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Adult interest in using a hypothetical modified risk tobacco product: findings from Wave 1 of the Population Assessment of Tobacco and Health Study (2013–2014)

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Abstract

Background and aims—The U.S. Family Smoking Prevention and Tobacco Control Act provides a pathway for manufacturers to market a modified risk tobacco product (MRTP). This study examines sociodemographic and tobacco use correlates of interest in a hypothetical MRTP in a nationally representative sample of U.S. adults.

Design—Cross sectional Wave 1 data from the 2013–2014 Population Assessment of Tobacco and Health (PATH) Study.

Setting—Household Audio-Computer Assisted Self-Interviews of U.S. adults conducted in 2013–2014.

Participants—32,320 civilian, non-institutionalized adults in the U.S.

Measurements—Interest in using a hypothetical MRTP ("If a tobacco product made a claim that it was less harmful to health than other tobacco products, how likely would you be to use that product?"), sociodemographics, tobacco use history, and mental health and substance use problems. All estimates were weighted.

Findings—Overall, 16.7% (95% CI: 16.28, 17.18) of U.S. adults reported interest in a hypothetical MRTP. Tobacco use was significantly associated with interest in a hypothetical MRTP, with interest most common among current established smokers (54.4%; 95% CI: 53.31,

55.39) and least common among never tobacco users (3.0%; 95% CI: 2.47, 3.52). Interest in a hypothetical MRTP was associated with experimental e-cigarette use among current experimental, current established, and former smokers. Among non-smokers, race, age, education, and substance use were associated with interest in using a hypothetical MRTP.

Conclusions—Among adults in the USA, interest in using a hypothetical modified risk tobacco product (MRTP) is low overall, and highest among current experimental and established smokers. A small percentage of non-smokers are interested in using a hypothetical MRTP.

INTRODUCTION

Consumers today are presented with an increasingly diverse array of products (e.g., Swedish snus, e-cigarettes, heat-not-burn), which may be a less harmful alternative to cigarettes, cigars, and hookah (1–10). The U.S. Family Smoking Prevention and Tobacco Control Act (FSPTCA) (11) provides a pathway for manufacturers to market a modified risk tobacco product (MRTP)—that is, any tobacco product that is sold or distributed for use to reduce harm or the risk of tobacco-related disease associated with commercially marketed tobacco products. In assessing MRTP applications, FDA is required to take into account, among other factors, the potential impact of an order on tobacco users and non-users."[a] An MRTP marketing order could be granted for any tobacco product that meets the standards described in Section 911 of the FSPTCA, and would apply only to the specific tobacco product that was reviewed, not the entire class of tobacco products. As of Spring 2017, FDA had not authorized any product to be marketed as an MRTP.

There is little available data on how U.S. adults might react to a tobacco product with an explicit harm reduction claim. Research on an earlier generation of potentially reduced harm tobacco products, including modified combustible products (e.g., Premier, Accord, and Eclipse) and dissolvable tobacco products (e.g., Ariva, Stonewall), suggests that, despite high reported interest among U.S. cigarette smokers (12), use of such products was low (12–15). Among current cigarette smokers, exposure to potentially reduced harm tobacco product advertising was associated with perceptions of lower health risk associated with the products (16–18), and reductions in cigarette smokers' readiness to quit smoking conventional cigarettes (19, 20). U.S. studies have found that lifetime use of potentially reduced harm tobacco products was more likely among females (21), current daily cigarette smokers (12), young adult recent quitters (20), younger cigarette smokers, and cigarette smokers with greater nicotine dependence or greater interest in quitting cigarette smoking (13, 22). These studies suggest that certain groups, specifically current smokers and young adults, might be most likely to try an MRTP if FDA were to issue such an order.

The public health impact of MRTPs depends not only on the extent to which these products reduce toxicity, but also on how they are used, and by whom. For instance, such products could benefit public health if they significantly displace the use of conventional combusted tobacco products (primarily cigarettes) that overwhelmingly cause the greatest proportion of preventable deaths and diseases from tobacco use behavior (23). However, an MRTP may

[a]Sections 911(g)(1)(A) and (B).

harm public health if their use undermines cessation of conventional tobacco products, promotes dual use, or attracts new users, leading to disproportionately more tobacco use among those who otherwise would never have used (24). The extent to which U.S. adult consumers—including both current tobacco users and non-users—might be interested in using an MRTP is unknown. To address this gap, this paper explores adult consumer interest in using a hypothetical MRTP and examines correlates of interest in a large, nationally representative sample of U.S. adults, including non-, former, and current cigarette smokers. This exploratory study aimed to: 1) estimate adult interest in using a hypothetical MRTP in the U.S. population overall, as well as by tobacco use status and age group; and 2) describe the association between interest in using a hypothetical MRTP, cigarette smoking status, and sociodemographic and tobacco use history characteristics.

