PEDiATRIC COLLECTIONS

eCigarettes

FEATURES

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- E-Cigarettes and Future Cigarette Use
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Pediatricians have been on the frontline of protecting their patients from the harm of tobacco, as they work to prevent initiation of smoking, implement cessation programs, and develop strategies to protect children and families from secondhand smoke exposure. In recent years, a wide range of new tobacco products have become available, including e-cigarettes. To help all of us learn more about e-cigarettes, *Pediatrics* and other American Academy of Pediatrics (AAP) publications have published articles that describe the patterns of use of these new products, the risk factors for initiation, and long-term health implications of using this method of smoking. The AAP has also published clinical care recommendations to address tobacco products with patients and their families.

To help you better understand the issues surrounding the use of e-cigarettes in teens and young adults, we are now bringing together published articles on e-cigarettes in one custom collection, giving you easy access through this collection to a compendium of studies and findings on this important topic. This custom collection will be continually updated online as we publish more articles on e-cigarettes, so please check this collection frequently for new studies and information that we hope you will share with your patients when they ask about concerns regarding the safety and risks of using e-cigarettes.

—Alex Kemper, MD, MPH, MS
Deputy Editor, *Pediatrics*
Risk Factors for Exclusive E-Cigarette Use and Dual E-Cigarette Use and Tobacco Use in Adolescents

Thomas A. Wills, PhD\textsuperscript{a}; Rebecca Knight, MPH\textsuperscript{a}; Rebecca J. Williams, DrPH\textsuperscript{b}; Ian Pagano, PhD\textsuperscript{a}; James D. Sargent, MD\textsuperscript{c}

abstract

OBJECTIVE: To describe electronic cigarette (e-cigarette) use and cigarette use among adolescents and determine whether established risk factors for smoking discriminate user categories.

METHODS: School-based survey of 1941 high school students (mean age 14.6 years) in Hawaii; data collected in 2013. The survey assessed e-cigarette use and cigarette use, alcohol and marijuana use, and psychosocial risk and protective variables (eg, parental support, academic involvement, smoking expectancies, peer smoking, sensation seeking). Analysis of variance and multinomial regression examined variation in risk and protective variables across the following categories of ever-use: e-cigarette only, cigarette only, dual use (use of both products), and nonuser (never used either product).

RESULTS: Prevalence for the categories was 17% (e-cigarettes only), 12% (dual use), 3% (cigarettes only), and 68% (nonusers). Dual users and cigarette-only users were highest on risk status (elevated on risk factors and lower on protective factors) compared with other groups. E-cigarette only users were higher on risk status than nonusers but lower than dual users. E-cigarette only users and dual users more often perceived e-cigarettes as healthier than cigarettes compared with nonusers.

CONCLUSIONS: This study reports a US adolescent sample with one of the largest prevalence rates of e-cigarette only use in the existing literature. Dual use also had a substantial prevalence. The fact that e-cigarette only users were intermediate in levels of risk and protective factors between nonusers and those who used both cigarettes and e-cigarettes raises the possibility that e-cigarettes are recruiting medium-risk adolescents, who otherwise would be less susceptible to tobacco product use.

WHAT'S KNOWN ON THIS SUBJECT: There is a debate about whether e-cigarettes will benefit public health. However, there is little knowledge about how e-cigarette users and dual users (those using both e-cigarettes and tobacco cigarettes) differ from other adolescents on a range of variables.

WHAT THIS STUDY ADDS: Teenagers who only used e-cigarettes were intermediate in levels of risk and protective factors between nonusers and those who used both cigarettes and e-cigarettes. This raises a question about whether e-cigarettes recruit low-risk youth to tobacco product use.
E-Cigarettes and Adolescents’ Risk Status

Thomas A. Wills, PhD

The prevalence of e-cigarette use was only in the low single digits a few years ago but currently reaches ≥30% among high school students, and at least half are regular users.1,2 This rapid explosion of e-cigarette use has caught the field by surprise, and researchers are scrambling to understand the implications for public health.

