 year later, between Wave 2 (2014–2015) and Wave 3 (2015–2016)

Wave 2 e-cigarette current use status <sup>a</sup>	Wave 3 non-nicotine containing e-cigarette use + current ONP use		Wave 3 nicotine containing e-cigarette use + current ONP use		Wave 3 nicotine containing e-cigarette use + no current ONP use		Wave 3 e-cigarette discontinuance + current ONP use		Wave 3 e-cigarette discontinuance + no current ONP use			
	n (%) <sup>b</sup>	95% CI	n (%) <sup>b</sup>	95% CI	n (%) <sup>b</sup>	95% CI	n (%) <sup>b</sup>	95% CI	n (%) <sup>b</sup>	95% CI		
Wave 2 non-nicotine e-cigarette current use	29 (19.43)	11.83; 29.38	19 (12.06)	8.40; 19.83	23 (14.81)	9.56; 21.57	12 (7.36) <sup>e</sup>	3.87; 14.56	46 (28.87)	20.58; 37.78	34 (17.46)	11.33; 25.18
Current use of other nicotine product (ONP) <sup>f</sup>	24 (20.78)	12.98; 31.57	5 (4.78) <sup>e</sup>	1.96; 11.22	23 (22.04)	14.52; 32.00	6 (5.38) <sup>e</sup>	1.98; 13.82	42 (39.74)	29.62; 50.82	12 (7.27) <sup>e</sup>	3.71; 13.76
No current use other nicotine product	4 (15.65) <sup>e</sup>	4.27; 43.58	14 (27.3)	15.38; 43.70	0.00	— <sup>d</sup>	6 (11.55) <sup>e</sup>	4.16; 28.18	4 (6.69) <sup>e</sup>	2.39; 17.39	22 (38.80)	23.84; 56.23
Wave 2 nicotine-containing e-cigarette current use	30 (2.01)	1.35; 2.91	18 (1.31)	0.78; 2.16	427 (33.46)	30.09; 36.15	255 (22.89)	20.60; 26.79	434 (33.68)	30.27; 36.41	88 (6.65)	5.48; 8.53
Current use of other nicotine product (ONP) <sup>f</sup>	25 (2.39)	1.59; 3.59	6 (0.83) <sup>e</sup>	0.36; 1.95	366 (39.69)	36.40; 43.07	75 (8.63)	6.62; 11.18	404 (43.11)	39.68; 45.60	52 (5.35)	4.07; 6.99
No current use other nicotine product	5 (1.07) <sup>e</sup>	0.38; 2.92	12 (2.54) <sup>e</sup>	1.29; 4.92	59 (17.73)	13.10; 23.54	177 (58.59)	51.25; 65.57	28 (10.00)	5.84; 16.59	36 (10.07)	6.93; 14.43

ONP stands for other nicotine product; Wave 3 all-wave weights are used in analyses; % reflects row values.

<sup>a</sup>Current e-cigarette use is defined as having ever used, has regularly used, and using every day or some days.

<sup>b</sup>Counts are unweighted; Proportions and 95% Confidence Intervals (CIs) are weighted.

<sup>c</sup>ONP stands for Other Nicotine Product and includes current use of at least one of the following nicotine products types: cigarette, cigars (traditional, filtered, and cigarillos), smokeless tobacco (including snus), hookah, pipe, dissolvables, and nicotine replacement therapy.

<sup>d</sup>Numerator reflects a value of 0, so 95% CIs are not reported.

<sup>e</sup>Estimate should be interpreted with caution because it has low statistical precision. It is based on a denominator sample size of less than 50, or the coefficient of variation of the estimate or its complement is larger than 30%.

<sup>f</sup>Counts for one of the cells is <3; therefore, both column cells are suppressed for confidentiality.

## New Tobacco Product Use in Subsequent Waves

We examined whether Wave 1 current NiCE use (compared with current NoCE use) was associated with any new tobacco product use in Wave 2 or 3 using unadjusted logistic regression. We stratified these analyses by ONP use. The relationship between Wave 1 current NiCE status and any new tobacco product use was nonsignificant both for those who did not currently use ONP (odds ratio = 1.43; 95% confidence interval: 0.64; 3.18,  $p = .38$ ) and for those who currently use ONP (odds ratio = 1.15; 95% confidence interval: 0.53, 2.48;  $p = .72$ ).