METHODS

Study Design

Data is from Wave 1 of the Population Assessment of Tobacco and Health (PATH) Study, conducted from September 12, 2013 to December 15, 2014. The PATH Study is a nationally representative, longitudinal cohort study of 45,971 adults and youth in the US, ages 12 years and older.(25) The National Institutes of Health, through the National Institute on Drug Abuse, is partnering with the Food and Drug Administration's Center for Tobacco Products to conduct the PATH Study under a contract with Westat. The PATH Study used Audio-Computer Assisted Self-Interviews (ACASI) available in English and Spanish to collect information on tobacco-use patterns and associated health behaviors. This analysis draws from the 32,320 Adult Interviews (all participants ages 18 years and older). Recruitment employed address-based, area-probability sampling, using an in-person household screener to select youths and adults. Adult tobacco users, young adults ages 18 to 24, and African Americans were oversampled relative to population proportions. The weighted response rate for the household screener was 54.0%. Among households that were screened, the overall weighted response rate was 74.0% for the Adult Interview. Further details regarding the PATH Study design and methods are published by Hyland and colleagues (26) and in the User Guide to the PATH Study restricted use files, available at http://doi.org/10.3886/ICPSR36231. Westat's Institutional Review Board approved the study design and protocol and the Office of Management and Budget approved the data collection.

Measures

Interest in using a hypothetical MRTP—Interest in using a hypothetical MRTP was assessed on a 4-point scale: "If a tobacco product made a claim that it was less harmful to health than other tobacco products, how likely would you be to use that product?" Respondents were classified into two groups: interested in using a hypothetical MRTP ("very likely" and "somewhat likely,") or uninterested in a hypothetical MRTP ("somewhat unlikely" and "very unlikely") to simplify identification of populations that might be relatively more open to using a hypothetical MRTP.

Tobacco use—Tobacco use behavior, specifically cigarette smoking, was the major independent variable of interest. The FSPTCA emphasizes understanding the effect of an

MRTP claim on the entire population, including non-, former, and current tobacco users. Use of 10 tobacco products was assessed in the PATH Study adult dataset: cigarettes, e-cigarettes, traditional cigars, cigarillos, filtered cigars, hookah, pipe tobacco, smokeless tobacco, snus pouches, and dissolvable tobacco. Under U.S. FDA regulatory authority as defined by the FSPTCA, e-cigarettes are considered tobacco products, as they meet the regulatory definition of a tobacco product (a product made or derived from tobacco that is intended for human consumption, including any component, part, or accessory of a tobacco product) and do not carry therapeutic claims. Products carrying therapeutic claims are regulated by FDA as therapeutic devices. As this paper is meant to inform FDA CTP regulation of tobacco products, e-cigarettes were treated as tobacco products in these analyses.

Respondents were categorized into 5 mutually-exclusive use categories for each tobacco product included in these analyses: non-users, long-term former users, recent former users, current experimental users, or current established users. A threshold of 100 lifetime units was used to differentiate current established and former users from non- and experimental users (see Table 1 footnotes for details) for two reasons: 1) to separate individuals with an established product-specific tobacco use history and greater likelihood of dependence from newer initiates with less product-specific tobacco use history and lower likelihood of dependence; and 2) to separate individuals with no current use and no or low lifetime tobacco product-specific consumption from former users with higher lifetime use consumption who were likely previously dependent. The definition of “units” varied by tobacco product, with cigarette, traditional cigar, cigarillo, filtered cigar, and snus pouch units defined as the product itself; e-cigarette units defined as “disposable e-cigarettes or e-cigarette cartridges”; pipe tobacco units defined as “bowls filled with pipe tobacco”; and hookah and smokeless units defined as “times you have smoked [hookah]/used [smokeless].” Respondents who used multiple tobacco products could be simultaneous members of multiple user groups, depending on their product-specific use histories. For example, a respondent could be a non-cigarette smoker but a current experimental snus user; similarly, a respondent could be a recent former cigarette smoker but a current established e-cigarette user.

