

Appendix 2.3

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Prevalence Estimates

Youth

Table A2.3-1 summarizes additional studies included in this chapter on patterns of e-cigarette use among youth, including ever and past-30-day use. Data from the 2013–2014 wave of the Population Assessment of Tobacco and Health (PATH) Study, representing 13,651 youth aged 12–17 years, revealed that 10.7% of respondents reported ever using e-cigarettes, with 3.1% using in the past 30 days (Ambrose et al. 2015). Data from this wave of PATH also showed that 27% of youth were susceptible to e-cigarettes, equivalent to the percentage who were susceptible to conventional cigarettes (Trinidad et al. 2016). The estimates of past-30-day use are lower than the 2015 data from the National Youth Tobacco Survey (NYTS) (16% among high school students and 5.3% among middle school students) (Tables 2.2a and 2.2b in Chapter 2). National estimates of e-cigarette use are even higher, given data from the 2015 Youth Risk Behavior Surveillance System, a national surveillance study of youth in 9th–12th grades. This study showed 44.9% of students had ever used e-cigarettes, while 24.1% had used them in the past 30 days (CDC 2016). The disparity in these three different estimates may be due to differences in the way the question was asked on the surveys (see Tables 2.2a and 2.2b in Chapter 2) or to the range in ages of respondents (Table A2.3-1). Other reasons for these differences may include the way in which the data were collected (e.g., school-based surveys vs. household-based surveys) and the content of the survey (e.g., whether the survey was solely about tobacco use or included other risky behaviors, such as drug use, sexual activity, etc.).

Data from state-level and local studies echo patterns seen at the national level. In 2013, among students in southeast Connecticut, 25.2% of high school students and 3.5% of middle school students were ever users of e-cigarettes. In the same survey, older students, males, and non-Hispanic Whites were the most likely in their respective categories to have tried e-cigarettes (Krishnan-Sarin et al. 2015). Similarly, a 2013 survey in Oahu, Hawaii, revealed that among students in 9th and 10th grades, 29% had ever used e-cigarettes, compared to 15% who had ever used conventional cigarettes. Specifically, 9% had used e-cigarettes only once or twice in their lifetimes; 11% had used them three to four times; 2%, yearly; 3%, monthly; 2%, weekly; and 2% had used them daily. In addition, 18% of all 9th and 10th graders had used e-cigarettes in the past month (Wills et al. 2015). A number of studies using 1 or 2 years of the NYTS data have reinforced the conclusion that past-30-day use of

e-cigarettes is higher among older youth and males than their counterparts (Amrock et al. 2015).

Use of e-cigarettes is also common in other countries. In Switzerland, in 2014, a study found that 43% of students in eighth grade had ever tried e-cigarettes. In that study, 24% of eighth graders self-identified as “regular” e-cigarette users. However, the definition of “regular” use was left open to the respondent, and thus the actual patterns of e-cigarette use underlying this definition are not clear (Suris et al. 2015). A study of Irish 16–17-year-olds in 2014 found that 20.7% had ever used e-cigarettes and 3.2% had used them in the past 30 days (Babineau et al. 2015). In South Korea, an estimated 5% of middle and high school students had used e-cigarettes in the past 30 days, according to a large study conducted there in 2011 (Lee et al. 2014).

Table A2.3-2 summarizes other studies related to susceptibility to use e-cigarettes. In a nationally representative sample of individuals 15 years of age or older in Italy, of those who had heard of e-cigarettes but had never tried one, 10.1% had an intention to try one in the future (Gallus et al. 2014). In the United States, several studies have explored interest or intention to try e-cigarettes in smaller or regional samples. In a small sample of U.S. adolescent males, willingness to try e-cigarettes was associated with being a smoker of conventional cigarettes (Pepper et al. 2013). Also in that study, among adolescent male nonsmokers, having fewer negative beliefs about the typical smoker was associated with willingness to try e-cigarettes (Pepper et al. 2013). In Connecticut, a 2013 study of middle and high school students examined susceptibility to e-cigarette use by asking students if they would smoke an e-cigarette offered to them by one of their best friends, and if they thought they would experiment with e-cigarettes in the future. Among never smokers, 25.5% of middle school students and 29.6% of high school students were susceptible to e-cigarettes, with “susceptible” students defined as those who answered anything other than “definitely not” on that survey. In this study, White males who had ever tried cigarettes or were current smokers were more susceptible to e-cigarettes than were their counterparts (Krishnan-Sarin et al. 2015). Finally, in a 2011 survey of a small sample of freshman and sophomore college students in the United States, smoking status, use of alternative tobacco products, and acceptability of the public use of e-cigarettes were significant predictors of intention to use or try e-cigarettes within the next 6 months (Trumbo and Harper 2013).

Young Adults

Table A2.3-3 summarizes additional studies of patterns of e-cigarette use behaviors, including ever and current use, among young adults. Some of these surveys suffered from methodologic issues that limited their comparability and yielded diverse estimates of ever use. For example, the age range that defines “young adult” populations varied; in some studies, these were adults up to 24 years of age, while in others, the upper boundary was 34 years. Additional information on susceptibility and intentions to use e-cigarettes among young adults can be found in Table A2.3-2.

Data from the nationally representative 2014 National Health Interview Survey (NHIS) indicated that 21.6% of adults aged 18–24 years had ever used e-cigarettes, and 5.6% were current users, defined as using e-cigarettes every day or some days (Delnevo et al. 2015; Schoenborn and Gindi 2015). The 2014 NHIS also found that 3.2% of adults who had never smoked cigarettes had tried an e-cigarette. Ever having used an e-cigarette was highest among adult never smokers, 18–24 years of age (9.7%) and declined with age (Schoenborn and Gindi 2015).

Another national survey reported that 25.3% of young adults (18–34 years of age) had ever used e-cigarettes in 2014, and 7.9% of the population of interest had used these products in the past 30 days (Sanders-Jackson et al. 2015). Similarly, the 2014 Tobacco Products and Risk

Perceptions Survey, which uses a probability sample of U.S. adults, found that 19.9% of young adults (18–24 years of age) had ever used e-cigarettes, and 5.2% of the 18–24 group had used them in the past 30 days (Weaver et al. 2016). Estimates of e-cigarette use by young adults from these studies are lower than what was reported above using 2013–2014 NATS data (35.8% for ever use and 13.6% for past-30-day use, respectively). As with youth, possible reasons for these discrepancies could include differences in the age range of the participants and differences in how questions were worded.

Several studies with regional and local samples also assessed past-30-day use of e-cigarettes in young adults. In a 2009 study of North Carolina college students, the prevalence of such use was 1.5% (Sutfin et al. 2013), while in a population-based, prospective cohort study of persons 20–28 years of age in the Midwest, the estimate was 1.2% for 2010–2011 (Choi and Forster 2013). In contrast, in 2013, 28% of college students in Oahu, Hawaii, were found to be past-30-day users (Pokhrel et al. 2015), but in the same year, in a study of college students 18–23 years of age in upstate New York, the estimate was about half that at 14.9% (Saddleson et al. 2015). In that study, past-30-day use was less common among those 20–23 years of age than those 18 years of age, females compared with males, non-Hispanic non-Whites versus non-Hispanic Whites, and those reporting better-than-average school performance (Saddleson et al. 2015).

Trends in Prevalence

Youth

Few published studies are available on trends in the prevalence of e-cigarette use among youth over time. Ever use of e-cigarettes has increased abroad as well as in the United States (Table A2.3-1). Among middle and high school students in Korea, the prevalence of ever use increased from 0.5% in 2008 (Cho et al. 2011) to 9.4% in 2011 (Lee et al. 2014). In a national school-based survey of Polish adolescents 15–19 years of age, ever use rose from 16.8% in 2010–2011 to 62.1% in 2013–2014 (Goniewicz et al. 2014). A survey of high school students in Connecticut and New York showed an increase in past-30-day use from February 2010 (0.9%) to June 2011 (2.3%) (Camenga et al. 2014a). In addition, repeated cross-sectional studies of adolescents from Poland found that the prevalence of past-30-day use of e-cigarettes among high school students increased from 8.9% in 2010–2011 (Goniewicz and Zielinska-Danch 2012) to 29.9% in 2013–2014 (Goniewicz et al. 2014).

Young Adults

In general, other surveys suggest increasing trends among young adults in ever using e-cigarettes (Table A2.3-3). One national study, which relied on the 2011–2012 GfK KnowledgePanel, showed a doubling of ever use (5.0% to 10.3%) from 2011 to 2012 among young adults 18–34 years of age (Richardson et al. 2014), but most of this use was among dual or poly-tobacco users. In another national survey (the 2014 Tobacco Products and Risk Perception Survey), never use increased from 2.5% in 2010 to 21.0% in 2013 among young adults (18–24 years). In that survey, past-30-day use of e-cigarettes in this age group was negligible (0%) in both 2010 and 2011, but it then rose to 3.4% in 2012 and all the way to 14.2% in 2013 (McMillen et al. 2015).

E-Cigarette Use and Use of Other Tobacco Products

Youth

Other cross-sectional studies related to covariation in the use of e-cigarettes and other tobacco products are presented in Table A2.3-1. In a study from southeast Connecticut conducted in 2013, among students who had never tried conventional cigarettes, 2.1% of middle school and 13.2% of high school students were found to have tried e-cigarettes (Krishnan-Sarin et al. 2015). This study estimated that 12% of the high school students were current e-cigarette users in 2013 and that 22.9% of high school students who were ever smokers were past-30-day e-cigarette users. The study also found that, among middle school students, e-cigarettes were the first product they reported trying and, among middle and high school students, ever and past-30-day cigarette smokers were more likely to have ever tried e-cigarettes in their lifetimes than were never smokers. Among students who had tried cigarettes in the past but had not smoked in the past 30 days, 59.8% reported having tried e-cigarettes.

In a sample of youth from four high schools in New York and Connecticut in 2010 and 2011, past-30-day e-cigarette users reported use of a greater number of alternative tobacco products (cigars, blunts, hookahs, or smokeless tobacco) (mean = 1.75, SD = 1.32) than past-30-day cigarette smokers who did not use e-cigarettes (mean = 1.15, SD = 1.03) or never smokers (mean = 0.06, SD = 0.3, $p < .0001$) (Camenga et al. 2014b). A higher proportion of current e-cigarette users ($n = 76$) reported occasional cigarette use (44.7%) than daily cigarette use (30.3%). Among those who were not current e-cigarette users, 66.1% reported occasional cigarette use compared to 33.9% who smoked cigarettes daily. Another survey of high school students, this one sampling grades 9–12 in Connecticut and New York ($n = 1,345$), found an increase in dual use of conventional cigarettes and e-cigarettes from February 2010 (0.8%) to June 2011 (1.9%). The majority of e-cigarette users were dual users (87.5% in wave 1, 82.8% in wave 2, and 83.9% in wave 3) (Camenga et al. 2014a).

