

Smoking Intention and Progression From E-Cigarette Use to Cigarette Smoking

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abstract

OBJECTIVES: To investigate whether the prospective association between electronic cigarette (e-cigarette) use and cigarette smoking is dependent on smoking intention status.

METHODS: Waves 2 and 3 data of the Population Assessment of Tobacco and Health (PATH) Study, a US nationally representative prospective cohort study of tobacco use. Data were collected in 2014–2015 (wave 2) and 2015–2016 (wave 3) and analyzed in 2019.

RESULTS: At wave 2, 12.8% of adolescent never-smokers of conventional cigarettes had intention to smoke and 8.5% had ever used an e-cigarette. At wave 3, 3.2% had ever smoked a cigarette. Both smoking intention and ever using e-cigarettes at wave 2 were positively associated with cigarette smoking at wave 3 (adjusted odds ratio [aOR] = 3.03; 95% confidence interval [CI] = 1.97–4.68, $P < .001$; aOR = 4.62, 95% CI = 2.87–7.42, $P < .001$, respectively). The interaction between smoking intention and ever using e-cigarettes was significant (aOR = 0.34, 95% CI = 0.18–0.64, $P < .01$). Among adolescents who had expressed intention to smoke conventional cigarettes at wave 2, the odds of cigarette smoking at wave 3 did not significantly differ for e-cigarette users and never e-cigarette users (aOR = 1.57; 95% CI 0.94–2.63; $P = .08$). Among adolescents who had no intention to smoke at wave 2, e-cigarette users, compared with never e-cigarette users, had >4 times the odds of cigarette smoking (aOR = 4.62; 95% CI 2.87–7.42; $P < .0001$).

CONCLUSIONS: E-cigarette use is associated with increased odds of cigarette smoking among adolescents who had no previous smoking intention. E-cigarette use may create intention to smoke and/or nicotine use disorder that lead to onset of cigarette smoking.



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WHAT'S KNOWN ON THIS SUBJECT: Adolescents' electronic cigarette (e-cigarette) use and intention to smoke cigarettes are strong predictors of future cigarette smoking. However, it is unknown whether the association of e-cigarette use with future cigarette smoking differs on the basis of adolescents' intentions to smoke cigarettes.

WHAT THIS STUDY ADDS: In prospective longitudinal data of 8661 adolescents, e-cigarette use was associated with higher risk of cigarette smoking among adolescents who had no previous smoking intention but not among those who had previously expressed smoking intention.

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Cigarette smoking remains a leading preventable cause of morbidity and mortality in the United States. Lifelong cigarette smoking is fueled by nicotine dependence (hereafter referred to as nicotine use disorder according to *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* criteria), which typically begins during adolescence.^{1,2} Although adolescent cigarette smoking has declined over the past several decades, electronic cigarette (e-cigarette) use presents a new risk for nicotine use disorder.¹ Adolescent e-cigarette users are at heightened risk of developing symptoms of nicotine use disorder and progressing to conventional cigarette smoking.³⁻⁹ However, which e-cigarette users progress to cigarette smoking, and why, remains unclear. Some prevailing hypotheses include the potential addictiveness of nicotine-containing e-cigarettes, similar commercial and social sources for e-cigarettes and conventional cigarettes, and characteristic smoking techniques that mimic and possibly prime e-cigarette users for conventional cigarette smoking.¹⁰ Empirical evidence suggests 2 major potential pathways from e-cigarette use to cigarette smoking: an addiction pathway and a smoking intention pathway.^{11,12}