Other tobacco-related behaviors and cognitions—Within tobacco users (including e-cigarette users), those with greater nicotine dependence, those who have tried and failed to quit, or those who perceive their tobacco use as harmful may be more interested in using an MRTP. Current established and experimental tobacco users were asked about past 30-day frequency of their thoughts about the harm of their tobacco use; additionally, current established tobacco users were asked about their intention to quit tobacco for good, whether they had attempted to quit tobacco in the past year, and how soon they used the product upon waking as part of the short assessment for the Fagerstrom Test for Nicotine Dependence (FTND). (27, 28) All respondents were asked about their beliefs concerning the perceived harm of cigarettes.

Mental health and substance use problems—Tobacco use is prevalent in populations with co-morbid psychiatric and substance use (e.g., alcohol or other drug use) conditions

(29, 30); thus, it is important to understand how adults with these conditions might respond to a hypothetical MRTP. The PATH Study used items from the Global Appraisal of Individual Needs-Short Screener (GAIN-SS) (31) to assess internalizing problems (e.g., symptoms of anxiety and depression), externalizing problems (e.g., lying and violent behavior), and substance use problems (e.g., spending a lot of time obtaining drugs). The following severity threshold cut points were used, counting positive responses to any item in the past year as a "symptom" within the set of items screening for internalizing, externalizing, and substance use problems: 0–1 symptoms (low), 2–3 symptoms (moderate), and 4/4+ symptoms (high) [29].

Sociodemographics—Other sociodemographic measures included in analyses were age group, gender, race, ethnicity, educational attainment, sexual orientation, and perceived health.

Statistical Analyses

All analyses were exploratory. Survey weights were used to estimate prevalence ratios of interest in using a hypothetical MRTP and to examine associations between interest and demographics, the GAIN subscales, and tobacco use behaviors, history, and perceptions. The weighting procedures adjusted for oversampling and nonresponse; combined with the use of a probability sample, the weighted data allow the estimates to be representative of the non-institutionalized, civilian US population. Analyses for correlates of interest in using a hypothetical MRTP were stratified by cigarette smoking status (non-, former, current experimental, and current established smokers) because cigarette smoking is the most prevalent form of tobacco use in the U.S. Use of other tobacco products was included in the analyses to account for non-cigarette tobacco use among non-cigarette smokers and former cigarette smokers, and poly tobacco use among current experimental or established cigarette smokers. Current experimental and established snus and/or e-cigarette use was coded separately, as one might expect elevated interest in using a hypothetical MRTP among users of these products. Individuals missing the outcome variable or missing cigarette smoking data were excluded from analyses. Estimates were suppressed if unweighted cell sizes were <50 or the relative standard error was >30%.

Four modified Poisson regression models were developed to derive adjusted prevalence ratios for interest in a hypothetical MRTP.(32) Models were stratified by cigarette smoking status and controled for all demographic covariates and other covariates associated with interest at $p<0.05$ in bivariate analyses. Orthogonal polynomials were used to assess for linear and nonlinear trends in levels of interest in using a hypothetical MRTP by sociodemographic characteristics. Reference categories were chosen based on highest prevalence. Variable levels were collapsed when they were not statistically significantly different from each other (e.g., levels of intention to quit). Perceived health was excluded from the adjusted model because inclusion did not improve model fit comparing nested models using post-estimation Wald tests. Sexual orientation was excluded from the adjusted model because there was not an unadjusted statistically significant relationship in interest in a hypothetical MRTP by smoking status. All analyses were conducted in Stata/SE version 12.1.

RESULTS

Overall, 16.7% of adults expressed interest in using a hypothetical MRTP, with 5.7% of respondents reporting that they were “very likely” and 11.0% “somewhat likely” to try an MRTP were such a product available. In contrast, the majority of U.S. adults were not interested in using a hypothetical MRTP, with 8.3% “somewhat unlikely” and 75.0% “very unlikely” to try an MRTP (Supplemental Table 1). Age was inversely related to interest, with more interest among those ages 18–24, and less interest among adults over age 65. Looking more closely at this trend, it was evident that the frequency of “very likely” responses did not vary significantly by age; however, “somewhat likely” responses were more common among adults under the age of 34 ($p<0.05$).

Table 1 presents weighted sample characteristics, as well as the weighted proportion of U.S. adults reporting interest in a hypothetical MRTP by sociodemographic and tobacco use characteristics. Tobacco use history was significantly associated with interest in a hypothetical MRTP, with 3.0% of never users, 13.5% of former users, and nearly half of current tobacco users interested in trying a hypothetical MRTP. By cigarette smoking status, interest was most prevalent among current established cigarette smokers, followed by current experimental, recent former, and long term former cigarette smokers. Differences by race were also evident, with interest most prevalent among American Indians/Alaska Natives and least prevalent among Asian Americans. By education, interest was most common among adults with a GED, and limited among those with a Bachelor’s degree or higher. Interest in using a hypothetical MRTP was more frequent among adults who thought that cigarettes were “not at all,” “slightly,” or “somewhat harmful,” compared to those who thought that cigarettes were “very” or “extremely harmful.”