Data from a 2013 survey of 9th and 10th graders (both public and private students) in Oahu, Hawaii ($n = 1,941$), indicated that 12% had ever used both e-cigarettes and conventional cigarettes (Wills et al. 2015). Elsewhere, data from a longitudinal cohort study of children with alcoholic parents ($n = 136$ families) found that, among adolescents (middle and late adolescence) who had ever used e-cigarettes, 68.9% had ever used conventional cigarettes also; and among those who had smoked regular cigarettes, e-cigarette use was associated with more

frequent use of conventional cigarettes during the previous 30 days (Lessard et al. 2014). The study by Wills and colleagues (2015) found that e-cigarette use was associated with willingness to smoke other tobacco products, such as cigarettes, in the future.

A study using data from the 2011 NYTS found that the odds of ever e-cigarette use were 58 times as high among current cigarette smokers as they were among nonsmokers after controlling for age, gender, race/ethnicity, disposable income, living with a smoker, and having a friend who smokes (Lippert 2015). The study also found that over 41% of adolescents who had ever used e-cigarettes were past-30-day smokers and 49.3% had ever tried a cigarette. That study also found that 90.7% of ever e-cigarette users had smoked combustible cigarettes in their lifetimes (Lippert 2015).

In 2012, according to data from the NYTS, 42.2% of past-30-day smokers and 60.2% of past-30-day smokers who had smoked at least 100 cigarettes in their lifetime had ever used e-cigarettes. Of smokers who had not used conventional cigarettes in the past 30 days, 13.6% had used e-cigarettes, compared with 0.9% of never smokers (Ambrose et al. 2014; Cardenas et al. 2015). Data from the 2012 NYTS also indicated that poly-tobacco use was positively correlated, after adjustment for multiple covariates, with male gender, race/ethnicity (White, non-Hispanic), use of flavored products, nicotine dependence, receptivity to tobacco marketing, and perceived prevalence of tobacco use in adolescents after adjustment for multiple covariates (Lee et al. 2015). In this adjusted model, poly-tobacco use was negatively correlated with living with someone who used tobacco and with agreeing that breathing smoke from tobacco products causes harm.

Bunnell and colleagues (2015) conducted similar analyses on 6th–12th-grade students who participated in the 2011, 2012, and 2013 NYTS, with their study focused on 43,873 students who had never tried a conventional cigarette. The authors found that 20.2% of ever smokers of regular cigarettes had tried an e-cigarette, compared with 0.9% of never cigarette smokers; and only 0.3% of never cigarette smokers had used an e-cigarette in the previous 30 days (i.e., 99.7% of school students who had never smoked a conventional cigarette had not used an e-cigarette in the previous 30 days). However, from 2011 to 2013, the weighted estimate of never smokers who had used an e-cigarette increased over 300%, from 79,000 to over 263,000 (Bunnell et al. 2015). In multivariate analyses of never smokers of conventional cigarettes, this study found that those who had tried e-cigarettes were

more open to trying a conventional cigarette in the future (43.9%, compared with 21.5% of those who had never tried an e-cigarette), as were those who had tried another combustible or noncombustible tobacco product. The study noted that, although e-cigarette use had increased by the latest year of the study (2013), the overall percentage indicating intentions to smoke conventional cigarettes decreased significantly (from 22.8% in 2011 to 17.9% in 2013), and the proportion of all students who smoked regular cigarettes decreased each year.

In the published literature on co-use of e-cigarettes and other tobacco products (Table A2.3-1) outside of the United States, one study from Wales found that among 10- to 11-year-old children, 47.6% of those who reported having smoked tobacco (1.4% of the sample) also reported having used e-cigarettes, compared to 5.3% of never smokers (98.1% of the sample) (Moore et al. 2016). Elsewhere, among eighth-grade students in Switzerland, nearly half of regular e-cigarette users and nearly one-quarter of ever e-cigarette users were current smokers (Suris et al. 2015). An analysis of data from the 2011 Korean Youth Risk Behavior Web-Based Survey found that 3.6% of students 13–18 years of age were past-30-day dual users of e-cigarettes and conventional cigarettes; past-30-day cigarette smokers were significantly more likely than never or former cigarette smokers to use e-cigarettes; and those who had smoked daily for the past 30 days had the highest rate of past-30-day e-cigarette use (50.8% vs. 0.6% for non-smokers) (Lee et al. 2014). Finally, a national school-based survey of youth 15–19 years of age in Poland found that dual use of e-cigarettes and cigarettes increased from 3.6% in 2010–2011 to 21.8% in 2013–2014 (Goniewicz et al. 2014). The same study found that nearly 73% of past-30-day e-cigarette users also smoked conventional cigarettes in 2013–2014, compared with 65.3% in 2010–2011.

Young Adults

Estimates of the co-use of e-cigarettes and other tobacco products among young adults have varied widely in other studies because of their different definitions of “current” tobacco use and varying definitions of young adulthood. These studies are also presented in Tables 2.7a and 2.7b. In a national sample of U.S. adults (PATH), only 3.2% of those 18–24 years of age who had never used conventional

cigarettes had ever tried e-cigarettes (Ambrose et al. 2014; Cardenas et al. 2015). In contrast, the 2014 NHIS estimated this figure was 9.7% (Schoenborn and Gindi 2015). Correspondingly, studies of ever e-cigarette use among young adults in subnational and regional studies have indicated that e-cigarette use is closely associated with tobacco use, especially cigarette smoking. For example, among a sample of North Carolina college students in 2009, current daily smokers, current nondaily smokers, and former smokers all had higher odds of ever using e-cigarettes in comparison with nonsmokers (Sutfin et al. 2013). A study in the Midwest found that among young adults 20–28 years of age, 9.7% of former cigarette smokers and 28.5% of current smokers were ever e-cigarette users in 2010–2011 (Choi and Forster 2013). In another study, this one using a sample of students at two universities in the Southeast, 20.0% of current smokers were ever e-cigarette users in 2013 (Berg et al. 2015). In a convenience sample of college students from Oahu, Hawaii, studied in 2013, 18.4% of never cigarette smokers, 47.7% of former cigarette smokers, and 68.2% of current cigarette smokers were ever e-cigarette users (Pokhrel et al. 2015).

Other studies using U.S. regional samples have reported consistent findings related to co-use of e-cigarettes and other tobacco products. In 2013, in an upstate New York sample of young adults (18–23 years of age) in colleges and universities ($n = 1,437$), past-30-day cigarette smokers had six times the odds of currently using e-cigarettes as those who had not smoked in the past 30 days; among those who had used tobacco that was not part of a cigarette in the past 30 days, 55.3% had ever used e-cigarettes (Saddleson et al. 2015). Moreover, this study found that users of e-cigarettes had most commonly used another nicotine product first (86.9%), compared with just 7.2% who started with e-cigarettes. In contrast, only 2.5% of ever smokers of conventional cigarettes had used e-cigarettes before smoking (although many probably started smoking before e-cigarettes had become widely available). In the 2013 sample of students from the Southeast ($n = 2,002$) discussed above, among past-30-day e-cigarette users, 71.6% also used cigarettes; 46.6%, cigars; 17.0%; smokeless tobacco; and 54.5%, hookahs (Berg et al. 2015). Finally, in a regional sample of past-30-day cigarette smokers from universities in North Carolina and Virginia, 43.5% had tried e-cigarettes by the beginning of their junior year (Sutfin et al. 2015).

