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Rising Vape Pod Popularity Disrupted Declining Use of Electronic Nicotine Delivery Systems among Young Adults in Texas, USA from 2014–2019

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Abstract

Aims.—To examine the longitudinal trajectory of young Texan (USA) adults' Electronic Nicotine Delivery Systems (ENDS) use from 2014–2019, and to determine if there are changes in the trajectory among younger and older young adults post-2017, when vape pods surged in popularity in the United States.

Design.—Nine-wave longitudinal study, with 6 months between each of the first eight waves and 1 year between the last two waves. Discontinuous, or piecewise, growth curve models were used to test the hypotheses that a) the overall current/past 30-day ENDS use trajectory would decline from 2014–spring 2017, but then increase from fall 2017–2019 and b) the increasing trajectory from 2017–2019 would occur only for younger participants, but not older participants. All models

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included socio-demographic covariates of sex, race/ethnicity, type of college attended at baseline (2-year or 4-year) and time-varying age.

Setting and Participants.—5,218 students (18–25 years old at baseline; 63.7% female) from 24 colleges in the five counties surrounding Austin, Dallas/Fort Worth, Houston, and San Antonio, Texas, USA.

Measurements.—Participants completed online surveys regarding past 30-day ENDS use at all nine waves.

Findings.—Current ENDS use significantly declined from 2014 to spring 2017, Odds Ratio (OR)=0.63 [95% Confidence Interval (CI)=0.59–0.68], and then significantly increased from autumn 2017 to 2019, OR=1.14 (95% CI=1.01–1.29). Further examination indicated the increase in current ENDS use from autumn 2017 to 2019 occurred only for younger (–1 SD below the mean age, 22.6 years old), but not older (+1 SD above the mean age, 26.2 years old), participants.

Conclusion.—The surge in the popularity of vape pods in the United States in late 2017 may have contributed to increasing use of Electronic Nicotine Delivery Systems (ENDS) among younger young adults (below 22.6 years) from late 2017 to 2019.

Young adults, 18–24 years old, have the highest prevalence of Electronic Nicotine Delivery Systems (ENDS) use in the United States (U.S.) compared with adolescents and older adults.^{1,2} Data from the National Health Interview Survey (NHIS) indicate that 7.6% of 18–24-year-olds were current users of ENDS products in 2018.³ Although repeated cross-sectional NHIS data show that prevalence of current ENDS use among all adults decreased from 2014–2017, prevalence increased from 2017–2018.⁴ Closer examination of the 2017–2018 data indicate that the increasing prevalence was only among 18–24-year-olds and not among those 25 years and older.³ Increasing prevalence of ENDS use during young adulthood is concerning given that tobacco use is solidified during this developmental period.⁵

The increase in ENDS use prevalence from 2017–2018 has been attributed to the rapid rise in popularity of vape pods,^{3,4} also referred to as pods or pod mods. Like other ENDS products, vape pods are rechargeable, available in a variety of flavors, and contain nicotine. Some vape pods deliver higher levels of nicotine than other types of ENDS products^{6–8} raising concerns regarding their potential for addiction. The most popular vape pod brand is JUUL. Introduced in June 2015, JUUL's popularity surged in late 2017⁹ with convenience store sales increasing 641% from 2016–2017, nationwide.¹⁰ Across the U.S., JUUL accounted for more than 70% of the dollar share of all ENDS products sold at convenience stores by August 2018.¹¹ Young adults report using JUUL and other vape pods because they have a sleek design, high levels of nicotine delivery, pleasurable taste and smell, and are easy to conceal.^{12,13}