The addiction pathway model suggests that e-cigarettes are capable of delivering high concentrations of nicotine to the blood,¹³⁻¹⁵ which may lead to nicotine use disorder.¹⁶ Nicotine use disorder, in turn, potentially fuels continued e-cigarette use and future cigarette smoking.¹¹ In the current study, we test the smoking intention pathway, which posits that e-cigarette use may lead to the development of smoking intention,¹² namely, lack of firm commitment not to smoke cigarettes,^{17,18} which according to the theory of planned behavior (TPB),¹⁹⁻²¹ predicts cigarette smoking.^{22,23} TPB posits that

attitudes, subjective norms, and perceived behavioral control (PBC) predict behavioral intention, which in turn predicts behavior.¹⁹⁻²¹ Although both e-cigarette use and smoking intention predict cigarette smoking, it remains unclear how they interact to influence cigarette smoking among adolescents. For example, does having previous smoking intention increase the risk of progressing from e-cigarette use to cigarette smoking? According to TPB, intention is more likely to lead to behavior in the presence of factors that facilitate the behavior's performance,^{19-21,24} and e-cigarette use facilitates cigarette smoking.^{7,9} Accordingly, adolescent e-cigarette users who have previous intention to smoke cigarettes may be at a higher risk of progressing to cigarette smoking than those without smoking intention. However, emerging evidence questions whether smoking intention is a necessary antecedent of cigarette smoking among adolescent e-cigarette users.^{3,4,25}

In a regional study of adolescents in Southern California, e-cigarette use predicted future smoking among adolescents with no previous intention to smoke at baseline.³ This finding suggests that e-cigarettes are not simply a transitional product used by adolescents with intention to smoke on their journey to cigarette smoking, but that e-cigarette use can predispose nonintending tobacco-naïve adolescents to cigarette smoking.³ In other studies, e-cigarette use predicted cigarette smoking among adolescents who were considered low risk for cigarette smoking on the basis of several factors including smoking intention.^{4,25} These findings challenge the importance of smoking intention as a predictor of cigarette smoking among adolescent e-cigarette users. In the current e-cigarette use epidemic, identifying whether smoking intention continues to be a reliable predictor of cigarette

smoking is essential to guide adolescent smoking prevention research and intervention efforts.

In the current study, we employ a theory-guided approach to investigate whether the prospective association between e-cigarette use and conventional cigarette smoking is dependent on baseline smoking intention status. Specifically, we use TPB to examine whether the likelihood of progressing from e-cigarette use to cigarette smoking differs on the basis of smoking intention in a national sample of adolescent never-smokers of conventional cigarettes.

METHODS

Study Participants

Deidentified data on adolescents aged 12 to 17 years were obtained from public-use files of the Population Assessment of Tobacco and Health (PATH) Study, a nationally representative household cohort study of tobacco use among the civilian, noninstitutionalized US population.^{26,27} Wave 1 data were collected in 2013–2014, wave 2 in 2014–2015, and wave 3 in 2015–2016. Waves 2 and 3 data were used in the current study because of the higher prevalence of e-cigarette use in wave 2 versus wave 1, reflecting the increased popularity of e-cigarette use in wave 2 years. Inclusion criteria for the current study were that participants were ages 12 to 17 at waves 2 and 3, reported at both waves 1 and 2 that they had never smoked conventional cigarettes, and provided valid data on cigarette smoking at wave 3 ($n = 6779$). Youth who were <12 years at wave 1 ("shadow youth") but aged up to ≥ 12 years in wave 2 were also included ($n = 1882$) for a total final sample of 8661 youth. Youth aged ≥ 18 were not included because they have characteristics (eg, legal access to cigarettes) that differ from the target adolescent population. The

current study was determined to be non-human subjects research by the sponsoring university's institutional review board.

Measures

All variables were measured at wave 2 except ever smoking, which was measured at wave 3.

Key Outcome and Predictors

Ever smoking, the key outcome variable, was measured via the item, "In the past 12 months, have you smoked a cigarette, even one or two puffs?" Smoking intention was measured by using the item, "Do you think you will smoke a cigarette in the next year?" Responses were on a 4-point scale: 1 = "definitely yes," 2 = "probably yes," 3 = "probably not," and 4 = "definitely not." Responses were dichotomized with definitely not coded "no smoking intention" and other responses coded "smoking intention."^{17,18,28,29} As specified in TPB, we operationalized smoking intention as a unique behavioral construct rather than as a component of a smoking susceptibility index as in previous studies.^{4,17,30-36} Ever using e-cigarettes was measured via participants' yes or no response to the item, "Have you ever used an electronic nicotine product, even one or two times? (Electronic nicotine products, such as e-cigarettes, e-cigars, e-pipes, e-hookahs, personal vaporizers, vape pens and hookah pens)."