Table 2 presents correlates of interest in using a hypothetical MRTP by cigarette smoking status (non-, former [collapsing both recent and long term former smokers], current experimental, and current established cigarette smokers), controlling for all other variables in the table. Among the small proportion (5.4%) of non-cigarette smokers, interest in a hypothetical MRTP was associated with younger age, Asian American and Black/African American race, moderate and high substance use problems, and lower level of educational attainment. Interest was significantly lower among non-cigarette smokers who were not current users of other tobacco products. Ten percent of former cigarette smokers reported interest in using a hypothetical MRTP; interest was greater among former cigarette smokers who were experimental e-cigarette users and recent former smokers. Among established cigarette smokers, over half of whom reported interest in using a hypothetical MRTP, there were few strong sociodemographic associations of interest in using a hypothetical MRTP outside an inverse association with age. Similar to associations observed among former smokers, experimental e-cigarette use without or in combination with snus pouches was associated with interest in using a hypothetical MRTP among current established cigarette smokers. Additionally, current established cigarette smokers with immediate plans to quit were less likely to report interest in using a hypothetical MRTP. There was also a small but significant association between increasing numbers of symptoms of anxiety and depression and interest in a hypothetical MRTP.

DISCUSSION

The goal of this study was to examine population level interest in the concept of a hypothetical MRTP—namely, a tobacco product claiming to pose reduced harm—and whether certain demographic or behavioral characteristics might predict such interest. Findings indicate interest in a hypothetical MRTP is associated with tobacco use history, with interest lowest among never and former tobacco users, and highest among current tobacco users. The prevalence of actual MRTP use, once authorized by FDA, may vary from the prevalence of interest in a hypothetical MRTP reported here. Indeed, it should be noted that actual use of prior tobacco products claiming reduced harm (e.g., Premier, Accord, and Eclipse) and current products that are often perceived to be less harmful than cigarette smoking (e.g., e-cigarettes) have seen a much lower adoption rate than the roughly 50% of current established and experimental smokers claiming interest in a hypothetical MRTP in this study (12–15, 33).

Interest in using a hypothetical MRTP was associated with higher severity levels of internalizing problems (e.g., symptoms of anxiety and depression) in established cigarette smokers. Research has shown that cigarette smokers who have co-morbid anxiety or depression have less self-efficacy to quit or have had more difficulty quitting in the past (34–36); given their past difficulties quitting, these cigarette smokers may be open to switching to an MRTP. Importantly, interest in using a hypothetical MRTP was inversely associated with immediate plans to quit among current established cigarette smokers, suggesting that an MRTP order might not dissuade cigarette smokers with immediate plans to quit, or that an MRTP might not be a preferred cessation aid among cigarette smokers with immediate plans to quit given the availability of nicotine replacement therapies.

Any interest in using an MRTP among non-tobacco users may be a concern to public health because an MRTP is unlikely to be without health risks, and thus should be avoided by tobacco-naïve individuals and users who have successfully stopped using tobacco. In this sample, interest in a hypothetical MRTP among never tobacco users and non-smokers was between 3–5.4%. However, there were some subgroups of non-smokers that had higher prevalence of interest in a hypothetical MRTP than other groups, namely those under the age of 25, Asian Americans and African Americans, individuals with substance use problems, and those with lower educational attainment. This clustering of vulnerabilities among non-smokers with an increased interest in using a hypothetical MRTP may reflect exposure to environments where tobacco use is normative, tobacco advertising is prevalent, and tobacco products are widely available. Indeed, members of these groups are at high risk of transitioning to daily use of a conventional tobacco product (29, 30, 37). While potentially of concern, these estimates should be interpreted with considerable caution. It is possible that among non-smokers, interest in using a hypothetical MRTP reflects general elevated interest in tobacco use, rather than specific interest in a hypothetical MRTP.