A growing number of studies examine vape pod use among young people, although most are cross-sectional and descriptive in nature.^{14–16} Data from the nationally representative Truth Longitudinal Cohort indicate that JUUL use increased significantly across a one-year period from 2018–2019 for 18–20 and 21–24 year old young adults.¹⁷ These increasing rates are consistent with increases in ENDS use among young adults from 2017–2018.^{3,4} Still

lacking in the literature, however, are studies that examine if the longitudinal trajectory of ENDS use was disrupted in late 2017 by the rapid rise in popularity of vape pods. Although there are new users of ENDS products during young adulthood,¹⁸ discontinuation during this developmental period is common^{19,20} and limited longitudinal evidence indicates that ENDS use declines as young adults age.²¹ Results from one study tracking 18–25-year-olds across a 2.5-year period from 2014–2017 indicated that as young adults aged, the probability of ENDS use decreased.²¹ The discontinuation and/or decline in ENDS use across increasing age is consistent with a maturing out hypothesis,²² which indicates that experimentation with ENDS should decrease during the developmental transition to adult roles, such as full-time work and marriage. No studies, however, have examined if the increasing popularity of vape pods in late 2017 disrupted the expected decline in ENDS use across young adulthood.

The purpose of the present study was to examine the longitudinal trajectory of ENDS use across a 4.5-year period from 2014–2019. Data from more than 5,000 young adults, who were 18–25 years old at the study's initiation, were used to determine if there were changes in the ENDS use trajectory post-2017, when vape pods surged in popularity in the U.S. Based on the rise in ENDS, including vape pod, use reported in other studies,^{3,4,17} we expected that a declining ENDS use trajectory would be disrupted in late 2017. Thus, we hypothesized (<https://doi.org/10.17605/OSF.IO/JBHCX>) that overall ENDS use would decline from 2014–spring 2017, but then increase from fall 2017–2019. We also examined if the hypothesized decline and subsequent increase in ENDS use varied across participant age. Given previous research,^{3,17} we expected that the increasing trajectory would occur only among younger young adults but not older young adults.

Method

Participants

Participants were 5,218 young adults participating in the Marketing and Promotions across Colleges in Texas (M-PACT) project. Project M-PACT is a longitudinal, rapid response study that tracked tobacco use among a cohort of 5,482 18–29-year-olds from 24 Texas colleges across a 4.5-year period from 2014–2019. To participate in the study, students were required to be 18–29 years old and full- or part-time degree- or certificate-seeking undergraduate students attending a participating 4-year college or a vocational/technical program at a 2-year college. Participants completed informed consent prior to completing online surveys. Of the 13,714 students who were eligible to participate, 5,482 students (40%) provided consent and completed the survey.

Only data from the 5,221 participants who were 18–25 years old at Wave 1 were included for this study as this is the age range typically considered to capture young adulthood. Of the 5,221 participants, only three were excluded due to missing covariates, resulting in a final sample size of 5,218 participants. At Wave 1, the mean age of the 5,218 participants was 20.65 years (SD=1.83); 63.7% were female; 93.3% attended a 4-year versus 2-year college; and 35.5% were non-Hispanic, white, 31.3% were Hispanic/Latino, 17.5% non-Hispanic, Asian, 8.1% were non-Hispanic, black, and 7.6% were another race/ethnicity or reported two or more races/ethnicities. Table 1 shows the socio-demographics for study participants at all study waves.

Procedure

Participants were recruited via email in fall 2014/spring 2015 from 24 colleges in the five counties surrounding Austin, Dallas/Fort Worth, Houston, and San Antonio. There were five follow-up waves every six months until spring 2017, and two annual follow-up waves, in spring 2018 and spring 2019. In between the spring 2017 and spring 2018 follow-up waves, we conducted an abbreviated survey to maintain contact with participants and that inquired only about their tobacco use (fall 2017). In total, we gathered tobacco use data from online surveys across nine waves spanning from fall 2014–spring 2019: eight full study waves (Waves 1–6 and Waves 8–9) and one abbreviated wave (Wave 7). Participants received a \$10 e-gift card incentive at Wave 1 and Wave 2, a \$20 e-gift card incentive for all other full study waves, and a \$5 e-gift card incentive for the abbreviated survey. In addition, there were drawings at each wave to win additional e-gift cards. Retention rates for the eight full study waves ranged from 70% (Wave 9) to 81% (Wave 4) of the original 5,482 participants; the retention rate for the abbreviated Wave 7 survey was 63%.