Smoking-Related Covariates

As in previous studies,^{10,37,38} we adjusted for TPB constructs that may confound the associations between smoking intention and e-cigarette use and cigarette smoking, including protobacco and antitobacco media exposures,^{39,40} attitudes and norms toward smoking,^{41,42} PBC,^{30,31,43} and 2 factors (ie, access to cigarettes and parental monitoring) that may facilitate or constrain cigarette smoking.⁴⁴⁻⁴⁶

Exposure to antitobacco advertisements was measured by creating a composite variable from 6 items asking whether participants had seen or heard specific antismoking advertisements (eg, "Cigarettes are bullies. Don't let tobacco control you."). Dichotomized responses were dummy coded and summed to create a variable ranging from 0 to 6, with higher values indicating greater exposure to antitobacco advertisements. Similarly, exposure to protobacco marketing was measured by using 10 dichotomous (yes or no) items. Six items related to participants' reports of whether they had noticed cigarettes or other tobacco products advertised in the past 30 days in print and electronic media. Four items asked about participants' experiences with tobacco marketing in the past 6 months (eg, "Have you gotten a discount coupon for any tobacco product?") Responses were dummy coded and summed to create an exposure index ranging from 0 to 10, with higher values indicating greater exposure to protobacco marketing. Perception of addictiveness of conventional cigarette smoking was measured by using the single item: "How likely is someone to become addicted to cigarettes?" (measured on a 5-point scale ranging from 1 = "very unlikely" to 5 = "very likely"). Perception of harm of conventional cigarette smoking was measured by averaging responses from 3 items, for example, "How much do you think people harm themselves when they smoke cigarettes?" (measured on a 4-point scale ranging from 1 = "no harm" to 4 = "a lot of harm"). Subjective norms were measured via 2 items capturing 2 dimensions of subjective norms: injunctive (perception of whether a certain group would approve of behavior) and descriptive (perception of other people's typical behavior) norms.^{21,47-49} Parent or guardian disapproval of smoking conventional

cigarettes (injunctive norm) was measured via the item, "If your parents or guardians found you using tobacco, how do you think they would react? Would they . . . ?" Responses were 1 = "be very upset," 2 = "not be too upset," and 3 = "have no reaction." The variable was dichotomized: no reaction was considered "less disapproving," whereas be very upset and not too upset were considered "more disapproving." Peer smoking (descriptive norm) was measured via the item, "How many of your best friends smoke cigarettes?" Responses were on a 5-point scale ranging from 1 = "none" to 5 = "all." PBC was measured in the PATH by using 1 item from the scale frequently used in previous studies^{30,31,35,36}: "If one of your best friends were to offer you a cigarette, would you try it?" Responses were 1 = definitely yes, 2 = probably yes, 3 = probably not, and 4 = definitely not and were dichotomized with the response definitely not, indicating high PBC, and other responses suggesting low PBC. Access to tobacco products was measured by how easy participants think it is for people their age to buy tobacco products in a store, ranging from 1 = "very easy" to 4 = "very difficult." Parental monitoring was measured by using parental yes or no responses on 2 items asking if the adolescent has a curfew or set time that they need to be home on school nights and weekend nights.⁵⁰ Responses were summed, with higher values indicating higher parental monitoring. Participants reported other tobacco product use as ever using each of the following products: cigar, cigarillo, filtered cigar, pipe, hookah, smokeless tobacco, snus, dissolvable tobacco, bidi, and kretek. Responses were summed, with higher values representing more alternative tobacco products used. Because <1% of the sample used >1 alternative tobacco product, this variable was dichotomized to any use (1) versus none (0).