Table A2.3-1 Summary of studies on patterns of e-cigarette use among youth

Study	Design/population	Measures	Outcomes/findings
Cho et al. (2011)	<ul style="list-style-type: none"> • Cross-sectional • 2008 • School-based survey of 4,341 Korean middle and high school students • Cluster probability sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever used an e-cigarette, even one or two puffs • Past-30-day use: n/a • Cigarette smoking: asked if ever used a cigarette, even one or two puffs • Dual use with cigarette: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 0.5% • Past-30-day use: not reported • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Goniewicz and Zielinska-Danch et al. (2012)	<ul style="list-style-type: none"> • Cross-sectional • 2010–2011 • School-based survey of Polish students: <ul style="list-style-type: none"> – 11,893 high school students (youth), 15–19 years of age – 1,894 university students (young adults), 20–24 years of age • Three-stage stratified cluster sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever used an e-cigarette • Past-30-day use: asked if used an e-cigarette at least once in the past 30 days • Cigarette smoking: (1) experimenters (those who had smoked a single cigarette in their lifetime); (2) ever smokers (those who had smoked at least 100 cigarettes in their lifetime); (3) current smokers (those who had smoked more than 100 cigarettes in their lifetime and who had smoked at least once in the past 30 days) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: <ul style="list-style-type: none"> – Overall: 20.9% (CI, 20.1–21.6%) – High school: 23.5% (CI, 22.7–24.3%) – University: 19.0% (CI, 17.1–20.8%) • Past-30-day use: <ul style="list-style-type: none"> – Overall: 6.9% (CI, 6.4– 7.4%) – High school: 8.2% (CI, 7.6–8.7%) – University: 5.9% (CI, 4.8–7.0%) • Dual use with cigarettes: 10.0% (CI, 9.2–10.9%) • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Centers for Disease Control and Prevention (2013a)	<ul style="list-style-type: none"> • Cross-sectional • NYTS • 2011, 2012 • School-based survey of 24,658 U.S. middle and high school students in grades 6–12 • Three-stage cluster sampling 	<ul style="list-style-type: none"> • Ever use: defined as ever trying electronic cigarettes or e-cigarettes, such as Ruyan or NJOY, even just once • Past-30-day use: defined as using electronic cigarettes ≥ 1 or more days in the past 30 days • Cigarette smoking: defined as using cigarettes ≥1 or more days in the past 30 days • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: <ul style="list-style-type: none"> – Overall: 3.3% in 2011; 6.8% in 2012 – Middle school: 1.4% in 2011; 2.7% in 2012 • Past-30-day use: <ul style="list-style-type: none"> – Overall: 1.1% in 2011; 2.1% in 2012 – Middle school: 2011, 0.6% (CI, 0.4–0.9%); 2012, 1.1% (CI, 0.9–1.5%) – High school: 2011, 1.5% (CI, 1.2–2.0%); 2012, 2.8% (CI, 2.3–3.5%) • Dual use with cigarettes: overall current use: 0.8% in 2011; 1.6% in 2012 • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Centers for Disease Control and Prevention (2013b)	<ul style="list-style-type: none"> • Cross-sectional • NYTS • 2011–2012 • School-based survey of 24,658 U.S. middle and high school students in grades 6–12 • Three-stage cluster sampling 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: asked if during the past 30 days had used electronic cigarettes on at least 1 day • Cigarette smoking: current smokers (those who had smoked on at least 1 day in the past 30 days) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: <ul style="list-style-type: none"> – Middle school: 0.6% (2011); 1.1% (2012) – High school: 1.5% (2011); 2.8% (2012) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Ambrose et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional • NYTS • 2012 • School-based survey of 24,658 U.S. middle and high school students in grades 6–12 • Three-stage cluster sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever tried electronic or e-cigarettes, such as Ruyan or NJOY • Past-30-day use: asked if on at least 1 of the past 30 days used e-cigarettes • Cigarette smoking: (1) never-established smokers (responded “no” to ever trying a cigarette, even one or two puffs); (2) former smokers (those who reported trying cigarettes but had not smoked in the past 30 days); and (3) current smokers (those who had smoked on at least 1 of the past 30 days) • Dual use with cigarettes: any reported past-30-day use of e-cigarettes among current cigarette smokers • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 6.8% • Past-30-day use: n/a • Dual use with cigarettes: 1.6% • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Camenga et al. (2014a)	<ul style="list-style-type: none"> • Cross-sectional • 2010–2011 • School-based survey of U.S. high school students in Connecticut and New York (3 waves) as part of intervention study: <ul style="list-style-type: none"> – 1,719 (Feb. 2010) – 1,702 (Oct. 2010) – 1,345 (June 2011) 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: asked if had used e-cigarettes (an electronic cigarette that is filled with liquid nicotine) in the past 30 days • Cigarette smoking: current use defined as use in the past 30 days • Dual use with cigarettes: concurrent use of e-cigarettes and cigarettes in the past 30 days • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: 0.9% (Feb. 2010); 1.7% (Oct. 2010); 2.3% (June 2011) • Dual use with cigarettes: 0.8% (Feb. 2010); 1.4% (Oct. 2010); 1.9% (June 2011) • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Camenga et al. (2014b)	<ul style="list-style-type: none"> • Cross-sectional • 2010–2011 • School-based survey of U.S. high school students (3 waves) in four suburban high schools in Connecticut and New York as part of intervention study: <ul style="list-style-type: none"> – Full sample: 3,102 – Subsample: 1,556 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: asked if had used e-cigarettes (an electronic cigarette that is filled with liquid nicotine and emits “smoke” vapor) in the past 30 days • Cigarette smoking: current use defined as using cigarettes ≥ 1 day in the past 30 days • Dual use with cigarette: not defined • Poly use with other tobacco products: not defined • Co-occurrence with other substances: not defined 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: 2.5% • Dual use with cigarettes: 75% (44.7% current occasional smokers and 30.3% current daily smokers) (among current e-cigarette users, n = 76) • Poly use with other tobacco products: Among current e-cigarette users (n = 76), 40.8% used cigars; 67.1% used blunts; 42.1% used hookah; 25.0% used smokeless tobacco • Co-occurrence with other substances: Among current e-cigarette users (n = 52), 94.2% had ever used alcohol; 86.5% currently used alcohol; 67.3% currently binge drank; 78.8% had ever used marijuana; 71.2% currently used marijuana
Centers for Disease Control and Prevention (2014b)	<ul style="list-style-type: none"> • Cross-sectional • NYTS • 2013 • School-based survey of 18,406 U.S. middle and high school students in grades 6–12 • Three-stage cluster sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever tried at least once. • Past-30-day use: asked if on at least 1 of the past 30 days used e-cigarettes • Cigarette smoking: (1) ever use (tried at least once); (2) current use (used at least once in the past 30 days) • Dual use with cigarettes: use of only combustible tobacco products and e-cigarettes • Poly use with other tobacco products: use of only noncombustible tobacco products and e-cigarettes <i>or</i> use of combustible, noncombustible, and electronic cigarettes • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: <ul style="list-style-type: none"> – Middle school: 3.0% (CI, 2.5–3.0%) – High school: 11.9% (CI, 10.5–13.5%) • Past-30-day use: <ul style="list-style-type: none"> – Middle school: 1.1% (CI, 0.8–1.5%); 0.4% (exclusive use) – High school: 4.5% (CI, 3.8–5.3%); 0.6% (exclusive use) • Dual use with combustible products (cigarettes, cigars, pipes, bidis, kreteks, hookah): <ul style="list-style-type: none"> – Middle school: 0.4% – High school: 2.7% • Poly use with other tobacco products (combustible, noncombustible, electronic cigarettes): <ul style="list-style-type: none"> – Middle school: 0.2% – High school: 1.1% • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Czoli et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional survey • 2012 • 1,188 Canadian youth (16–19 years of age) and young adults (20–30 years of age) • Recruitment through an online panel of a commercial market research company 	<ul style="list-style-type: none"> • Ever use: defined as those who had tried an e-cigarette but had not smoked one in the last 30 days • Past-30-day use: defined as those who had tried an e-cigarette and had smoked one in the last 30 days • Cigarette smoking: (1) current smokers (those who had smoked 100 cigarettes in their lifetime and had smoked in the last 30 days); (2) former smokers (those who had smoked 100 cigarettes in their lifetime but had not smoked in the last 30 days); (3) nonsmokers (those who had smoked less than 100 cigarettes in their lifetime) • Dual use with cigarette: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 16.1% • Past-30-day use: 5.7% • Dual use with cigarette: 15.0% • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Dutra and Glantz (2014)	<ul style="list-style-type: none"> • Cross-sectional • NYTS • 2011–2012 • School-based survey of U.S. middle and high school students: • 17,353 in 2011 • 22,529 in 2012 • Three-stage cluster sampling 	<ul style="list-style-type: none"> • Ever use: defined as those who had tried electronic cigarettes or e-cigarettes, such as Ruyan or NJOY, even just one time • Past-30-day use: defined as those who had used e-cigarettes on at least 1 day in the past 30 days • Cigarette smoking: (1) experimenters (those who had tried cigarette smoking, even one or two puffs); (2) ever smokers (those who smoked 100 or more cigarettes/five or more packs in lifetime); (3) current smokers (those who smoked at least 100 cigarettes and smoked in the past 30 days) • Dual use with cigarette: defined as those who are currently using e-cigarettes and conventional cigarettes • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 3.1% (2011), 6.5% (2012) • Past-30-day use: 1.1% (2011), 2.0% (2012) • Dual use with cigarettes: 0.5% (2011), 1.0% (2012) • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Goniewicz et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional • 2010–2011, 2013–2014 • School-based survey of 3,730 Polish students, 15–19 years of age • Three-stage stratified cluster sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever puffed on e-cigarette, even a single puff • Past-30-day use: asked if puffed on e-cigarette in the past 30 days • Cigarette smoking: (1) ever smokers (those who had ever smoked tobacco cigarettes); (2) current smokers (those who had smoked tobacco cigarettes within the past 30 days) • Dual use with cigarettes: current use of e-cigarettes and tobacco cigarettes • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 2010–2011, 16.8% (CI, 14.7– 19.2%); 2013–2014, 62.1% (CI 60.1–64.0%) • Past-30-day use: 2010–2011, 5.5% (CI, 3.8–7.8%); 2013–2014, 29.9% (CI, 28.2–31.7%) • Dual use with cigarettes: 2010–2011, 3.6% (CI, 2.2–5.8%); 2013–2014, 21.8% (CI, 20.3–23.5) • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Lee et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional • 2011 • Web-based survey of 75,643 Korean students, 13–18 years of age • Stratified multistage cluster sampling 	<ul style="list-style-type: none"> • Ever use: asked if they had ever used e-cigarettes • Past-30-day use: asked if they had used e-cigarettes in the past 30 days • Cigarette smoking: (1) ever smokers (not defined); (2) former smokers (those who had ever smoked one puff but had not smoked in the past 30 days; (3) current smokers (those who had smoked in the past 30 days) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 9.4% (1.4% of the students only ever used e-cigs) • Past-30-day use: 4.7% • Dual use with cigarettes: 3.6% • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Lessard et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional survey • 136 adolescents from ongoing longitudinal case-control study who were recruited at 12 months of age • Recruited from ongoing longitudinal study 	<ul style="list-style-type: none"> • Ever use: asked if ever used an e-cigarette. • Past-30-day use: n/a • Cigarette smoking: (1) current smoker (those who answered yes when asked if they currently smoke) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: participants were asked if they had ever used marijuana, ever had more than a few sips of alcohol 	<ul style="list-style-type: none"> • Ever use: 36.9% • Past-30-day use: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a • Ever marijuana and e-cigarette use: 84.4% • Ever alcohol and e-cigarette use: 97.8%