Measures

Outcome Variable

Current ENDS use.: The primary outcome variable was past 30-day use of any ENDS product, assessed at each of the nine waves. Current ENDS use assessment evolved across the nine waves from 2014–2019 to reflect the changing marketplace. At all nine waves, participants reported if they used an ENDS product “during the past 30 days ... even one or 2 puffs, as intended (i.e., with nicotine cartridges and /or e-liquid/e-juice).” However, the descriptors and brand names for ENDS expanded to match the available types and brands of ENDS products throughout the study. In fall 2017 (Wave 7), JUUL was included for the first time in the preamble to the ENDS use question as one brand of ENDS. It is important to note that although the survey did not include direct assessment of JUUL or other vape pods prior to fall 2017, participants were asked, at each wave, to select from a list and/or include in an open-ended response the brand names of ENDS they were using. The first mention of a vape pod brand, JUUL, was on the spring 2017 (Wave 6) survey by only one participant. In spring 2018 (Wave 8) and spring 2019 (Wave 9), we included a series of vape pod-specific items. Participants viewed images of disposable ENDS products and asked to select the image of the product they most often used in the past 30 days. Participants who selected the image of a vape pod were coded as current vape pod users.

Socio-Demographic Covariates

Socio-demographics.: Participant sex, race/ethnicity, and type of college attended, all assessed at baseline, were included as time-invariant covariates in the study models and participant age in years, assessed at all waves, was included as a time-varying covariate. Sex was coded ‘0’ (female)/‘1’ (male), race/ethnicity was dummy-coded (for Hispanic/Latino, non-Hispanic, black, non-Hispanic, Asian, and other; non-Hispanic, white was the reference group), type of college attended was coded ‘0’ (2-year)/‘1’ (4-year). Participant age was centered at age 18 and log-transformed consistent with prior research with these data¹⁸ to produce a better fit to generalized linear models of tobacco use.

Data Analysis—The hypothesis that overall ENDS use would decline from 2014-spring 2017, but then increase from fall 2017–2019 was tested using discontinuous, or piecewise, growth curve models.²³ Discontinuous growth curve models are used to examine non-linear trajectories by estimating changes in slopes and elevation. A slope, also referred to as a trajectory, captures change in an outcome across time and elevation is a shift in the level of an outcome at a point in time that joins two slopes. For this study, the base model included an elevation variable that was modeled at fall 2017 (Wave 7) to represent the point in time when vape pods rose rapidly in popularity in the U.S. The base model also included two linear slope variables, one representing current ENDS use prior to the rapid rise in popularity of vape pods from 2014-spring 2017 (Wave 1-Wave 6) and the other after the rapid rise in popularity from fall 2017–2019 (Wave 7-Wave 9). For brevity, we refer to the two slopes as the pre-2017 trajectory and the post-2017 trajectory, respectively. The models were analyzed using generalized linear mixed models with a logit link function to accommodate the binary distribution of the current ENDS use outcome variable. Analyses were conducted with the R `glmer` function in the `lme4` package, version 1.1.21.9002²⁴ using R version 3.6.2. Models were fit using maximum likelihood, which makes use of all observations within a study wave regardless of a participant’s completion of other study waves. The four socio-demographic covariates (sex, race/ethnicity, type of college attended, and time-varying age in years) were also included in the base model.

After fitting the base model, we evaluated participant age as a possible moderator of the two slopes and elevation change, hypothesizing the increasing trajectory from fall 2017–2019 would occur only among younger young adults but not among older young adults. To test participant age as a moderator of the slope and elevation change effects, we added the following two-way interactions individually to the base model: (1) age (log) x pre-2017 trajectory interaction, (2) age (log) x post-2017 trajectory interaction, and (3) age (log) x post-2017 elevation interaction. We then sequentially examined if each model that included a two-way interaction differed from the base model using the Bayesian Information Criterion (BIC). The BIC was selected over alternative fit measures because it penalizes for both model complexity and sample size and thus avoids overfitting the data. Following recommendations from Raftery (1995) we required that the more complex model have a BIC at least two lower than the less complex model to retain it.

Missing data.: Across all study waves, data were missing for only 22% of all observations. Although discontinuous growth curve models use all available data, we conducted a series of generalized linear mixed models to determine if missingness was associated with any of the four socio-demographic covariates (sex, race/ethnicity, type of college attended, and age). Findings indicated that males, those enrolled in 2-year colleges, and older students were more likely than their peers to be missing data, and students reporting Asian ethnicity were less likely than non-Hispanic, white peers to be missing data. Thus, the socio-demographic covariates were included in subsequent analyses to ameliorate the impact of missing data on model estimates.