Sociodemographic Variables

Sociodemographic variables included race and ethnicity (white non-Hispanic, Black non-Hispanic; other non-Hispanic, and Hispanic); sex; age (categorized in the PATH public-use data file into 12–14 years and 15–17 years), and parental education (less than high school, general equivalency diploma (GED), high school degree or equivalent, some college, bachelor's degree, or advanced degree). PATH investigators imputed missing data on race and ethnicity and parental education, as described in the user guide.⁵¹

Statistical Analysis

Multivariable logistic regression was used to analyze whether smoking intention moderated the association between e-cigarette use and ever smoking among adolescent never-smokers of conventional cigarettes. In model 1, smoking intention and ever using e-cigarettes at wave 2 predicted ever smoking at wave 3, with all covariates included except the interaction term (smoking intention X e-cigarette use). Model 2 added the interaction term to test whether the association between e-cigarette use and ever smoking is statistically different for adolescents with previous smoking intention versus those without.^{52,53} We generated

odds ratios of ever smoking for each group on the basis of weighted marginal least square means coefficients using the LSMEANS statement in SAS (SAS Institute, Inc, Cary, NC).⁵⁴ This procedure calculates population predicted probabilities and corresponding odds ratios at specified covariate levels.

Missing data for each variable ranged from 0.01% (ever using other tobacco products) to 4.7% (e-cigarette use at wave 2). Data were assumed to be missing completely at random and were handled by using complete-case analysis (listwise deletion).⁵⁵ Statistical analysis was conducted by using SAS version 9.4.⁵⁶ As recommended, wave 3 all-waves replicate weights were applied and Fay's variant of balanced repeated replication was used for accurate estimation of variances.^{26,51,57} Models were additionally weighted for attrition by wave 3. Statistical significance for all analyses was set at $P < .05$.

As a sensitivity analysis to ensure that results were not due to missing data, 25 multiply imputed data sets were created in Stata 15 (Stata Corp, College Station, TX) by using chained equations.⁵⁸ All independent variables were included in imputation models. The models described above were repeated by using the multiply

imputed data but with no replicate or longitudinal weights. A second sensitivity analysis excluded all individuals who reported lifetime use of any tobacco products other than e-cigarettes at wave 2. Results of both sensitivity analyses were substantively the same as the primary analyses and are not reported here.

RESULTS

Demographic and smoking-related characteristics of the sample are listed in Tables 1 and 2. Bivariate associations between e-cigarette use and ever smoking by smoking intention group are shown in Table 3. Among adolescents who had no smoking intention at wave 2, 9.71% of e-cigarette users, compared with 1.51% of never e-cigarette users, progressed to cigarette smoking at wave 3 (543% higher rate of progression). Among adolescents with smoking intention at wave 2, 17.36% of e-cigarette users, compared with 10.04% of never e-cigarette users, progressed to cigarette smoking at wave 3 (73% higher rate of progression). Although a larger proportion of those who intended to smoke cigarettes progressed to cigarette smoking compared with those without an intention, the relative rate of progression to cigarette smoking for

TABLE 1 Sample Descriptive Characteristics, $N = 8661$

	No. (%)	Missing No. (%)
Male sex	4452 (51.5)	21 (0.2)
Female sex	4188 (48.5)	21 (0.2)
12–14 y old	5484 (63.3)	0 (0.0)
15–17 y old	3177 (36.7)	0 (0.0)
Race and ethnicity		
White non-Hispanic	4014 (46.9)	95 (1.1)
Black non-Hispanic	1187 (13.9)	95 (1.1)
Other non-Hispanic	795 (9.3)	95 (1.1)
Hispanic	2570 (30.0)	95 (1.1)
Parent's education		
Less than high school	1323 (15.5)	148 (1.7)
GED	421 (5.0)	148 (1.7)
High school graduate	1604 (18.8)	148 (1.7)
Some college	2584 (30.4)	148 (1.7)
Bachelor's degree	1683 (19.8)	148 (1.7)
Advanced degree	898 (10.6)	148 (1.7)