In their paper “Adolescent Risk Behaviors and Use of Electronic Vapor Products and Cigarettes,” Demissie et al3 provide a useful new perspective on this phenomenon. The researchers showed that 16% of the adolescent population used e-cigarettes only, 3% only smoked cigarettes, and 8% were dual users (cigarettes and e-cigarettes). The good news is that 73% of the adolescent population did not use any tobacco-related product (nonusers). However, that 27% of adolescents still do is not comforting to public health researchers and advocates.

Here I bring out 3 points about how this paper helps us understand how e-cigarette use is related to adolescents’ risk status overall.

E-CIGARETTE USERS ARE INTERMEDIATE IN RISK STATUS

The pattern of results in Demissie et al3 shows that youth who use e-cigarettes only are intermediate between the behavioral characteristics of nonusers and dual users. For example, 6% of the nonusers engaged in a sexual risk behavior, whereas the figures were 17% for e-cigarette-only users and 39% for dual users. Similar patterns were found for substance use (eg, illicit prescription drug use) and behavioral problems (eg, fighting), as in our original report with social-cognitive variables.4 A recent study of Iceland adolescents5 observed a similar pattern; for example, the rate of drunkenness was 4% among nonusers, 17% among e-cigarette-only users, and 72% among dual users. Furthermore, a recent study of California adolescents including measures of psychopathology6 showed that nonusers were well adjusted, e-cigarette-only users were slightly less adjusted, and dual users scored high on maladjustment. A plausible explanation for these results across 4 international studies is that e-cigarettes are operating to recruit lower-risk adolescents to substance use. Because e-cigarettes are perceived as fashionable and more healthy than combustible cigarettes, they seem to attract young people who are slightly elevated on risk status but not initially likely to engage in a lifestyle of substance use. E-cigarettes apparently are perceived as a behavior that may be a little deviant but is still safe.

E-CIGARETTE USE AND BEHAVIORAL RISK STATUS—AN UNPLEASANT SURPRISE

But how safe are e-cigarettes? What are the consequences when a teen starts using them? Recent longitudinal research has provided an unpleasant surprise: among initial nonsmokers, those who use e-cigarettes are more likely to start smoking combustible cigarettes.7–10 This puts a somewhat different light on the situation. If e-cigarettes are without risk, it does not matter much if they attract new users. Being related to smoking...
Perfect Storm Can Spur Nicotine Addiction in Youths

Alyson Sulaski Wyckoff, Associate Editor

Among the reasons to keep youths from starting to smoke: Each year, only about 4% of 12- to 19-year-old smokers will successfully quit. While half of adult smokers try to quit annually, less than 5% succeed. And the younger people are when they begin smoking, the less likely they will kick the habit.

Tobacco exposure through personal use or second- or thirdhand smoke exposure remains the most important preventable cause of illness, disability and death among adults in the U.S. Internationally, tobacco use is the No. 1 cause of preventable death.

After a gradual decline in smoking, the rate of decline has begun to slow for cigarettes. There also has been a significant rise in the use of nicotine products such as e-cigarettes, hookahs and smokeless tobacco, according to a new AAP technical report.

Nicotine and Tobacco as Substances of Abuse in Children and Adolescents, from the Committee on Substance Use and Prevention, reviews the stages of use in progression to dependence on nicotine-containing products, as well as the physiologic characteristics, neurobiology, metabolism, pharmacogenetics and health effects of nicotine. The report is available at http://dx.doi.org/10.1542/peds.2016-3436 and will be published in the January issue of Pediatrics.

MULTIPLE CONTRIBUTING FACTORS

While tobacco products contain more than 4,000 chemicals, nicotine is the major contributor to the development of dependence and the primary pharmacologic component of tobacco. Rapidly developing brains are especially susceptible to nicotine addiction, but behavioral, social, environmental and psychological factors also influence the development and maintenance of addiction.

The urge to smoke occurs early on after kids first try it, the report notes, and then drives adolescents to smoke more often.