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Wang et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional • 2012 • NYTS • School-based survey of 24,658 U.S. middle and high school students in grades 6–12 • Three-stage cluster sampling 	<ul style="list-style-type: none"> • Ever use: asked if they had ever used electronic cigarettes or e-cigarettes, such as Ruyan or NJOY, even just one time • Past-30-day use: asked if they used electronic cigarettes or e-cigarettes, such as Ruyan or NJOY, on at least 1 day during the past 30 days • Cigarette smoking: (1) ever smoker (those who reported ever trying cigarette smoking, even one or two puffs); (2) current smoker (those who had smoked cigarettes on at least 1 of the past 30 days) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 6.8% (CI, 5.9–7.8%) • Past-30-day use: 2.1% (CI, 1.8–2.5%) • Dual use with conventional tobacco: 12.9% (CI, 11.0–15.0%) • Poly use with other tobacco products: <ul style="list-style-type: none"> – Current e-cigarette and other nonconventional tobacco product use: 19.1% (CI, 16.2–22.2%) • Co-occurrence with other substances: n/a
Ambrose et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • Wave 1 of PATH study • Household-based, nationally representative survey of 13,651 youth 12–17 years of age 	<ul style="list-style-type: none"> • Ever use: asked if ever used an e-cigarette, even one or two times • Past-30-day use: asked how many days in the last 30 used an e-cigarette • Cigarette smoking: asked if ever used a cigarette, even one or two puffs, in the past 30 days • Dual use with cigarette: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 10.7% • Past-30-day use: 3.1% • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Amrock et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • NYTS • 2012 • School-based survey of 24,658 U.S. middle and high school students in grades 6–12 • Three-stage cluster sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever tried electronic or e-cigarettes, such as Ruyan or NJOY • Past-30-day use: asked if on at least 1 of the past 30 days used e-cigarettes 	<ul style="list-style-type: none"> • Ever use: 6.8% • Past-30-day use: 2.1% • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Bostean et al. (2015)	<ul style="list-style-type: none"> • California Health Kids Survey • 2012–2013 • School-based survey of 482,179 middle and high school students in grades 6–12 in California 	<ul style="list-style-type: none"> • Ever use: asked if ever used e-cigarettes at least once in their lifetime • Past-30-day use: asked if used e-cigarettes on 1 or more days in the past 30 days • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 24.4% • Past-30-day use: 12.9% • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Bunnell et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • NYTS • 2011, 2012, 2013 (pooled data from all 3 years) • School-based survey of 43,873 U.S. middle and high school students in grades 6–12 • Three-stage cluster sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever tried, even just one time [...] electronic cigarettes or e-cigarettes, such as Ruyan or NJOY • Past-30-day use: asked if in the past 30 days had used e-cigarettes on at least 1 day • Cigarette smoking: (1) ever use (those who had tried, even just one time); (2) never use (those who had not tried, even just one time) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 6.1% • Past-30-day use: no overall prevalence available • Current e-cigarette use: 6.9% among ever cigarette users; 0.3% among never cigarette users • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Cardenas et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional NYTS • 2012 • School-based survey of U.S. middle and high school students • Full sample size not reported; subsample of 14,861 children who never tried smoking cigarettes • Three-stage cluster sampling 	<ul style="list-style-type: none"> • Ever use: defined as ever trying electronic cigarettes or e-cigarettes, such as Ruyan or NJOY, even just once • Past-30-day use: asked if had used electronic cigarettes or e-cigarettes, such as Ruyan or NJOY, on at least 1 day in the past 30 days • Cigarette smoking: (1) ever use (those who had tried, even just once); (2) current use (those who used on at least 1 day in the past 30 days) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: weighted prevalence: 1.5% (11–12 years of age); 6.3% (13–16 years of age); 12.8% (17–18 years of age) • Past-30-day use: not reported • Dual use with cigarettes: 60.2% • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Hamilton et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • Biennial provincewide survey of 2,892 Canadian high school students • Two-stage stratified cluster sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever smoked at least one puff from an electronic cigarette (responses of “smoked an e-cigarette with nicotine” and “smoked an e-cigarette without nicotine” grouped as ever smokers) • Past-30-day use: n/a • Cigarette smoking: (1) ever smokers (those who smoked at least a puff of a cigarette in their lifetime); (2) 12-month smokers (those who reported any smoking within the last 12 months) • Dual use with cigarettes: those who reported ever use of both e-cigarettes and tobacco cigarettes • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 14.6% (CI, 12.3–17.3%) (5% of this group had never used other tobacco products) • Past-30-day use: n/a • Dual use with cigarettes: 9.6% (CI, 8.0–11.5%) • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Hughes et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • School-based survey of 16,193 students in North West England, 14–17 years of age 	<ul style="list-style-type: none"> • Ever use: asked if ever bought or tried e-cigarettes • Past-30-day use: n/a • Cigarette smoking: ranged from never smoker to tried but didn't like it to ex-smoker, to only smoke when drinking, to regular light smoker (<5/day), to regular heavy smoker (>5/day) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: frequency of alcohol consumption evaluated and students categorized into five drinker types from nondrinker at the lowest to regular drinkers that binge at the highest 	<ul style="list-style-type: none"> • 19.2% reported having accessed e-cigarettes (bought or ever tried) • E-cigarette access was 4.9% among never smokers, 50.7% among ex-smokers, 67.2% among light regular smokers, and 75.8% among heavy regular smokers, $p < 0.001$ • Participants who drank regularly and binge drank were significantly more likely to have accessed e-cigarettes
Hummel et al. (2015)	<ul style="list-style-type: none"> • Cohort study • 2008, 2010, 2013, 2014 • 6,602 Dutch smokers, 15 years of age or older: <ul style="list-style-type: none"> – 1,520 in 2008 – 1,802 in 2010 – 1,530 in 2013 – 1,550 in 2014 • Recruitment through probability-based web database 	<ul style="list-style-type: none"> • Ever use: defined as those who reported using an e-cigarette but less than monthly • Past-30-day use: defined as those who reported using an e-cigarette at least monthly • Cigarette smoking: smokers (those who smoked at least 100 cigarettes in their lifetime and were currently smoking at least monthly) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: no point estimate available; OR for every trial of e-cigarettes of 1.52 (CI, 1.09–2.11) among 15- to 24-year-olds compared with those 55+ years of age (2014) • Past-30-day use: no point estimate available; OR for current use of e-cigarettes of 0.48 (CI, 0.28–0.85) among 15–24-year-olds compared with those 55+ years of age (2014) • Dual use with cigarettes: not reported, explicitly for young adults • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Kinnunen et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • Biennial, mail-based survey of 3,535 Finnish adolescents, 12–18 years of age • Nationally representative sample 	<ul style="list-style-type: none"> • Ever use: those who reported trying once or twice, trying 20 times or less, or trying more than 20 times • Past-30-day use: n/a • Cigarette smoking: (1) never smokers (those who never tried conventional cigarettes); (2) experimenters (those who tried but did not smoke daily); (3) current smokers (those who reported daily smoking and smoked >50 cigarettes in their lifetime) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 17.4% • Past-30-day use: n/a • Dual use with cigarettes: 32.9% ever use among experimenters with conventional cigarettes; 81.1% ever use among daily smokers • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Kong et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2012–2013 • Middle and high school students (youth) in New Haven County, Connecticut: <ul style="list-style-type: none"> – Focus groups = 18 (n = 127) – Schoolwide survey = 4,780 • College students (young adults) in New Haven County, Connecticut: <ul style="list-style-type: none"> – Focus groups = 127 – Schoolwide survey = 625 • Recruitment by flyers and active recruitment sessions 	<ul style="list-style-type: none"> • Ever use: those who indicated they had ever tried e-cigarettes • Past-30-day use: n/a • Cigarette smoking: (1) never smokers (those who indicated never smoking); (2) cigarette smokers (those who indicated smoking occasionally or every day) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use for focus group: 33.9% • Past-30-day use: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Krishnan-Sarin et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • School-based survey of middle (1,166) and high school (3,614) students in Connecticut • Recruitment by selected district reference groups 	<ul style="list-style-type: none"> • Ever use: defined as those who had tried an e-cigarette • Past-30-day use: defined as those who indicated use in the past 30 days • Cigarette smoking: (1) never smoker (those who had never smoked a cigarette); (2) current smokers (those who smoked cigarettes on 1 or more days during the past 30 days); (3) ever smokers (those who had tried cigarettes but reported not smoking cigarettes during the past 30 days) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: <ul style="list-style-type: none"> – Middle school: 3.5% – High school: 25.2% • Past-30-day use: <ul style="list-style-type: none"> – Middle school: 1.5% – High school: 12% • Dual use with cigarettes: <ul style="list-style-type: none"> – Middle school: 38.5% – High school: 64.1% • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Lee et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • NYTS • 2012 • School-based survey of 24,658 U.S. middle and high school students in grades 6–12 • Three-stage cluster sampling 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: defined as use of e-cigarettes on at least 1 of the past 30 days • Cigarette smoking: current smoker (those who had smoked a cigarette on at least 1 of the past 30 days) • Dual use with cigarettes: defined as current cigarette smokers who reported using one other tobacco product • Poly use with other tobacco products: defined as current cigarette smokers who reported using two or more other tobacco products • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: 0.9% (CI, 0.7–1.3%) were users of e-cigarettes exclusively • Dual use with cigarettes: 0.4% (CI, 0.3–0.5%) • Poly use with other tobacco products: poly use with e-cigarettes not explicitly reported • Co-occurrence with other substances: n/a
Leventhal et al. (2015)	<ul style="list-style-type: none"> • Longitudinal repeated assessment • 2013 (baseline); 2014 (6-month follow-up); 2014 (12-month follow-up) • School-based cohort of 2,530 middle and high school students who reported never using combustible tobacco at baseline, in grades 6–10 from 10 public high schools in Los Angeles, California • Convenience sampling 	<ul style="list-style-type: none"> • Ever use: asked if they had ever used an e-cigarette in lifetime • Past-30-day use: n/a • Cigarette smoking: use of combustible cigarettes in the past month • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 8.8% at baseline • Past-30-day use: n/a • Dual use with cigarettes: not explicitly reported; only past 6- and 12-month tobacco use against ever use of e-cigarettes were reported • Poly use with other tobacco products: not reported • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Li et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2014 • Nationwide, in-home survey in New Zealand • Multistage, stratified, clustered, and random probability sampling method (oversampling of Maori and Pacific peoples) • Participants 15 years of age and older, n = 2,594 • Youth: 15–17 years of age, 3.8% of sample • Young adults: 18–24 years of age, 13.4% of sample 	<ul style="list-style-type: none"> • Ever use: asked if ever used an e-cigarette • Current use: defined as at least once a day, at least once a week, at least once a month, less than once a month, and do not use one now • Cigarette smoking: n/a • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Among 15- to 17-year-olds, 20.7% had ever used an e-cigarette, and 0.0% were current users • Among 18- to 24-year olds, 25.8% had ever used an e-cigarette, and 0.2% were current users
Lippert (2015)	<ul style="list-style-type: none"> • Cross-sectional • NYTS • 2011 • School-based survey of 15,264 U.S. middle and high school students in grades 6–12 • Probability sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever tried e-cigarettes (short list of e-cigarette brands provided as examples) • Past-30-day use: n/a • Cigarette smoking: (1) never smoker (those who reported never smoking); (2) former smoker (those who had tried a cigarette but had not smoked at least once a day for 20 or more days in the past month); (3) current smoker (those who had smoked at least once a day for 20 or more days in the past month) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 3.2% • Past-30-day use: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Moore et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • Combination of two datasets: <ul style="list-style-type: none"> – CHETS Wales: School-based survey of Welsh year 6 school children, 10–11 years of age, n = 1,601 – HBSC Wales: School-based survey of Welsh secondary school students 11–16 years of age, n = 9055 	<ul style="list-style-type: none"> • Ever use: asked if they had ever used an e-cigarette • Current use: HBSC Wales participants asked if they used e-cigarettes on “a few occasions (1–5 times),” or “regularly (at least once a month)” • Cigarette smoking: both surveys asked if ever smoked tobacco; HBSC Wales respondents were asked on how many days they smoked cigarettes • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 5.8% of 10- to 11-year-olds, 12.3% of 11- to 16-year-olds • Current use: 1.5% of HBSC Wales respondents reported “regular use” • Dual use with cigarettes: the majority of children who had ever used an e-cigarette reported that they had never smoked tobacco • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Pentz et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • School-based survey of 410 seventh-grade students from two public middle schools in Southern California • Recruited from cross-sectional pilot study of a large randomized controlled trial 	<ul style="list-style-type: none"> • Ever use: defined as those who did not indicate “none” when asked how many cartridges or disposable e-cigarettes they had used in their entire life • Past-30-day use: n/a • Cigarette smoking: lifetime use (those who did not indicate “no use” when asked if they had ever smoked a cigarette in their whole life) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 11% • Past-30-day use: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Primack et al. (2015)	<ul style="list-style-type: none"> • Longitudinal cohort: <ul style="list-style-type: none"> – Wave 2: 2012–2013 – Wave 3: 2013–2014 • 694 youth (16–17 years of age) and young adults (18–26 years of age) • Participants had to be never smokers and nonsusceptible to smoking at baseline • Random-digit dialing • National sample from Dartmouth Media, Advertising, and Health Study 	<ul style="list-style-type: none"> • Ever use: asked if ever used an e-cigarette • Past-30-day use: n/a • Cigarette smoking: defined as someone who had smoked at least one puff of a cigarette in her or his lifetime • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 2.3% at baseline • Past-30-day use: not reported • Dual use with cigarettes: not explicitly reported • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Wills et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • School-based survey of 1,941 private or public high school students in Oahu, Hawaii • Recruitment through five schools representative of the Hawaii educational system 	<ul style="list-style-type: none"> • Ever use: defined as those who reported any use of e-cigarettes • Past-30-day use: defined as those who indicated using e-cigarettes once, twice, or ≥ 3 times in the past month • Cigarette smoking: not defined • Dual use with cigarettes: defined as ever use of e-cigarettes and ever use of cigarettes • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 29% • Past-30-day use: 18% • Dual use with cigarettes: 12% • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
CDC (2016)	<ul style="list-style-type: none"> • Cross-sectional • 2014–2015 school year • School-based, self-administered questionnaire • 15,624 middle and high school students 	<ul style="list-style-type: none"> • Ever use: defined as those who had ever tried e-cigarettes • Past-30-day use: defined as those who indicated using e-cigarettes on at least 1 day during the 30 days before the survey • Cigarette smoking: status on scale from never to every day, number of smoking days within the past 30 days • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 44.9% • Past-30-day use: 24.1% • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Gilreath et al. (2016)	<ul style="list-style-type: none"> • Cross-sectional • Southern California Children’s Health Study • 2014 • 2,091 students in grades 11 and 12 	<ul style="list-style-type: none"> • Ever use: defined as those who provided an age of first use of e-cigarettes but no use in the past 30 days • Current use: defined as those who indicated using e-cigarettes in the past month • Cigarette smoking: same definitions as ever use and current use for e-cigarettes • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 14.4% • Current use: 9.6% • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Jiang et al. (2016)	<ul style="list-style-type: none"> • Cross-sectional • School-based Survey on Smoking Among Students • 2012–2013 • 45,857 secondary school students (grades 7–12) in Hong Kong 	<ul style="list-style-type: none"> • Ever use: n/a • Past 30-day use: defined as those who indicated using e-cigarettes in the past 30 days • Cigarette smoking: status on scale from never to every day, number of smoking days within the past 30 days • Dual use with cigarettes: use of both products within the past 30 days • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: 1.1% • Dual use with cigarettes: Among former or current smokers, 9.6% were current e-cigarette users • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-1 Continued