TABLE 2 Smoking-Related Characteristics of Sample at Wave 2, *N* = 8661

	No. (%) or Mean (SD)	Missing No. (%)
Smoking intention at wave 2		
Yes	1107 (12.8%)	11 (0.1)
No	7543 (87.2%)	11 (0.1)
Ever using e-cigarettes at wave 2		
Yes	701 (8.5%)	408 (4.7)
No	7552 (91.5%)	408 (4.7)
Ever cigarette smoking at wave 3		
Yes	276 (3.2%)	0 (0.0)
No	8385 (96.8%)	0 (0.0)
Injunctive norm toward smoking		
Parents less approving of smoking	8438 (98.4%)	84 (1.0)
Parents more approving of smoking	139 (1.6%)	84 (1.0)
PBC over smoking		
Low	1281 (14.8%)	11 (0.1)
High	7369 (85.2%)	11 (0.1)
Ever use of other tobacco products at wave 2 ^a		
Yes	411 (4.8%)	1 (0.0)
No	8249 (95.3%)	1 (0.0)
Protobacco advertisement exposure (0–10)	2.1 (2.2)	2 (0.0)
Antitobacco advertisement exposure (0–6)	2.8 (2.1)	3 (0.0)
Peer smoking (1–5)	1.2 (0.6)	62 (0.7)
Perceived harm of cigarette smoking (1–4)	3.8 (0.4)	7 (0.1)
Perceived addictiveness of cigarette smoking (1–5)	4.2 (1.1)	166 (1.2)
Access to cigarettes in store (1–4)	2.0 (1.0)	281 (3.2)
Parental monitoring (0–2)	1.7 (0.7)	35 (0.4)

^a Other tobacco product use is defined as ever using any of the following products: cigar, cigarillo, filtered cigar, pipe, hookah, smokeless tobacco, snus, dissolvable tobacco, bidi, and kretek.

e-cigarette users versus never e-cigarette users was larger among those who did not intend to smoke cigarettes than those who intended to smoke (543% vs 73%).

Regression results are contained in Table 4. These analyses adjust the above bivariate associations for a number of potential confounders prescribed by TPB. Supplemental Table 5 contains coefficients for all covariates included in Table 4. In model 1, both smoking intention

(adjusted odds ratio [aOR] = 2.14; 95% CI = 1.42–3.21; *P* < .001) and ever using e-cigarettes (aOR = 2.58; 95% confidence interval [CI] = 1.73–3.85; *P* < .0001) at wave 2 were positively associated with ever smoking at wave 3. In model 2, the interaction of smoking intention and ever using e-cigarettes was significant (aOR = 0.34; 95% CI = 0.18–0.64; *P* < .01), suggesting the association between e-cigarette use and ever smoking was dependent on previous smoking intention status. The aORs of

ever smoking by e-cigarette use and smoking intention at wave 2 derived from the least square means estimates of predicted probabilities and corresponding odds ratios are displayed in Fig 1. Among adolescents who intended to smoke conventional cigarettes at wave 2, e-cigarette use was not significantly associated with ever smoking at wave 3 (aOR = 1.57; 95% CI 0.94–2.63; *P* = .08). Among those without intention to smoke at wave 2, e-cigarette users had 4 times higher odds of smoking at

TABLE 3 Bivariate Association of E-Cigarette Use at Wave 2 and Smoking Initiation at Wave 3, by Smoking Intention at Wave 2, *n* = 8242

	Did Not Initiate Smoking at Wave 3, No. (%)	Initiated Smoking at Wave 3, No. (%)	Total No. (%)
No smoking intention at wave 2			
No e-cigarette use at wave 2	6633 (98.5)	102 (1.5)	6735 (100)
E-cigarette use at wave 2	372 (90.3)	40 (9.7)	412 (100)
Total	7005 (98.0)	142 (2.0)	7147 (100)
Smoking intention at wave 2			
No e-cigarette use at wave 2	726 (90.0)	81 (10.0)	807 (100)
E-cigarette use at wave 2	238 (82.6)	50 (17.4)	288 (100)
Total	964 (88.0)	131 (12.0)	1095 (100)

A total of 419 observations have missing data for e-cigarette use or smoking intention at wave 2 and are excluded from this table.