A predictable sequence of events often unfolds: wanting to smoke, having cravings and then needing to smoke to avoid withdrawal symptoms. This “neurophysiologic dependence” leads to tolerance, and a greater amount of nicotine is needed to maintain equilibrium.

APPEALING SENSATIONS

Increasing the palatability of cigarettes are additives like menthol, with its candy-like taste and cooling properties. The sensory effects may result in the perception that cigarettes are less harmful than they really are and may drive up smoking frequency.

Similarly, the sweeteners and fruit flavors in hookahs and the more than 7,000 flavors now available in electronic nicotine delivery systems including e-cigarettes also add to the products’ appeal. E-cigarette experimentation and recent use among middle and high school students in the U.S. doubled from 2011 to 2012, according to the report. About 1.78 million students had used e-cigarettes as of 2012.
High School Students’ Use of Electronic Cigarettes to Vaporize Cannabis

Meghan E. Morean, PhD, Grace Kong, PhD, Deepa R. Camenga, MD, Dana A. Cavallo, PhD, Suchitra Krishnan-Sarin, PhD

BACKGROUND AND OBJECTIVES: Electronic cigarette (e-cigarette) use is increasing rapidly among high school (HS) students. Of concern, e-cigarettes can be used to vaporize cannabis, although use rates among adolescents are unknown. We evaluated lifetime rates of using e-cigarettes to vaporize cannabis among all lifetime e-cigarette users (27.9%), all lifetime cannabis users (29.2%), and lifetime users of both e-cigarettes and cannabis (18.8%); common means of vaporizing cannabis including hash oil, wax infused with Δ-9-tetrahydrocannabinol (THC), and dried cannabis; and demographic predictors of using e-cigarettes to vaporize cannabis.

METHODS: In the spring of 2014, 3847 Connecticut HS students completed an anonymous survey assessing e-cigarette and cannabis use.

RESULTS: Vaporizing cannabis using e-cigarettes was common among lifetime e-cigarette users, lifetime cannabis users, and lifetime dual users (e-cigarette 18.0%, cannabis 18.4%, dual users 26.5%). Students reported using e-cigarettes to vaporize hash oil (e-cigarette 15.4%, cannabis 15.5%, dual users 22.9%) and wax infused with THC (e-cigarette 10.0%, cannabis 10.2%, dual users 14.8%) and using portable electronic vaporizers to vaporize dried cannabis leaves (e-cigarette 19.6%, lifetime cannabis 23.1%, lifetime dual users 29.1%). Binary logistic regression indicated that male students (odds ratio [OR] = 2.05), younger students (OR = 0.64), lifetime e-cigarette users (OR = 5.27), and lifetime cannabis users (OR = 40.89) were most likely to vaporize cannabis using e-cigarettes. Rates also differed by HS attended.

CONCLUSIONS: Rates of vaporizing cannabis using e-cigarettes were high. These findings raise concerns about the lack of e-cigarette regulations and the potential use of e-cigarettes for purposes other than vaping nicotine.

WHAT’S KNOWN ON THIS SUBJECT: Electronic cigarette use among youth is rising exponentially. Among other concerns, modified electronic cigarettes can be used to vaporize cannabis. However, no scientific data have been published on the rates of using electronic cigarettes to vaporize cannabis among youth.

WHAT THIS STUDY ADDS: This study presents rates of vaporizing cannabis among a sample of high school students (N = 3847). Rates of vaporizing cannabis were high among lifetime e-cigarette users (18.0%), lifetime cannabis users (18.4%), and lifetime dual cannabis and e-cigarette users (26.5%).

Dr Morean contributed to the conceptualization and design of the study, conducted the statistical analyses, and drafted the original manuscript; Drs Kong and Cavallo contributed to the conceptualization and design of the study, coordinated and supervised data collection, and critically reviewed and revised the manuscript; Dr Camenga contributed to the conceptualization and design of the study and critically reviewed and revised the manuscript; Dr Krishnan-Sarin led the study conceptualization and design team and critically reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

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