Study	Design/population	Measures	Outcomes/findings
Moore et al. (2016)	<ul style="list-style-type: none"> • Cross-sectional • 2014 • School-based survey of Welsh year 6 school children, 10–11 years of age: <ul style="list-style-type: none"> – Students = 1,578 – Items on e-cigarette use completed = 1,495 • Probability sampling 	<ul style="list-style-type: none"> • Ever use: asked if they had ever used an e-cigarette • Past-30-day use: n/a • Cigarette smoking: (1) ever smoker (those who reported ever smoking at least one cigarette) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 5.3% among never smokers • Past-30-day use: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products (among children that used tobacco): (n = 21); 47.6% had used an e-cigarette • Co-occurrence with other substances: n/a
Morean et al. (2016)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • 2,241 adolescents in grades 9–12 at four high schools in Southeastern Connecticut 	<ul style="list-style-type: none"> • Ever use: n/a • Current use: defined as using e-cigarettes on at least 1 day in the past 30 days • Cigarette smoking: defined as use on at least 1 day in the past 30 days • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: alcohol use, defined as use on at least 1 day in past 30 days 	<ul style="list-style-type: none"> • Ever use: n/a • Current use: 11.6% • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: e-cigarettes and alcohol, 4.60%
Thrasher et al. (2016)	<ul style="list-style-type: none"> • Cross-sectional • 2015 • Stratified random sampling in Mexico's three largest cities (Mexico City, Guadalajara, and Monterrey) • 10,146 middle school students 	<ul style="list-style-type: none"> • Ever use: defined as those who had ever tried e-cigarettes • Current use: n/a • Cigarette smoking: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 10% • Current use: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Wills et al. (2016)	<ul style="list-style-type: none"> • Longitudinal • 2013 and 2014 • School-based survey of 2,338 private and public high school students in Oahu, Hawaii • Recruitment through five schools representative of the Hawaii educational system 	<ul style="list-style-type: none"> • Ever use: defined as those who reported any use of e-cigarettes • Past-30-day use: n/a • Cigarette smoking: defined as those who had ever smoked a cigarette • Dual use with cigarettes: defined as ever use of both products • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 31% at baseline (2013), 38% (2014) • Current use: n/a • Dual use with cigarettes: Among never smokers at baseline (in 2013), those who had used e-cigarettes at baseline were more likely to have smoked cigarettes in 2014 (AOR = 2.87, p <0.0001)

Note: AOR = adjusted odds ratio; CI = confidence interval; PATH = Population Assessment of Tobacco and Health Study; NYTS = National Youth Tobacco Survey; OR = odds ratio.

Table A2.3-2 Summary of studies on susceptibility and intentions to use e-cigarettes among youth and young adults

Study	Design/population	Measures	Outcomes/findings
Faletau et al. (2013)	<ul style="list-style-type: none"> • Qualitative exploratory • Structured focus groups and individual interviews • Recruited from two low-socioeconomic primary schools in East and South Auckland, New Zealand • Year sample drawn: 2011 • Youth: Maori, Tongan, Samoan, Cook Island, and Niuean, 6–10 years of age; N = 20 • Young adults: n/a 	<ul style="list-style-type: none"> • Viewed tobacco cigarette and e-cigarette videos 	<ul style="list-style-type: none"> • Children thought the e-cigarette was “cool ... cause you can charge it like a phone and it lasts longer”
Li et al. (2013)	<ul style="list-style-type: none"> • Cross-sectional • Telephone-based survey • Random-digit-dial sampling • Years sample drawn: 2011–2012 • Youth: n/a • Young adults: current smokers and recent quitters, ≥18 years of age, in New Zealand; N = 840 	<ul style="list-style-type: none"> • Indicate your level of agreement: <ol style="list-style-type: none"> 1. I would switch to e-cigarettes completely if they were cheaper than tobacco cigarettes (n = 360) 2. If I wanted to stop smoking tobacco, I would give e-cigarettes a go to help me quit smoking (n = 360) 	<ul style="list-style-type: none"> • OR = 1.14 (CI, 0.47–2.76) among participants 18–24 years of age for willingness to switch to e-cigarettes if they are cheaper compared with participants ≥45 years of age • OR = 3.37 (CI, 1.17–9.69) among participants 18–24 years of age for willingness to use e-cigarettes to support a quit attempt compared with participants ≥45 years of age
Pepper et al. (2013)	<ul style="list-style-type: none"> • Cross-sectional • Web-based survey • Recruited through parents who were members of an online panel assembled by random-digit dialing and address-based sampling • Year sample drawn: 2011 • Youth: U.S. males, 11–17 years of age; N = 228 • Young adults: n/a 	<ul style="list-style-type: none"> • If one of your best friends were to offer you an e-cigarette, would you try it? • If one of your best friends were to offer you a flavored e-cigarette (chocolate, mint, apple, etc.), would you try it? 	<ul style="list-style-type: none"> • 18% were willing to try an e-cigarette if offered by a best friend: <ul style="list-style-type: none"> – 13% were willing to try a plain e-cigarette – 5% were willing to try flavored e-cigarettes or both kinds • Willingness to try e-cigarettes by age: <ul style="list-style-type: none"> – 11–13: 11% – 14–16: 15% – 17–19: 29% • OR = 3.26 (CI, 1.27– 8.35) among those 17–19 years of age for willingness to try an e-cigarette, compared with those 11–13 years of age • Willingness to try e-cigarettes by smoking status: <ul style="list-style-type: none"> – Nonsmoker: 13% – Smoker: 74% • OR = 18.67 (CI, 6.22–55.98) among smokers for willingness to try an e-cigarette, compared with nonsmokers

Table A2.3-2 Continued

Study	Design/population	Measures	Outcomes/findings
Trumbo and Harper (2013)	<ul style="list-style-type: none"> • Cross-sectional • Web-based survey • Recruitment by offer of extra credit to students in a 100-level course • Year sample drawn: 2011 • Youth: n/a • Young adults: freshmen and sophomores in a 100-level mass media in society course; n = 244 	<ul style="list-style-type: none"> • How likely do you think it is that you would use an e-cigarette in the not-too-distant future, say in the next 6 months? • Indicate your level of agreement with the following attitudes (5-point scale): <ol style="list-style-type: none"> 1. Use of e-cigarettes should be legal for adults 2. E-cigarettes are a big step forward 3. E-cigarettes are a more modern way of using tobacco 	<ul style="list-style-type: none"> • Most students had little intention of using an e-cigarette within the next 6 months • Mean score (SD) of attitude items: 11.5 (2.3)
Czoli et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional • Survey • Recruitment through online panel of commercial market research company • Year sample drawn: 2012 • Youth: Canadian youth recruited from online panel, 16–30 years of age (n = 1,188) • Young adults: Canadian young adults recruited from online panel noted above 	<ul style="list-style-type: none"> • Would you be interested in trying this product? 	<ul style="list-style-type: none"> • Mean score for interest in trying e-cigarettes: <ul style="list-style-type: none"> – Among cigarette nonsmokers: 1.9 (e-cigarette nonuser) vs. 4.2 (e-cigarette ever user) – Among former smokers: 3.2 (e-cigarette nonuser) vs. 4.1 (e-cigarette ever user) – Among current smokers: 3.1 (e-cigarette nonuser) vs. 7.1 (e-cigarette ever user) • Reasons for trying e-cigarettes among current cigarette smokers: <ul style="list-style-type: none"> – To help cut back on the amount they smoked (77.7%) – As a long-term replacement for cigarettes (77.8%) – For the times when they don't want to smoke around others (78.8%) – To help them while they are trying to quit smoking (80.4%) – As a cheaper alternative to cigarettes (80.7%) – In places where they can't smoke cigarettes (80.9%)
Gallus et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional • In-person survey • Representative multistage sampling • Year sample drawn: 2013 • Youth: n/a • Young adults: Italians ≥15 years of age; N = 3,000 	<ul style="list-style-type: none"> • Have you heard about e-cigarettes, have you ever tried them, or do you have the intention to try them? 	<ul style="list-style-type: none"> • 10.1% of participants aware of electronic cigarettes were intent on trying electronic cigarettes