Results

Table 1 shows the prevalence of any current ENDS use at each of the nine study waves and current vape pod use at Wave 8 (spring, 2018) and Wave 9 (spring, 2019), when vape pod use was directly assessed. Examination of Table 1 shows that ENDS use was highest at Wave 1 (16.9% in fall, 2014/spring, 2015) and lowest at Wave 6 (9.2% in spring, 2017). Moreover, prevalence of vape pod use doubled from Wave 8 to Wave 9.

Results from the base discontinuous growth curve model testing the hypothesis that overall ENDS use would decline from 2014–spring 2017, but then increase from fall 2017–2019 are shown in Table 2. As shown, the two slope parameters and the elevation change parameter were significantly associated with the prevalence of ENDS use over time. The pre-2017 trajectory was statistically significant and negative, indicating a declining trajectory of current ENDS use from 2014–spring 2017. The post-2017 trajectory was statistically significant and positive, indicating an increasing trajectory of current ENDS use from fall 2017–2019. Elevation change also was statistically significant, indicating an increase in ENDS use across all three waves post-fall 2017.

To determine if the ENDS use trajectories varied across participant age, comparisons were conducted between the base discontinuous growth curve model (BIC=22,292.1) and models that tested the impact of the 1) age (log) x pre-2017 trajectory interaction (BIC=22,302.3), 2) age (log) x post-2017 trajectory interaction (BIC=22,288.9), and 3) age (log) x post-2017 elevation interaction on the prevalence of current ENDS use (BIC=22,290.6). Only the age (log) x post-2017 trajectory interaction model (see Table 2) showed an improvement in fit over the base model (delta-BIC = 3.13). To evaluate the nature of the interaction, we estimated post-2017 trajectories at one standard deviation (SD) below the mean age (22.6 years old representing younger participants) and one SD above the mean age (26.2 years old representing older participants) at the mid-point of the post-2017 period (Summer, 2018). As shown in Figure 1, only the post-2017 trajectory varied across age: The post-2017 trajectory was statistically significant and positive for younger (95% CI=[0.21, 0.56]), but not older (95% CI=[-0.10, 0.17]), participants. Thus, the increasing trajectory of current ENDS use from fall 2017–2019 occurred only for younger participants. Moreover, it is notable that for younger participants only, current ENDS use at the final wave was comparable to current ENDS use at Waves 1 and 2, but higher than that at all other waves.

Discussion

The increase in prevalence of ENDS use among U.S. young adults from 2017–2018 after a period of decline from 2014–2017 has caused serious concern. The increase has been attributed to the rapid rise in sales¹⁰ and use¹⁷ of newly available vape pod devices in late 2017, but no studies have examined changes in young adults' ENDS use trajectories pre and post the rapid rise. Findings from this study indicated that ENDS use declined from 2014–spring 2017, then increased from fall 2017–2019. Furthermore, the increasing trajectory from fall 2017–2019 occurred only for younger young adults. The increase in ENDS use is inconsistent with the maturing out hypothesis,²² and other longitudinal evidence that

ENDS use declines as young adults increase in age.²¹ These findings are alarming given that tobacco use is solidified during young adulthood.⁵

According to the maturing out hypothesis,²² substance use behaviors decrease as young adults transition to adulthood and assume new roles, such as full-time employee and marital partner. From this perspective, substance use behaviors are developmentally limited or experimental for a large portion of young adults. Consistent with the maturing out hypothesis, previous research showed that desistance of ENDS use was common across a 1-year period from 2013–2015¹⁹ among young adults and that ENDS use declined across a 2.5-year period from 2014–2017 for young adults initially 18–25 years old.²¹ Findings from the present study are only partially consistent with the maturing out hypothesis and with existing research. Although ENDS use declined from 2014–spring 2017, the period prior to the rapid rise of vape pods, ENDS use increased from fall 2017–2019 among younger participants in the study. These findings support the premise that the rapid rise of vape pods may have contributed to the overall increase in ENDS prevalence from 2017–2018 among young adults in the U.S.^{3,4} The finding that increasing ENDS use occurred only for younger participants corroborates research showing that vape pod use is higher among 18-to-24-year old young adults than those older than 24,¹⁷ and highlights the potentially disruptive nature of this newly available product on younger participants' ENDS use.

