

E-Cigarettes and Adolescents' Risk Status

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The prevalence of e-cigarette use was only in the low single digits a few years ago but currently reaches $\geq 30\%$ 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



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onset, however, puts a behavioral risk into the picture. The finding of associations with other health-risk behaviors augments concern because, as the authors note, the odds of experiencing poor health increase with the addition of each unhealthy behavior. And importantly, Demissie et al³ show that among adolescent smokers, those who use e-cigarettes actually smoke more frequently, an effect that is contrary to the hopes of harm reduction advocates and has now been found internationally.¹¹

BUT WEREN'T THEY GOING TO SMOKE ANYWAY?

Critics of e-cigarette research have tried to dismiss the onset studies cited thus far, arguing that e-cigarette use is simply a marker for high-risk adolescents who were going to smoke anyway. They miss the fact that the studies controlled for variables that are defining characteristics of high-risk youth, including risk-taking, impulsiveness, negative affect, low parental support, and affiliation with deviant peers, and the effect of e-cigarette use for smoking onset was independent of these confounders.^{7–10} Moreover, recent research with different designs has shown that e-cigarettes are most strongly related to smoking onset among lower-risk adolescents, thus specifically contradicting the confounding hypothesis.^{9,12} Data from Demissie et al³ do raise the possibility of an underlying vulnerability (not previously measured) that produces both e-cigarette use and smoking. As the authors discuss, the risk behaviors they assessed could derive from rejection of conventional social norms¹³ or from activation of common neural pathways by nicotine,¹⁴ and such hypotheses need to be tested. The jury is still out. Demissie et al³ have provided

data that will guide further research testing different facets of a common-liability model.¹⁵

CONCLUSIONS

Are e-cigarettes going to replace traditional cigarettes, or are they operating to recruit a new audience of adolescents to tobacco products? Our wish is for the former. But at present the empirical evidence looks more like the latter. We need surveillance and mechanism research to understand what e-cigarettes will mean for youth risk status. However, there is enough evidence now to advocate programs for educating teenagers about e-cigarettes.

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