Finally, for an MRTP to benefit public health, it must not attract former tobacco users who would have otherwise remained abstinent. In this analysis, smoking cessation in the past year was associated with higher interest in using a hypothetical MRTP. This interest is perhaps unsurprising, as only 3–5% of smokers who quit unassisted (the majority of smokers

in the U.S.) remain abstinent 6–12 months post-quit.(38) *There would be a public health benefit if the MRTP* attracts former tobacco users who might have otherwise relapsed to their higher harm tobacco product, though it is unlikely that actual product adoption would approach the levels of interest found in this research. However, elevated interest in using a hypothetical MRTP may be of concern if it translates to actual use of an MRTP among former smokers would not have otherwise relapsed. In all likelihood, elevated interest in using a hypothetical MRTP among recent former cigarette smokers represents a mix of both scenarios, and the ultimate public health impact of an MRTP order depends on the proportion of former cigarette smokers in each category. These findings suggest that surveillance of the effect of a future MRTP order on tobacco use behavior should include a focus on tobacco users who have quit in the past 12 months, as well as continued surveillance of long-term quitters.

Limitations

Interpretation of the current findings should be considered in light of a few limitations. Results are based on an item assessing interest in a hypothetical, undefined reduced harm tobacco product. It is unclear what type of product participants had in mind when submitting their response. For example, current tobacco users may have imagined a lower harm version of their preferred product, while non-users may have imagined a product that does not exist. Some participants may have thought of e-cigarettes, as research suggests that these products are often perceived as less harmful than cigarettes (39–41). Indeed, the positive association between current e-cigarette and/or snus pouch use, products that may be perceive as less harmful than cigarettes, and interest in a hypothetical MRTP may be an indication that current users of these products already thought they were using an MRTP, rather than signaling interest in a future MRTP. The item also asked about interest in an MRTP in relation to “other tobacco products,” which may have been interpreted differently depending on tobacco use history. Additionally, the phrasing of the item (e.g., “made a claim that it was less harmful”) may have cast doubt in respondents’ minds that the claim was true and thus may underestimate the degree of interest among a public that is often skeptical of the tobacco industry. Finally, the item did not clarify the magnitude of harm reduction offered by the hypothetical MRTP. It is likely that we would have obtained different estimates and correlates of interest if we had specified, for example, a 5% or 95% reduction in harm. Still, the generic nature of the item is useful in that it assessed participants’ interest in the *concept* of a reduced harm tobacco product, rather than any particular product. Actual interest in using an MRTP will likely differ from what is presented here, as interest will vary by product category and will be influenced by marketing, sociocultural, and individual factors.

A second limitation is uncertainty as to how participants’ responses will correspond to their actual future curiosity about, experimentation with, or consistent use of a future MRTP. While behavioral intention is a central concept from health behavior theory, it only weakly to moderately predicts future behavior (42). Social, physical, and policy environments also affect behavior and will shape the population-level response to a future MRTP order. While actual response to an MRTP order will be unobservable until such a designation is applied, the currently observed association between interest in using an MRTP and use of existing potentially reduced harm products (snus pouches and/or e-cigarettes) suggests that this item

will have some construct validity despite its hypothetical nature. Finally, our analyses were exploratory and the significance level was not adjusted for multiple comparisons. Findings should be interpreted as hypothesis generating for future research.

CONCLUSION

The data presented here suggest that interest in using a hypothetical MRTP is generally low, but most common among current cigarette smokers. Ultimately, questions of the effect of an MRTP designation on public health will be addressed product-by-product, based on both pre-market research and post-marketing surveillance. In the absence of an actual tobacco product with an MRTP order, these data provide insight into which demographic subgroups may demonstrate increased interest in a future modified risk tobacco products.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. Cervellati F, Muresan XM, Sticozzi C, Gambari R, Montagner G, Forman HJ, et al. Comparative effects between electronic and cigarette smoke in human keratinocytes and epithelial lung cells. Toxicol In Vitro. 2014; 28(5):999–1005. [PubMed: 24809892]
2. Coggins CR, Ballantyne M, Curvall M, Rutqvist LE. The in vitro toxicology of Swedish snus. Crit Rev Toxicol. 2012; 42(4):304–13. [PubMed: 22400986]
3. Farsalinos KE, Romagna G, Allifranchini E, Ripamonti E, Bocchietto E, Todeschi S, et al. Comparison of the cytotoxic potential of cigarette smoke and electronic cigarette vapour extract on cultured myocardial cells. Int J Environ Res Public Health. 2013; 10(10):5146–62. [PubMed: 24135821]
4. Gartner CE, Hall WD, Vos T, Bertram MY, Wallace AL, Lim SS. Assessment of Swedish snus for tobacco harm reduction: an epidemiological modelling study. Lancet. 2007; 369(9578):2010–4. [PubMed: 17498798]
5. Hansson J, Galanti MR, Hergens MP, Fredlund P, Ahlbom A, Alfredsson L, et al. Snus (Swedish smokeless tobacco) use and risk of stroke: pooled analyses of incidence and survival. J Intern Med. 2014; 276(1):87–95. [PubMed: 24548296]
6. Hansson J, Pedersen NL, Galanti MR, Andersson T, Ahlbom A, Hallqvist J, et al. Use of snus and risk for cardiovascular disease: results from the Swedish Twin Registry. J Intern Med. 2009; 265(6): 717–24. [PubMed: 19504754]
7. Hecht SS, Carmella SG, Kotandeniya D, Pillsbury ME, Chen M, Ransom BW, et al. Evaluation of toxicant and carcinogen metabolites in the urine of e-cigarette users versus cigarette smokers. Nicotine Tob Res. 2015; 17(6):704–9. [PubMed: 25335945]
8. Misra M, Leverette RD, Cooper BT, Bennett MB, Brown SE. Comparative in vitro toxicity profile of electronic and tobacco cigarettes, smokeless tobacco and nicotine replacement therapy products:

e-liquids, extracts and collected aerosols. Int J Environ Res Public Health. 2014; 11(11):11325–47. [PubMed: 25361047]

9. Nordenvall C, Nilsson PJ, Ye W, Andersson TM, Nyren O. Tobacco use and cancer survival: a cohort study of 40,230 Swedish male construction workers with incident cancer. Int J Cancer. 2013; 132(1):155–61. [PubMed: 22492255]
10. Yan XS, D'Ruiz C. Effects of using electronic cigarettes on nicotine delivery and cardiovascular function in comparison with regular cigarettes. Regul Toxicol Pharmacol. 2015; 71(1):24–34. [PubMed: 25460033]
11. H.R. 1256-111th Congress: Family Smoking Prevention and Tobacco Control Act 2012. 2009
12. Parascandola M, Hurd AL, Augustson E. Consumer awareness and attitudes related to new potential reduced-exposure tobacco products. Am J Health Behav. 2008; 32(4):431–7. [PubMed: 18092903]
13. Shaikh RA, Siahpush M, Singh GK. Socioeconomic, demographic and smoking-related correlates of the use of potentially reduced exposure to tobacco products in a national sample. Tob Control. 2014; 23(4):353–8. [PubMed: 23291431]
14. O'Connor RJ, Norton KJ, Bansal-Travers M, Mahoney MC, Cummings KM, Borland R. US smokers' reactions to a brief trial of oral nicotine products. Harm Reduct J. 2011; 8:1. [PubMed: 21219609]
15. Agaku IT, King BA, Husten CG, Bunnell R, Ambrose BK, Hu SS, et al. Tobacco product use among adults--United States, 2012–2013. MMWR Morb Mortal Wkly Rep. 2014; 63(25):542–7. [PubMed: 24964880]
16. Biener L, Bogen K, Connolly G. Impact of corrective health information on consumers' perceptions of "reduced exposure" tobacco products. Tob Control. 2007; 16(5):306–11. [PubMed: 17897988]
17. Cummings KM, Hyland A, Bansal MA, Giovino GA. What do Marlboro Lights smokers know about low-tar cigarettes? Nicotine Tob Res. 2004; 6(Suppl 3):S323–32. [PubMed: 15799595]
18. Shiffman S, Pillitteri JL, Burton SL, Rohay JM, Gitchell JG. Smokers' beliefs about "Light" and "Ultra Light" cigarettes. Tob Control. 2001; 10(Suppl 1):i17–23. [PubMed: 11740040]
19. Kozlowski L, Goldberg M, Yost B, White E, Sweeney C, Pillitteri J. Smokers' misperceptions of light and ultra-light cigarettes may keep them smoking. Am J Prev Med. 1998; 15:9–16. [PubMed: 9651633]
20. Shiffman S, Pillitteri JL, Burton SL, Di Marino ME. Smoker and ex-smoker reactions to cigarettes claiming reduced risk. Tob Control. 2004; 13(1):78–84. [PubMed: 14985602]
21. Parascandola M, Augustson E, O'Connell ME, Marcus S. Consumer awareness and attitudes related to new potential reduced-exposure tobacco product brands. Nicotine Tob Res. 2009; 11(7): 886–95. [PubMed: 19541949]
22. Parascandola M, Augustson E, Rose A. Characteristics of current and recent former smokers associated with the use of new potential reduced-exposure tobacco products. Nicotine Tob Res. 2009; 11(12):1431–8. [PubMed: 19915081]
23. U.S. Department of Health and Human Services. The Health Consequences of Smoking: 50 Years of Progress. A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.
24. Cobb CO, Villanti AC, Graham AL, Glasser AM, Rath JM, Stanton CA, et al. Markov modeling to estimate the population impact of emerging tobacco products: A proof-of-concept study. Tob Regul Sci. 2015; 1(2):129–41.
25. United States Department of Health and Human Services, National Institutes of Health, National Institute on Drug Abuse, and United States Department of Health and Human Services, Food and Drug Administration, Center for Tobacco Products. Population Assessment of Tobacco and Health (PATH) Study [United States] Restricted-Use Files. ICPSR36231. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor]; 2016-05-24. http://doi.org/10.3886/ICPSR36231
26. Hyland A, Ambrose BK, Conway KP, Borek N, Lambert E, Carusi C, et al. Design and methods of the Population Assessment of Tobacco and Health (PATH) Study. Tob Control. 2016