Increasing ENDS use across young adulthood is concerning for several reasons. First, an increasing trajectory may indicate that young adults who have not previously used ENDS may be initiating use with vape pods. ENDS use at the final wave was comparable to ENDS use at baseline and Wave 2 among the younger young adults in this study, but higher than estimates at all waves in-between. Thus, vape pods may be attracting new users during a developmental period when desistance is developmentally expected and common. The possibility of new users is supported by research indicating that young adults may be more likely than adolescents to initiate use of all types of tobacco products, including ENDS.¹⁸ Some of these new users may be using vape pods because they perceive that they are less harmful alternatives to smoking cigarettes or to quitting/cutting down on smoking. A qualitative study of 18–29-year old young adults indicated that among those who smoked cigarettes, vape pod use decreased their cravings and desire for cigarettes.¹³ However, other research indicates that only a little more than half of young adults who used JUUL vape pods were aware that they always contain nicotine,²⁵ suggesting that many young adults are unlikely to be using these products as substitutes for cigarettes.

Another concern is that young adults who otherwise might have desisted using ENDS as they increased in age are not doing so, but rather are switching to vape pods because of their appeal. Compared with other ENDS products, vape pods have been described by 18–29 year olds as aesthetically more appealing, delivering more nicotine, more convenient, and more socially acceptable.¹³ The present study did not examine why young adults were using ENDS products, including vape pods; but, given the rise in use from fall 2017–2019, additional longitudinal research is needed to identify the factors contributing to changes in ENDS use and in device type across young adulthood. Research that continues to track young adults as they transition to adulthood is needed to determine who begins and/or continues to use vape pods and other ENDS products, and also who eventually quits. Use

of vape pods during young adulthood by those who previously did not use ENDS products is particularly alarming and deserves attention because vape pods can expose users to high concentrations of nicotine,⁶ which may lead to addiction during a developmental period when tobacco use is solidified.⁵

Findings must be interpreted in the context of study limitations. First, participants were recruited from 24 colleges in Texas; thus, findings may not be generalizable to young adults nationwide or to those who do not attend college. However, recent evidence from the Population Assessment of Tobacco and Health (PATH) Study indicates that the risk of ENDS use did not vary across college attenders versus non-college attenders when the two samples were matched on various intra-individual factors.²⁶ Moreover, 70% of 2016 high school graduates were enrolled in college in the fall of 2016.²⁷ Second, we assessed longitudinal trajectories in past 30-day ENDS use, which captures a variety of use patterns ranging from one or two puffs to daily use in the past month. Additional research is needed to determine if findings are consistent across these various patterns. Finally, although there was attrition across the nine study waves (see Table 1), and we used maximum likelihood estimation methods and included socio-demographic covariates in study models, which ameliorate the impact of missing data on resulting findings. Nonetheless, when compared with most nationally-representative studies, a strength of this study is the frequent assessments of ENDS use - every six months for the first 3.5 years, which allowed us to capture changes in the ENDS marketplace as they were occurring.

Notwithstanding the limitations, this is the first longitudinal study to examine current ENDS use from 2014 through 2019, which encompasses late 2017, when vape pods began surging in popularity. The findings have implications for public health. First, the increasing use of ENDS products from fall 2017–2019 for younger participants during a developmental period when substance use is expected to decline²² underscores the importance of targeting young adults with prevention and intervention efforts. Prevention and intervention efforts should highlight the high nicotine content in some of these products, and in turn, the potential for addiction. Second, the increasing use of ENDS after a period of decline among the younger participants highlights the need for additional regulations of ENDS products. As of January 2020, the sales of cartridge-based vape pods, such as JUUL, in youth-appealing flavors other than menthol or tobacco are prohibited by federal regulations. Unfortunately, numerous knock-off, disposable, vape pods that circumvent these regulations have proliferated.²⁸ Given that the majority of young adults use flavored rather than tobaccoflavored ENDS products²⁹ and that the most popular vape pods contain high concentrations of nicotine,⁸ regulations should be tightened to eliminate appealing flavors and to limit nicotine concentrations from all types of ENDS, including vape pods.