Table A2.3-2 Continued

Study	Design/population	Measures	Outcomes/findings
Krishnan-Sarin et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • School-based survey • Recruitment by selected district reference groups • Year sample drawn: 2013 • Youth: Connecticut middle (n = 1,166) and high school (n = 3,614) students • Young adults: n/a 	<ul style="list-style-type: none"> • Given a choice, would you rather smoke an e-cigarette, a regular cigarette, or neither? • Do you think that in the future you might experiment with e-cigarettes? 	<ul style="list-style-type: none"> • Susceptibility to future e-cigarette use was significantly higher in ever smokers and current smokers, compared with never smokers • Susceptible to future use, middle school: <ul style="list-style-type: none"> – 26.4% (overall) – 25.5% (never smokers) – 100.0% (ever smokers) – 83.3% (current smokers) • Susceptible to future use, high school: <ul style="list-style-type: none"> – 31.7% (overall) – 29.6% (never smokers) – 57.0% (ever smokers) – 73.3% (current smokers)
Pokhrel et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • Web-based survey • Recruitment by flyers across three college campuses • Year sample drawn: 2013 • Youth: n/a • Young adults: U.S. students from a 4-year university and two 2-year community colleges in Oahu, Hawaii; n = 307 	<ul style="list-style-type: none"> • Of the ads or commercials you see, how much do you like the ads? • When you see e-cigarette ads or commercials, do you think they are funny? • When you see e-cigarette ads or commercials, do you think they are sexy? • When you see e-cigarette ads or commercials, do you wish you were like people in the ads or commercials? 	<ul style="list-style-type: none"> • 41.2% reported liking e-cigarette ads the least compared with 4.0% who liked e-cigarette ads the most • 45.9% reported never finding e-cigarette ads funny compared with 4.3% who always found e-cigarette ads funny • 65.9% reported never finding e-cigarette ads sexy compared with 1.0% who always found e-cigarette ads sexy • 78.0% reported never wishing to be like the people in the ads compared with 0.7% who always wished to be like the people in the ads

Notes: CI = confidence interval; OR = odds ratio; SD = standard deviation.

Table A2.3-3 Summary of studies on patterns of e-cigarette use among young adults

Study	Design/population	Measures	Outcomes/findings
Goniewicz and Zielinska-Danch (2012)	<ul style="list-style-type: none"> • Cross-sectional • 2010–2011 • School-based survey of Polish students <ul style="list-style-type: none"> – 11,893 high school students, 15–19 years of age – 1,894 university students, 20–24 years of age • Three-stage stratified cluster sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever used an e-cigarette • Past-30-day use: asked if used an e-cigarette at least once in the past 30 days • Cigarette smoking: (1) experimenters (those who had smoked a single cigarette in their life); (2) ever smokers (those who had smoked at least 100 cigarettes in their life); (3) current smokers (those who had smoked more than 100 cigarettes in their lifetime and who had smoked at least once in the past 30 days) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: overall, 20.9% (CI, 20.1–21.6%); high school, 23.5% (CI, 22.7–24.3%); university, 19.0% (CI, 17.1–20.8%) • Past-30-day use: overall, 6.9% (CI, 6.4–7.4%); high school, 8.2% (CI, 7.6–8.7%); university, 5.9% (CI, 4.8–7.0%) • Dual use with cigarettes: 10.0% (CI, 9.2–10.9%) • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
McMillen et al. (2012)	<ul style="list-style-type: none"> • Cross-sectional • 2010 • Mixed-mode, mixed-frame survey of 3,240 U.S. adults, 18 years of age or older: <ul style="list-style-type: none"> – 1,504 in mode 1 – 1,736 in mode 2 • Probability-based sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever tried electronic cigarettes or e-cigarettes, such as Ruyan or NJOY, even just one time • Past-30-day use: asked if used an electronic cigarette or e-cigarette, such as Ruyan or NJOY, in the past 30 days • Cigarette smoking: (1) current smokers (those who had smoked at least 100 cigarettes in their entire life and now smoke every day or some days); (2) never smokers (those who had not smoked at least 100 cigarettes); (3) former smokers (those who had smoked at least 100 cigarettes but no longer smoke) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever e-cigarette use: overall, 1.8% ($p < .001$) • Never smokers, 0.3% • Former smokers, 1.5% • Nondaily smokers, 8.2% • Daily smokers, 6.2%

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
Pearson et al. (2012)	<ul style="list-style-type: none"> • Cross-sectional • Survey 1: <ul style="list-style-type: none"> – 2010 – Web-based – 2,649 U.S. adults – Recruited primarily through address-based sampling – Some random-digit-dial sampling • Survey 2: <ul style="list-style-type: none"> – 2008–2010 – Phone-based – 3,658 U.S. adults • List-assisted random-digit-dial sampling 	<ul style="list-style-type: none"> • Ever use: asked if they had ever tried or used an electronic cigarette or e-cigarette • Past-30-day use: asked if they had used an electronic cigarette in the past 30 days (asked only in survey 1) • Cigarette smoking: (1) never smokers (those who had smoked fewer than 100 cigarettes in their lives; (2) former smokers (those who had smoked 100 cigarettes or more in their lives but do not currently smoke); (3) current smokers (those who had smoked more than 100 cigarettes in their lives and reported currently smoking every day or some days) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: not explicitly reported for young adults • Past-30-day use: not explicitly reported for young adults • Dual use with cigarettes: not explicitly reported for young adults • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Rath et al. (2012)	<ul style="list-style-type: none"> • Cross-sectional • 2011 • Web-based survey of 4,201 U.S. adults, 18–34 years of age • Probability sampling 	<ul style="list-style-type: none"> • Ever use: asked if they had ever used or tried e-cigarettes like blu or NJOY • Past-30-day use: asked during the past 30 days, on how many days have you used e-cigarettes (like blu or NJOY) • Cigarette smoking: now smoke cigarettes every day or some days • Dual use with cigarettes: every-day or some-day use of both cigarettes and other tobacco products (not specific to e-cigarettes) • Poly use with other tobacco products: not defined • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 6% (CI, 5–7%) • Past-30-day use: 7% among those who used cigarettes or tobacco products every day or some days • Dual use with cigarettes: 9% • Poly use with other tobacco products: not reported • Co-occurrence with other substances: n/a

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
Choi and Forster (2013)	<ul style="list-style-type: none"> • Population-based • Cross-sectional interview • 2010–2011 • 2,624 U.S. adults, 20–28 years of age, in Minnesota • Cluster random sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever used e-cigarettes, described in awareness item as “an e-cigarette or electronic cigarette, a cigarette-looking electronic device that delivers nicotine vapor when you puff it” • Past-30-day use: the number of days they had used e-cigarettes in the past 30 days, dichotomized • Cigarette smoking: (1) never established smokers (those who had not smoked 100 cigarettes); (2) former smokers (those who had smoked 100 cigarettes but had not smoked in the past 30 days); and (3) current smokers (those who had smoked at least 100 cigarettes and had smoked in the past 30 days) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 7% prevalence • Past-30-day use: 1.2% • Dual use with cigarettes: 28.5% of current smokers had ever used e-cigarettes; 9.7% of former smokers had ever used e-cigarettes; OR was 10.07 (CI, 6.38–15.89) among current smokers and 3.51 (CI, 1.97–6.27) among former smokers for ever e-cigarette use in comparison with never established smokers • Poly use with other tobacco products: n/a • Co-occurrence with other substances : n/a
Dockrell et al. (2013)	<ul style="list-style-type: none"> • Population online-based surveys • 2010, 2012 • British young adults, 18–24 years of age (full sample included adults older than 25 years of age) • Targeted quota sampling 	<ul style="list-style-type: none"> • Ever use: defined as those who have tried e-cigarettes but do not use them anymore • Past-30-day use: defined as those who had tried e-cigarettes and still use them • Cigarette smoking: (1) never smokers (those who reported having never smoked); (2) former smokers (those who reported having smoked, but not currently); (3) occasional smokers (those who currently smoked, but not every day); (4) daily smokers (those who reported smoking every day) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: not reported explicitly for young adults • Past-30-day use: not reported explicitly for young adults • Dual use with cigarette: not reported explicitly for young adults • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
King et al. (2013)	<ul style="list-style-type: none"> • Cross-sectional consumer panel • HealthStyles • 2010–2011 • Mail- and web-based survey of 10,739 U.S. adults, 18 years of age or older: <ul style="list-style-type: none"> – 2010 mail = 4,184 – 2010 web = 2,505 – 2011 web = 4,050 • Stratified random sampling (2010 mail-based survey) • Probability-based sampling (2010, 2011 web-based surveys) 	<ul style="list-style-type: none"> • Ever use: asked if ever tried electronic cigarettes or e-cigarettes, even just one time • Past-30-day use: n/a • Cigarette smoking: current smokers (those who had smoked ≥100 cigarettes in their lifetime and now smoke every day or some days) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 2.1% (2010 mail); 3.3% (2010 web); 6.2% (2011 web) • Past-30-day use: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Regan et al. (2013)	<ul style="list-style-type: none"> • Cross-sectional • ConsumerStyles • 2009–2010 • Consumer-based mail-in survey of 20,915 U.S. adults, 18 years of age or older: <ul style="list-style-type: none"> – 10,587 in 2009 – 10,328 in 2010 • Stratified sampling 	<ul style="list-style-type: none"> • Ever use: asked if they had ever tried electronic cigarettes or e-cigarettes, even just one time • Past-30-day use: asked if in the past 30 days they had used an electronic cigarette or e-cigarette at least once (asked only in 2010 survey) • Cigarette smoking: (1) current smokers (those who had smoked ≥100 cigarettes in their lifetime and currently smoke every day or some days); (2) former smokers (those who had smoked ≥100 cigarettes in their lifetime but currently do not smoke at all); (3) never smokers (those who had not smoked 100 cigarettes in their lifetime) • Dual use with cigarettes: not defined • Poly use with other tobacco products: defined as current use of multiple tobacco products • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 10.1% (CI, 3.1–17.0%) among 18–24- year-olds • Past-30-day use: not reported due to unreliable estimate • Dual use with cigarettes: not explicitly reported for young adults • Poly use with other tobacco products: not explicitly reported for young adults • Co-occurrence with other substances: n/a
Trumbo and Harper (2013)	<ul style="list-style-type: none"> • Cross-sectional • 2011 • Web-based survey of 244 first- and second-year college students who were taking a 100-level course titled “Mass Media in Society” • Recruitment by offer of extra credit to students in a 100-level course 	<ul style="list-style-type: none"> • Ever use: asked if they had ever used an e-cigarette • Past-30-day use: asked if they used e-cigarettes every day or some days • Cigarette smoking: not defined • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 13% • Past-30-day use: not reported • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
Vickerman et al. (2013)	<ul style="list-style-type: none"> • Cross-sectional • 2011–2012 • Telephone-based survey of 2,758 adults, 18 years of age or older, who were enrolled in a one-call or multiple-call smoking cessation program • Recruitment among states with evaluations with Alere Wellbeing, Inc. 	<ul style="list-style-type: none"> • Ever use: those who had ever used e-cigarettes, electronic, or vapor cigarettes (current or past use) • Past-30-day use: those who currently used e-cigarettes every day or some days • Cigarette smoking: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: not explicitly reported for young adults • Past-30-day use: not explicitly reported for young adults • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Bartoli et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • 590 alcohol-consuming students in Italy, 18–24 years of age • Smartphone-based survey 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: use of electronic cigarettes (e-cigarettes) in the last 30 days • Cigarette smoking: use of cigarettes in the last 30 days • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: not defined 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: binge drinkers: 6.7%; nonbinge drinkers: 2.5% • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: no point estimate available; OR of 2.49 (CI, 1.01–6.18) among current e-cigarette users for a recent episode of binge drinking compared with never e-cigarette users
Centers for Disease Control and Prevention (2014a)	<ul style="list-style-type: none"> • Cross-sectional • NATS • 2012–2013 • Landline and cellular phone surveys of 60,192 U.S. adults, 8 years of age or older • National random-digit-dial sampling 	<ul style="list-style-type: none"> • Ever use: usage threshold of ≥ 1 time • Past-30-day use: asked if used e-cigarettes “every day” or “some days” • Cigarette smoking: asked if used cigarettes “every day” or “some days” • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: not reported explicitly for young adults • Past-30-day use: 2.4% (CI, 1.8–3.0%) for adults 18–24 years of age • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
Choi and Forster (2014)	<ul style="list-style-type: none"> • Population-based • 2011–2012 • Prospective cohort study survey • 1,379 participants in the Minnesota Adolescent Community Cohort • Average age = 24.1 years • Cluster random sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever used an electronic cigarette • Past-30-day use: n/a • Cigarette smoking: (1) nonsmoker (never smoked ≥100 cigarettes in their lifetime and none in the past 30 days); (2) former smokers (smoked ≥100 cigarettes in their lifetime but none in the past 30 days); (3) current smokers (smoked ≥100 cigarettes in their lifetime and at least 1 day in the past 30 days) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 7.4% (among those who had never used e-cigarettes at baseline, n = 102) • Past-30-day use: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Czoli et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional survey • 2012 • 1,188 Canadian youth (16–19 years of age) and young adults (20–30 years of age) • Recruitment through an online panel of a commercial market research company 	<ul style="list-style-type: none"> • Ever use: defined as those who had tried an e-cigarette but had not smoked one in the last 30 days • Past-30-day use: defined as those who had tried an e-cigarette and had smoked one in the last 30 days • Cigarette smoking: (1) current smokers (those who had smoked 100 cigarettes in their lifetime and had smoked in the last 30 days); (2) former smokers (those who had smoked 100 cigarettes in their lifetime but had not smoked in the last 30 days); (3) nonsmokers (those who had smoked fewer than 100 cigarettes in their lifetime) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 16.1% • Past-30-day use: 5.7% • Dual use with cigarettes: 15.0% • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
Pokhrel et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • Web-based survey of 307 U.S. students from a 4-year university and two 2-year community colleges in Oahu, Hawaii • Recruitment by flyers across three college campuses 	<ul style="list-style-type: none"> • Ever use: asked if ever used an electronic cigarette • Past-30-day use: asked how many times they had used e-cigarettes in the past 30 days • Cigarette smoking: (1) current smokers (those who reported any use in the past 30 days and smoking 100 or more cigarettes in their lifetime); (2) former smokers/experimenters (those who reported lifetime use but not use in the past 30 days) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: not reported • Past-30-day use: not reported • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Schmidt et al. (2014)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • Telephone-based survey of 5,000 noninstitutionalized adults in Montana • Random-digit-dial sampling 	<ul style="list-style-type: none"> • Ever use: defined as those who had ever used an electronic cigarette, even just one time in their entire life • Past-30-day use: defined as those who had ever used an electronic cigarette and currently use electronic cigarettes every day or some days • Cigarette smoking: not defined • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 22.5% (CI, 16.4–28.6%) among 18–34 year-olds • Past-30-day use: not explicitly reported for young adults • Dual use with cigarettes: not explicitly reported for young adults • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Delnevo et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • National Health Interview Survey • 2014 • Computer-assisted personal interviewing • 36,697 adults 18 years of age or older • 12.6% were 18–24 years of age 	<ul style="list-style-type: none"> • Ever use: defined as those who had tried an e-cigarette, even one time • Current use: defined as using “every day” or “some days” • Cigarette smoking: (1) current daily; (2) current some days; (3) recent quitter (i.e., quit 1 year ago or less); (4) former smoker who quit 2 to 3 years ago; (5) former smoker who quit 4 or more years ago; (6) never smoker • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Among adults 18–24 years of age, 78.4% were never users, 16.5% were former smokers, 4.3% were some-day users, and 0.9% were daily users