27. Haberstick BC, Timberlake D, Ehringer MA, Lessem JM, Hopfer CJ, Smolen A, et al. Genes, time to first cigarette and nicotine dependence in a general population sample of young adults. Addiction. 2007; 102(4):655–65. [PubMed: 17309537]
28. Heatherton TF, Kozlowski LT, Frecker RC, Rickert W, Robinson J. Measuring the heaviness of smoking: using self-reported time to the first cigarette of the day and number of cigarettes smoked per day. Br J Addict. 1989; 84(7):791–9. [PubMed: 2758152]
29. Degenhardt L, Hall W. The relationship between tobacco use, substance-use disorders and mental health: results from the National Survey of Mental Health and Well-being. Nicotine Tob Res. 2001; 3(3):225–34. [PubMed: 11506766]
30. Kalman D, Morissette SB, George TP. Co-morbidity of smoking in patients with psychiatric and substance use disorders. Am J Addict. 2005; 14(2):106–23. [PubMed: 16019961]
31. Dennis ML, Chan YF, Funk RR. Development and validation of the GAIN Short Screener (GSS) for internalizing, externalizing and substance use disorders and crime/violence problems among adolescents and adults. Am J Addict. 2006; 15(Suppl 1):80–91. [PubMed: 17182423]
32. Zou G. A modified poisson regression approach to prospective studies with binary data. Am J Epidemiol. 2004; 159(7):702–6. [PubMed: 15033648]
33. Delnevo CD, Giovenco DP, Steinberg MB, Villanti AC, Pearson JL, Niaura RS, et al. Patterns of electronic cigarette use among adults in the United States. Nicotine & Tobacco Research. 2015 In Press.
34. Berlin I, Covey LS. Pre-cessation depressive mood predicts failure to quit smoking: the role of coping and personality traits. Addiction. 2006; 101(12):1814–21. [PubMed: 17156181]
35. Haukkala A, Uutela A, Vartiainen E, McAlister A, Knekt P. Depression and smoking cessation: the role of motivation and self-efficacy. Addict Behav. 2000; 25(2):311–6. [PubMed: 10795958]
36. McClave AK, Dube SR, Strine TW, Kroenke K, Caraballo RS, Mokdad AH. Associatiod anxiety and depression among U.S. adults. Addict Behav. 2009; 34(6–7):491–7. [PubMed: 19217720]
37. Agaku IT, King BA, Dube SR. Centers for Disease C, Prevention. Current cigarette smoking among adults - United States, 2005–2012. MMWR Morb Mortal Wkly Rep. 2014; 63(2):29–34. [PubMed: 24430098]
38. Piasecki T. Relapse to smoking. Clin Psychol Rev. 2006; 26(2):196–215. [PubMed: 16352382]
39. Adkison SE, O'Connor RJ, Bansal-Travers M, Hyland A, Borland R, Yong HH, et al. Electronic nicotine delivery systems: international tobacco control four-country survey. Am J Prev Med. 2013; 44(3):207–15. [PubMed: 23415116]
40. Berg CJ, Stratton E, Schauer GL, Lewis M, Wang Y, Windle M, et al. Perceived harm, addictiveness, and social acceptability of tobacco products and marijuana among young adults: marijuana, hookah, and electronic cigarettes win. Subst Use Misuse. 2015; 50(1):79–89. [PubMed: 25268294]
41. Pepper JK, Emery SL, Ribisl KM, Rini CM, Brewer NT. How risky is it to use e-cigarettes? Smokers' beliefs about their health risks from using novel and traditional tobacco products. J Behav Med. 2015; 38(2):318–26. [PubMed: 25348584]
42. Webb TL, Sheeran P. Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. Psychol Bull. 2006; 132(2):249–68. [PubMed: 16536643]

Table 1

Weighted sample characteristics and the proportion of U.S. adults interested in a modified risk tobacco product (MRTP) by sociodemographic characteristics and tobacco product use; 2013–2014 Population Assessment of Tobacco and Health (PATH) Study (N=32,140).