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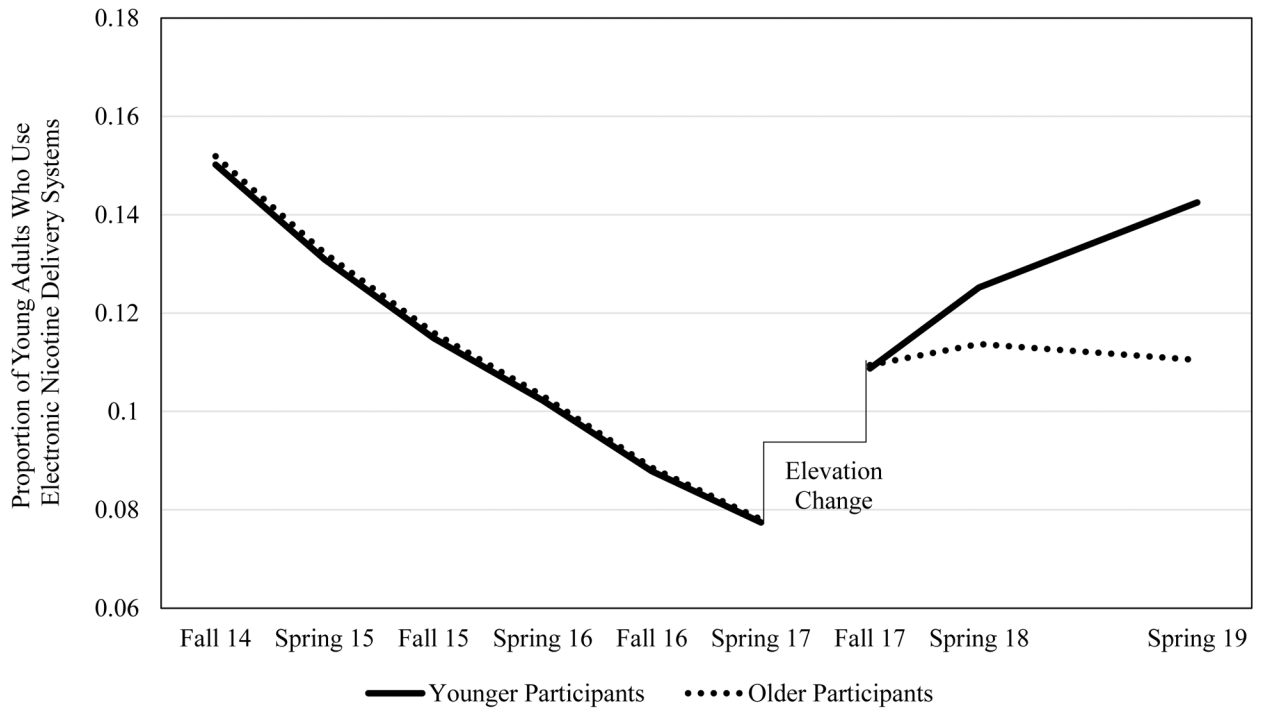


Figure 1. Discontinuous growth curve model showing the pre-2017 trajectories, elevation change, and post-2017 trajectories for younger and older young adults.
 Note. Elevation change connects the two trajectories and was modeled at fall 2017 to represent the point in time when vape pods rose rapidly in popularity in the United States.