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
Berg et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • Online-based survey of 2,002 U.S. students from two southeastern universities • Recruitment by random selection 	<ul style="list-style-type: none"> • Ever use: asked if ever tried, even just one time, electronic cigarettes or e-cigarettes, such as Ruyan or NJOY • Past-30-day use: number of days they had used e-cigarettes in the last 30 days • Cigarette smoking: (1) ever users (those who had tried cigarettes, even just one time); (2) current users (those who used in the last 30 days) • Dual use with cigarettes: concurrent use of e-cigarettes and cigarettes in the last 30 days • Poly use with other tobacco products: concurrent use of e-cigarettes with cigar products, hookah, or smokeless tobacco in the last 30 days • Co-occurrence with other substances: concurrent use of e-cigarettes with marijuana in the last 30 days 	<ul style="list-style-type: none"> • Ever use: 13.2% • Past-30-day use: 4.5% • Dual use with cigarettes: n/a • Poly use with other tobacco products: among current e-cigarette users (n = 88), 71.6% used cigarettes; 46.6% used cigar products; 54.5% used hookah; 17.0% used smokeless tobacco • Co-occurrence with other substances: among current e-cigarette users (n = 88), 53.4% used marijuana
Coleman et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • NATS • 2012–2013 • Landline and cellular phone surveys of 4,310 U.S. young adults, 18–29 years of age, who never established cigarette smoking behavior • National random-digit-dial sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever used an electronic cigarette, even just one time in entire life • Past-30-day use: not defined • Cigarette smoking: ever use defined as having tried cigarettes, even just one or two puffs • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 7.9% (CI, 6.9–8.9%) • Past-30-day use: among ever users (n = 328), 14.6% reported current use (CI, 9.8–19.3%) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Hummel et al. (2015)	<ul style="list-style-type: none"> • Cohort study survey • 2008, 2010, 2013, 2014 • 6,602 Dutch smokers, 15 years of age or older: <ul style="list-style-type: none"> – 1,520 in 2008 – 1,802 in 2010 – 1,530 in 2013 – 1,550 in 2014 • Recruitment through probability-based web database 	<ul style="list-style-type: none"> • Ever use: defined as those who reported using an e-cigarette less than monthly • Past-30-day use: defined as those who reported using an e-cigarette at least monthly • Cigarette smoking: smokers (those who had smoked at least 100 cigarettes in their lifetime and were currently smoking at least monthly) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: no point estimate available; OR of 1.52 (CI, 1.09–2.11) among 15- to 24-year-olds for ever trial of e-cigarettes compared with those 55+ years of age for 2014 • Past-30-day use: no point estimate available; OR of 0.48 (CI, 0.28–0.85) among 15- to 24-year-olds for current use of e-cigarettes compared with those 55+ years of age for 2014 • Dual use with cigarettes: not reported explicitly for young adults • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
King et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • HealthStyles • 2010–2013 • Consumer panel • Web-based survey of 14,758 U.S. adults, 18 years of age and older: <ul style="list-style-type: none"> – 2,505 in 2010 – 4,050 in 2011 – 4,170 in 2012 – 4,033 in 2013 • Probability-based sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever tried electronic cigarettes or e-cigarettes, even just one time • Past-30-day use: asked if used electronic cigarettes or e-cigarettes at least once in the past 30 days • Cigarette smoking: (1) current smokers (those who had smoked ≥ 100 cigarettes in their lifetime and now smoke every day or some days); (2) former smokers (those who had smoked ≥ 100 cigarettes in their lifetime and reported smoking “not at all” at the time of survey); (3) never smokers (those who had not smoked ≥ 100 cigarettes in their lifetime) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 2010, 7.0% (CI, 3.0–10.9%); 2011, 6.9% (CI, 3.2–10.6%); 2012, 4.1% (CI, 1.8–6.3%); 2013, 7.8% (CI, 4.2–11.4%) • Past-30-day use: not reported for 2010/2011 due to relative SE $\geq 40\%$; 2012/2013, 0.9% (CI, 0.2–1.7%) • Dual use with cigarettes: not reported explicitly for young adults • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Kong et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional focus groups • 2012–2013 • Middle and high school students (youth) in New Haven County, Connecticut: <ul style="list-style-type: none"> – Focus groups = 18 (n = 127) – Schoolwide survey = 4,780 • College students (young adults) in New Haven County, Connecticut: <ul style="list-style-type: none"> – Focus groups = 127 – Schoolwide survey = 625 • Recruitment by flyers and active recruitment sessions 	<ul style="list-style-type: none"> • Ever use: those who indicated they had ever tried e-cigarettes • Past-30-day use: n/a • Cigarette smoking: (1) never smokers (those who indicated never smoking); (2) cigarette smokers (those who indicated smoking occasionally or every day) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use in focus group: 33.9% • Past-30-day use: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Lee et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2012 • Phone-based survey of 3,507 U.S. civilian, noninstitutionalized adults, 18 years of age or older • Probability sample 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: defined as those who reported using electronic cigarettes every day, some days, or rarely • Cigarette smoking: current smokers (those who smoke every day or some days and have smoked at least 100 cigarettes) • Dual use with cigarettes: current use of cigarettes and electronic cigarettes • Poly use with other tobacco products: current use of cigarettes and two or more other tobacco products • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: not explicitly reported for young adults • Dual use with cigarettes: not explicitly reported for young adults • Poly use with other tobacco products: poly use with e-cigarettes not explicitly reported • Co-occurrence with other substances: n/a