TABLE 4 Adjusted Multivariable Logistic Regression Revealing Interaction Between Smoking Intention and Ever Using E-Cigarettes at Wave 2 in Prediction of Ever Cigarette Smoking, $n = 7644$

	Model 1				Model 2			
	B (SE)	P	aOR	95% CI	B (SE)	P	aOR	95% CI
Intention to smoke (reference: no intention)	0.76 (0.21)	<.001	2.14	1.42–3.21	1.11 (0.22)	<.001	3.03	1.97–4.68
Ever using e-cigarettes (reference: never use)	0.95 (0.20)	<.001	2.58	1.73–3.85	1.53 (0.24)	<.001	4.62	2.87–7.42
Smoking intention x e-cigarette use	—	—	—	—	-1.08 (0.32)	.001	0.34	0.18–0.64

All models control for sex, age, race and ethnicity, parent education, subjective norms toward smoking, PBC over smoking, other tobacco product use at wave 2, protobacco advertisement exposure, antitobacco advertisement exposure, peer smoking, perceived harm of conventional cigarette smoking, perceived addictiveness of conventional cigarette smoking, access to cigarettes in store, and parental monitoring. —, not applicable.

wave 3 than never e-cigarette users (aOR = 4.62; 95% CI 2.87–7.42; $P < .0001$).

DISCUSSION

We used a theory-guided approach to investigate whether smoking intention moderates the association between e-cigarette use and cigarette smoking among adolescent never-smokers of conventional cigarettes. This study builds on previous work establishing smoking intention and e-cigarette use as predictors of cigarette smoking among adolescents. We found that progression from e-cigarette use to cigarette smoking in a recent national cohort of adolescents was dependent on their baseline smoking intention status. Among adolescents who had

expressed intention to smoke conventional cigarettes at baseline, e-cigarette use did not predict cigarette smoking at follow-up. However, among adolescents without previous intention to smoke conventional cigarettes, e-cigarette use predicted cigarette smoking.

Although adolescents who have no intention to smoke are generally less likely to progress to cigarette smoking than those who intend to smoke,¹⁸ our findings indicate that lack of smoking intention may not be sufficient to protect against cigarette smoking among today's adolescent e-cigarette users. Indeed, we found that among adolescent never-smokers who had no previous smoking intention, e-cigarette users

were 4 times more likely than never e-cigarette users to have smoked cigarettes 1 year later. Thus, e-cigarette use may potentially override the protective association between lack of smoking intention and cigarette smoking, such that adolescents who have no intention to smoke conventional cigarettes still may progress to cigarette smoking if they use e-cigarettes.

Our results partly support the smoking intention pathway from e-cigarette use to conventional cigarette smoking. E-cigarette use was associated with higher odds of cigarette smoking among those who did not previously express smoking intention, corroborating findings from previous studies that adolescent e-cigarette users who progress to cigarette smoking are not simply those with previous predisposition to cigarette smoking.^{3,25} However, e-cigarette use was not associated with cigarette smoking among adolescents who had expressed smoking intention at baseline. These findings suggest that e-cigarette use facilitates cigarette smoking primarily among tobacco-naïve adolescents with no previous smoking intentions. Because smoking intention is an established antecedent to cigarette smoking,^{22,23} it is plausible that adolescent e-cigarette users begin without having intention to smoke conventional cigarettes, but develop nicotine use disorder (given emerging evidence on the addictiveness of nicotine in newer e-cigarette products^{11,13}), which creates smoking