Table 1

Socio-demographic characteristics and current/past 30-day electronic nicotine delivery systems (ENDS) and vape pod use among young adult participants at each study wave, 2014–2019

<i>n</i> ^a	Wave 1 Fall 14 5,217	Wave 2 Spring 15 4,099	Wave 3 Fall 15 4,111	Wave 4 Spring 16 4,204	Wave 5 Fall 17 4,049	Wave 6 Spring 17 4,161	Wave 7 ^b Fall 18 3,297	Wave 8 Spring 18 3,923	Wave 9 Spring 19 3,599
Mean Age in Years (Standard Deviation)	20.65 (1.83)	21.11 (1.82)	21.53 (1.82)	22.00 (1.82)	22.48 (1.81)	22.98 (1.81)	23.47 (1.80)	24.02 (1.82)	25.05 (1.81)
% Male	36.3%	35.8%	35.4%	35.7%	35.0%	35.2%	34.5%	35.3%	35.4%
% 4-Year College	93.3%	93.8%	94.1%	93.7%	94.0%	93.9%	94.2%	93.7%	93.7%
% non-Hispanic, White	35.5%	35.2%	35.1%	34.5%	35.2%	34.9%	35.2%	34.9%	35.0%
% Hispanic/Latino	31.3%	30.4%	30.9%	31.2%	30.6%	30.9%	29.5%	30.8%	30.4%
% non-Hispanic, Black	8.1%	7.7%	7.9%	7.8%	7.8%	7.9%	7.6%	7.9%	7.7%
% non-Hispanic, Asian	17.5%	19.2%	18.7%	19.0%	18.8%	18.8%	20.2%	19.0%	19.4%
% Other Race/Ethnicity	7.6%	7.5%	7.5%	7.4%	7.7%	7.5%	7.4%	7.4%	7.4%
% Current ENDS Use ^c	16.9%	14.6%	12.4%	10.9%	9.4%	9.2%	12.4%	12.4%	13.9%
% Current Vape Pod Use								3.0%	6.9%

^aThe *n* is the number of cases that were included in each wave. 5,218 unique participants contributed to one or more wave.

^bAt Wave 7, participants completed an abbreviated survey with only tobacco use items and the incentive was significantly lower (\$5) than for the other eight full survey waves (\$10 for Waves 1–2, \$20 for Waves 3–6 and Waves 8–9).

^cWaves 7–9 ENDS use includes vape pod use; JUUL was included in the preamble at Wave 7 and vape pod use directly assessed at Waves 8–9.

Parameter estimates for the base discontinuous growth curve model of current/past 30-day electronic nicotine delivery systems (ENDS) use and for the age-moderated discontinuous growth curve model of current/past 30-day ENDS use, 2014–2019

Table 2

Parameter	Base Model (N=5,218)				Model with Significant Age Interaction (N=5,218)			
	Odds Ratio	95% CI	z	p	Odds Ratio	95% CI	z	p
Wave 1 Age (log)	1.07	(0.88, 1.31)	0.66	.506	1.02	(0.83, 1.25)	0.20	.843
Male	2.18	(1.83, 2.60)	8.67	<.001	2.18	(1.83, 2.61)	8.68	<.001
^a Hispanic/Latino	1.03	(0.84, 1.27)	0.32	.748	1.03	(0.84, 1.27)	0.29	.775
Non-Hispanic, Black	0.69	(0.50, 0.97)	-2.12	.034	0.69	(0.49, 0.97)	-2.12	.034
Non-Hispanic, Asian	0.56	(0.44, 0.72)	-4.49	<.001	0.55	(0.43, 0.71)	-4.59	<.001
Other Race/Ethnicity	1.27	(0.91, 1.77)	1.41	.158	1.26	(0.91, 1.76)	1.38	.167
4- (vs. 2-) Year College	1.04	(0.74, 1.46)	0.20	.838	1.03	(0.73, 1.46)	0.19	.848
Pre-2017 Trajectory	0.63	(0.59, 0.68)	-12.40	<.001	0.64	(0.59, 0.69)	-12.09	<.001
Post-2017 Elevation	2.36	(2.01, 2.76)	10.59	<.001	2.30	(1.96, 2.69)	10.22	<.001
Post-2017 Trajectory	1.14	(1.01, 1.29)	2.20	.028	4.93	(2.25, 10.83)	3.98	<.001
Age (log) x Post-2017 Trajectory ^a					0.49	(0.34, 0.72)	-3.67	<.001

Note. non-Hispanic, white is the reference category for race/ethnicity.

^aThe odds ratio for the two-way interaction is an exponentiated parameter estimate; a ratio of odds ratios.