## Discussion

This study describes characteristics of self-reported NoCE and NiCE users and transitions in self-reported NoCE/NiCE use, including discontinuation and ONP use over 1 year. Compared with NiCE users, a higher proportion of NoCE users were from some racial/ethnic groups, had lower incomes, and were female. Given that little is known about the NoCE marketing or appeal, it is unclear why use in these groups is higher. Of adult e-cigarette users, 89.2% were NiCE users and 10.8% were NoCE users. Our estimates of NiCE use are higher than those found by Weaver et al.,<sup>1</sup> who estimated that among adult users, 69.2% reported usually using NiCE. In our analysis, a higher proportion of NoCE users were NH Black, Hispanic, and had the lowest annual household income assessed, whereas a higher proportion of NiCE users were 25–44 years and NH White.

The most common pattern of NiCE/NoCE use status at an earlier wave was to maintain the same status at a later wave; many transitional patterns were also observed. Using PATH data, Coleman et al. found that nearly two-thirds of PATH Wave 1 e-cigarette users (including infrequent, moderate, and daily users) either decreased or discontinued e-cigarette use by Wave 2.<sup>7</sup> Similarly, our findings showed that a large proportion of current e-cigarette users discontinued use in later waves; however, there were important distinctions between NiCE and NoCE users. Compared with NiCE users, a higher proportion of NoCE users transitioned to discontinuation of all nicotine products. Exclusive NoCE users had the highest proportions of those who discontinued all products compared to all other e-cigarette user status groups. Compared with NoCE users, a higher proportion of NiCE users used NiCE plus ONP 1 year later. Findings indicate the important role of nicotine in sustaining later e-cigarette and ONP use and provide support for the consideration of nicotine use when defining e-cigarette user status.

The association between Wave 1 current NiCE status and subsequent new tobacco product addition in Wave 2 or 3 was nonsignificant regardless of ONP use, showing no initial evidence that NoCE users are less likely to initiate later product use compared with NiCE users. Also, a non-negligible proportion of exclusive NoCE users transitioned to nicotine product use in later waves. In addition to nicotine, other factors (such as familiarity of using the actual device) may predispose NoCE users to NiCE use with implications for later nicotine dependence.

Study limitations included inability to examine youth, as items assessing whether users' e-cigarettes contain nicotine were not included in the Waves 1 and Wave 2 youth instruments. These items were added to the youth instrument starting in Wave 3, so future analyses may ascertain youth NoCE use and transitions. Also, reliance on NiCE/NoCE self-reported items may lead to misclassification; some e-cigarette may inaccurately believe their products to be non-nicotine containing, leading to overreporting of use.<sup>8</sup> However, our low estimates of NoCE use prevalence are closer to findings from Nielsen data estimates<sup>2</sup> than those by Weaver et al.<sup>1</sup> Additionally, the item used to define NiCE/NoCE does not permit detection of dual use of NoCE and NiCE. Also, we were unable to assess new tobacco product use of

specific product types by Wave 1 NoCE/NiCE status due to low cell counts. As noted, there were subtle changes in items assessing NoCE/NiCE status with each wave; thus, our analysis considered separate 1-year period assessing transitions in NoCE/NiCE and ONP use. However, we found similar transition patterns from analyses examining Wave 1 to Wave 2 (Table 2a), Wave 2 to Wave 3 (Table 2b), and Wave 1 to Wave 3 (a 2-year period; results not shown).

In conclusion, most adult e-cigarette users self-report using NiCE. Although nicotine may be an important factor influencing trajectories of use over time, a non-negligible portion of exclusive NoCE users transition to NiCE and/or ONP use. Future research may confirm the role of other factors, in addition to nicotine, that may influence e-cigarette use trajectories.

## Supplementary Material

Supplementary data are available at *Nicotine & Tobacco Research* online.

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## Declaration of Interests

The authors declare there is no conflict of interest.

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