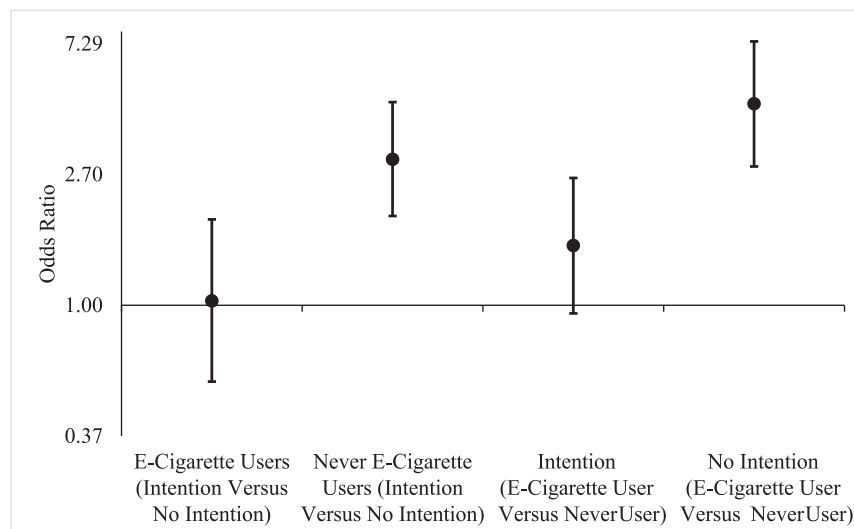


FIGURE 1 aORs for smoking initiation by e-cigarette user category and smoking intention.

intention and subsequent conventional cigarette smoking. E-cigarette use may also provide an introduction to smoking-related behaviors, peers who use tobacco products, and the culture of tobacco product use that subsequently lead to cigarette smoking in adolescents without previous smoking intention.

These findings are instructive for future adolescent smoking prevention efforts. With the proliferation of e-cigarettes among adolescents, absence of smoking intention may no longer be sufficient to prevent cigarette smoking. Abstinence from e-cigarette use is also necessary to reduce likelihood of conventional cigarette smoking. It is essential that health care providers, parents, and education campaigns emphasize the dangers associated with e-cigarette use, including the risk of progressing to cigarette smoking that remains even without an intention to smoke conventional cigarettes. Tailored interventions that emphasize abstinence from e-cigarette use may be effective in preventing cigarette smoking among adolescents.

The primary limitation was the relatively long (1 year) interval

between study waves. Previous studies suggest intention-behavior associations are stronger closer in time, for example, 3 or 6 months.⁵⁹ Thus, our study findings should be validated with shorter wave intervals. Our study is also subject to typical limitations of self-reported data. In addition, in the current study, we examine ever using e-cigarettes and ever smoking of conventional cigarettes. Future research examining regular use of each product will be fruitful in further understanding the role of intentions in progression from e-cigarette to cigarette use. Such analyses were not possible here because of data limitations and low endorsement of regular smoking at wave 3. Nonetheless, the large, nationally representative sample and prospective study design are major strengths. Finally, the study data were collected in 2014–2016 before the recent surge in adolescent e-cigarette use and the influx of newer and potentially more addictive e-cigarette products.¹³ Given that adolescent e-cigarette use is currently even higher than at the time of our study, it is likely that more adolescents are at increased risk of nicotine use

disorder and subsequent smoking initiation.

CONCLUSIONS

E-cigarette use was associated with higher odds of cigarette smoking only among adolescents who had no previous intention to smoke conventional cigarettes, suggesting adolescent e-cigarette users can progress to cigarette smoking even when they have no previous intentions to do so. Pediatricians should continue to screen for and counsel adolescents against e-cigarette use to prevent onset of cigarette smoking.⁶⁰ Indeed, abstinence from e-cigarette use should be framed as an adolescent smoking prevention strategy.

ABBREVIATIONS

aOR: adjusted odds ratio
CI: confidence interval
e-cigarette: electronic cigarette
GED: general equivalency diploma
PATH: Population Assessment of Tobacco and Health
PBC: perceived behavioral control
TPB: theory of planned behavior

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