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
Li et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2014 • Nationwide, in-home survey in New Zealand • Multistage, stratified, clustered, and random-probability sampling method (oversampling of Maori and Pacific peoples) • Participants 15 years of age or older, n = 2,594 • Youth: 15–17 years of age, 3.8% of sample • Young adults: 18–24 years of age, 13.4% of sample 	<ul style="list-style-type: none"> • Ever use: asked if ever used an e-cigarette • Current use: defined as at least once a day, at least once a week, at least once a month, less than once a month, and do not use one now • Cigarette smoking: n/a • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Among 15- to 17-year-olds, 20.7% had ever used an e-cigarette, and 0.0% were current users • Among 18- to 24-year-olds, 25.8% had ever used an e-cigarette, and 0.2% were current users
Majeed et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional consumer panel • HealthStyles • 2012 • Web-based survey of 4,043 U.S. adults, 18 years of age and older • Probability-based sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever tried electronic cigarettes or e-cigarettes, such as Ruyan or NJOY, even just one time • Past-30-day use: n/a • Cigarette smoking: (1) current smokers (those who had smoked 100 cigarettes or more in their lifetime and currently smoke every day or some days); (2) former smokers (those who had smoked 100 cigarettes or more in their lifetime but do not currently smoke); (3) never smokers (those who had not smoked 100 cigarettes or more in their lifetime) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: not explicitly reported for young adults • Past-30-day use: n/a • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
McMillen et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2010–2013 • Mixed-mode, mixed-frame survey of 12,683 U.S. adults: <ul style="list-style-type: none"> – 3,240 in 2010 – 3,097 in 2011 – 3,101 in 2012 – 3,245 in 2013 • Probability-based sampling 	<ul style="list-style-type: none"> • Ever use: asked if ever tried electronic cigarettes or e-cigarettes, even just one time • Past-30-day use: asked if used an electronic cigarette or e-cigarette every day or some days • Cigarette smoking: (1) current smokers (those who had smoked at least 100 cigarettes in their entire life and now smoke every day or some days); (2) former smokers (those who had smoked at least 100 cigarettes in their entire life but do not smoke now) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: Among 18–24 year olds: <ul style="list-style-type: none"> – 2010: 2.5% (CI, 0.6–4.4%) – 2011: 7.3% (CI, 4.5–10.1%) – 2012: 15.0% (CI, 9.9–20.1%) – 2013: 21.0% (CI, 16.6–25.4%) • Past-30-day use: <ul style="list-style-type: none"> – 2010: 0.0% (CI, 0.0–0.0%) – 2011: 0.0% (CI, 0.0–0.0%) – 2012: 3.4% (CI, 0.8–6.0%) – 2013: 14.2% (CI, 10.4–18.0%) • Dual use with cigarettes: not explicitly reported for young adults • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Pepper et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • Web-based survey of 6,607 U.S. adult smokers • Random-digit-dial sampling 	<ul style="list-style-type: none"> • Ever use: asked if they had ever used an e-cigarette, even one puff • Past-30-day use: defined as those who now use e-cigarettes some days or every day • Cigarette smoking: n/a • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: not reported exclusively • Past-30-day use: not reported exclusively • Dual use with cigarettes: not explicitly reported for young adults • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Pokhrel et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • Web-based survey of 307 U.S. students from a 4-year university and two 2-year community colleges in Oahu, Hawaii • Recruitment by flyers across three college campuses 	<ul style="list-style-type: none"> • Ever use: asked if ever used an electronic cigarette • Past-30-day use: asked how many times they had used e-cigarettes in the past 30 days • Cigarette smoking: (1) current smokers (those who reported any use in the past 30 days and 100 or more cigarettes in their lifetime); (2) former smokers/experimenters (those who reported lifetime use but did not report use in the past 30 days) • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 43% • Past-30-day use: 28% • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
Primack et al. (2015)	<ul style="list-style-type: none"> • Longitudinal cohort <ul style="list-style-type: none"> – Wave 2: 2012–2013 – Wave 3: 2013–2014 • 694 youth (16–17 years of age) and young adults (18–26 years of age) • Never smokers who were nonsusceptible to smoking at baseline • Random-digit dialing • National sample from Dartmouth Media, Advertising, and Health Study 	<ul style="list-style-type: none"> • Ever use: asked if ever used an e-cigarette • Past-30-day use: n/a • Cigarette smoking: defined as someone who had smoked at least one puff of a cigarette in her or his lifetime • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 2.3% use at baseline • Past-30-day use: not reported • Dual use with cigarettes: not explicitly reported • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Ramo et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • Web-based survey • Study 1: <ul style="list-style-type: none"> – 2009–2010 – 1,987 young adults, 18–25 years of age who had smoked at least one cigarette in the previous month • Study 2: <ul style="list-style-type: none"> – 2010–2011 – 570 young adults, 18–25 years of age who had smoked at least one cigarette in the previous month • Study 3: <ul style="list-style-type: none"> – 2013 – 79 young adults, 18–25 years of age who smoked 3 or more days each week and used Facebook 4 or more days per week • Recruitment used three Internet-based methods: <ul style="list-style-type: none"> – Advertisements on Craigslist.org – Paid advertising on a variety of websites through Adbrite – Purchase of completed surveys through Survey Sampling International 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: asked if they had used any tobacco products other than cigarettes in the past month • Cigarette smoking: not defined • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: <ul style="list-style-type: none"> – Study 1: 6.2% – Study 2: 18.8% – Study 3: 41.0% • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
Rutten et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2009–2010 • Web-based survey of 2,254 U.S. current smokers, 18 years of age or older • Probability-based sampling 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: asked if they now use e-cigarettes (e.g., blu, NJOY, V2, Red Dragon) • Cigarette smoking: current smokers (those who had smoked at least 100 cigarettes in their entire life and reported currently smoking some days or every day) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: not explicitly reported • Dual use with cigarettes: 19.6% (young adults, 18–29 years of age) • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Saddleson et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2013 • Web-based survey of 1,437 U.S. college students, 18–23 years of age, in selected classes at four universities in the state of New York • Recruitment by selected classes at four colleges in the state of New York 	<ul style="list-style-type: none"> • Ever use: defined as those who ever tried or experimented with an e-cigarette, even one or two puffs • Past-30-day use: defined as those who used e-cigarettes on one or more days in the previous 30 days • Cigarette smoking: (1) never smokers (those who reported never trying a tobacco cigarette); (2) former smokers (those who had smoked ≥ 100 cigarettes in their lifetime and had not smoked in the past 30 days); (3) experimenters (those who had ever tried a cigarette, had smoked < 100 cigarettes in their lifetime, and had not smoked in the past 30 days); (4) current smokers (those who had smoked on at least 1 day in the past 30 days) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 29.9% • Past-30-day use: 14.9% • Dual use with cigarettes: 6.4% • Poly use with other tobacco products: <ul style="list-style-type: none"> – Past-30-day other tobacco product use and current e-cigarette use: 32.7% (AOR = 3.11, CI, 2.13–4.54) • Co-occurrence with other substances: <ul style="list-style-type: none"> – Past 12-month marijuana use and ever e-cigarette use: 54.2% (AOR = 2.37, CI, 1.69–3.31) – Past 12-month marijuana use and current cigarette use: 27.5% (AOR = 1.47, CI, 0.99–2.17) – Past-30-day alcohol use and ever e-cigarette use: 23.9% (AOR = 0.98, CI, 0.58–1.68) – Past-30-day alcohol use and current e-cigarette use: 10.7% (AOR = 1.15, CI, 0.58–2.30) – Past-30-day binge drinking and ever e-cigarette use: 40.3% (AOR = 1.08, CI, 0.71–1.62) – Past-30-day binge drinking and current e-cigarette use: 21.6% (AOR = 1.71, CI, 1.01–2.90)

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
Sanders-Jackson et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2014 • Web-based survey of 1,247 U.S. young adults, 18–34 years of age • Address-based and random-digit-dial sampling 	<ul style="list-style-type: none"> • Ever use: defined as those who had ever used e-cigarettes but not within the past 30 days • Past-30-day use: defined as any use in the past 30 days • Cigarette smoking: (1) nonsmoker (<100 cigarettes in their lifetime); (2) former smoker (those who had smoked at least 100 cigarettes in their lifetime but none in the past 30 days); (3) current smoker (nondaily or daily based on the number of days smoked in the past 30 days) • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: 25.3% • Past-30-day use: 7.9% • Dual use with cigarettes: 63.3% • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Vardavas et al. (2015)	<ul style="list-style-type: none"> • Cross-sectional • 2012 • Phone-based survey of 26,566 youth and young adults, 15 years of age or older, from 27 countries in the European Union • Probability-based sampling 	<ul style="list-style-type: none"> • Ever use: defined as those who responded “regularly,” “occasionally,” or “tried it once or twice” when asked if they had ever tried electronic cigarettes • Past-30-day use: n/a • Cigarette smoking: not defined • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: no point estimate available. OR of 3.30 (CI, 2.50–4.55) for e-cigarette use among those 15–24 years of age for use of electronic cigarettes compared with those 55 years of age and older • Past-30-day use: n/a • Dual use with cigarettes: no point estimate available. OR of 3.70 (CI, 2.70–5.00) among current smokers 15–24 years of age for use of electronic cigarettes compared with current smokers 55 years of age and older • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a

Table A2.3-3 Continued

Study	Design/population	Measures	Outcomes/findings
Gmel et al. (2016)	<ul style="list-style-type: none"> • Longitudinal • Cohort Study on Substance Use Risk Factors (C-SURF) • Baseline data collect between 2010 and 2012; follow-up data collected between 2012 and 2013 • Sample drawn from Army recruitment centers, from 21 Swiss cantons • 5,128 Swiss men, 20 years of age 	<ul style="list-style-type: none"> • Ever use: n/a • Current use: use of e-cigarettes within past year • Cigarette smoking: use of cigarettes in past year • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Among baseline nonsmokers, e-cigarette users were more likely to start smoking at follow-up than non-e-cigarette users: <ul style="list-style-type: none"> – OR = 6.02 (95% CI: 2.81–12.88) for becoming occasional smokers – OR = 12.69 (95% CI: 4.00–40.28) for becoming daily smokers • Among baseline occasional smokers, e-cigarette users were less likely to quit smoking (OR = 0.43; 95% CI: 0.19–0.96) or become daily smokers (OR = 0.42 [95% CI: 0.15–1.18])
Soneji et al. (2016)	<ul style="list-style-type: none"> • Cross-sectional • 2012–2013 • Web-based survey of a national sample of 1,596 youth and young adults, 16–26 years of age, who participated in longitudinal study. • Random-digit-dial sampling 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: defined as use of an electronic cigarette in the past 30 days • Cigarette smoking: n/a • Dual use with cigarettes: not defined • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Ever use: n/a • Past-30-day use: 5% • Dual use with cigarettes: 13% • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a
Weaver et al. (2016)	<ul style="list-style-type: none"> • Cross-sectional • 2014 Tobacco Products and Risk Perceptions Survey • Probability sample drawn from GfK Knowledge Panel • 5,717 adults, 18 years of age or older 	<ul style="list-style-type: none"> • Ever use: asked if they had ever used an e-cigarette, even just once • Current use: those who had used the product at least once during the past 30 days • Cigarette smoking: had smoked at least 100 cigarettes in lifetime and used cigarettes “every day” or “some days” • Dual use with cigarettes: n/a • Poly use with other tobacco products: n/a • Co-occurrence with other substances: n/a 	<ul style="list-style-type: none"> • Among adults 18–24 years of age (12.6% of the sample), 19.9% had ever used e-cigarettes, and 5.2% were current users • 13.6% of adults 18–24 years of age were current cigarette users

Notes: AOR = adjusted odds ratio; CI = confidence interval; NATS = National Adult Tobacco Survey; OR = odds ratio.

References

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