		Total		Interested in an MRTP[a]	
	Variable	**%**	**95% CI**	**%**	**95% CI**
Overall				16.7	(16.28, 17.18)
Gender	Male	48.1	(47.99, 48.14)	18.6	(17.99, 19.18)
	Female	51.9	(51.86, 52.01)	15.0	(14.37, 15.66)
Age	18–24	13.0	(12.98, 13.03)	20.7	(19.64, 21.76)
	25–29	8.7	(8.27, 9.08)	19.5	(18.07, 20.96)
	30–34	9.0	(8.69, 9.41)	19.7	(18.25, 21.22)
	35–44	16.6	(16.10, 17.04)	17.7	(16.69, 18.76)
	45–64	34.6	(34.49, 34.63)	17.5	(16.66, 18.40)
	65+	18.2	(18.07, 18.24)	8.7	(7.91, 9.65)
Race	White	78.2	(77.86, 78.43)	16.0	(15.46, 16.54)
	Black/African American	12.3	(12.18, 12.47)	21.2	(20.01, 22.37)
	American Indian/Alaska Native	1.0	(0.81, 1.16)	24.6	(19.91, 29.93)
	Asian American	5.2	(5.10, 5.31)	12.5	(10.65, 14.62)
	Native Hawaiian / Pacific Islander	0.8	(0.70, 0.98)	22.0	(16.97, 27.94)
	2+ Races	2.5	(2.35, 2.71)	21.7	(19.31, 24.18)
Ethnicity	Non-Hispanic	85.1	(85.04, 85.17)	17.0	(16.50, 17.47)
	Hispanic[b]	14.9	(14.83, 14.96)	15.3	(14.02, 16.57)
Education	< HS	11.5	(11.19, 11.77)	24.1	(22.68, 25.60)
	GED	5.1	(4.85, 5.42)	29.8	(27.26, 32.54)
	HS diploma	24.3	(24.19, 24.46)	19.6	(18.40, 20.75)
	Some college/associate degree	31.1	(30.92, 31.28)	17.3	(16.50, 18.09)
	Bachelor’s degree or greater	28.0	(27.79, 28.14)	8.2	(7.60, 8.80)
Sexual Orientation	Straight	95.1	(94.78, 95.43)	16.4	(15.94, 16.85)

		Total		Interested in an MRTP[a]	
	Variable	**%**	**95% CI**	**%**	**95% CI**
	Bisexual	2.1	(1.92, 2.29)	26.0	(22.47, 29.79)
	Gay/Lesbian	1.5	(1.30, 1.70)	25.0	(20.89, 29.54)
	“Something else”	1.3	(1.14, 1.49)	19.5	(15.54, 24.28)
Perceived health	Poor	2.1	(1.92, 2.37)	31.8	(28.12, 35.71)
	Fair	10.8	(10.31, 11.29)	25.9	(24.55, 27.34)
	Good	32.8	(32.13, 33.50)	20.0	(19.16, 20.80)
	Very good	36.7	(35.94, 37.46)	13.0	(12.40, 13.64)
	Excellent	17.6	(16.80, 18.36)	11.0	(10.16, 11.84)
GAIN internalizing scale	Low	67.7	(66.86, 68.47)	14.0	(13.47, 14.55)
	Moderate	20.7	(20.04, 21.34)	19.3	(18.38, 20.28)
	High	11.7	(11.12, 12.20)	28.4	(26.94, 29.91)
GAIN externalizing scale	Low	68.8	(68.08, 69.45)	14.9	(14.38, 15.42)
	Moderate	21.9	(21.30, 22.51)	18.7	(17.70, 19.75)
	High	9.3	(8.88, 9.81)	25.6	(23.91, 27.40)
GAIN substance use scale[c]	Low	85.1	(84.52, 85.70)	14.4	(13.93, 14.88)
	Moderate	11.4	(10.85, 11.88)	27.1	(25.62, 28.65)
	High	3.5	(3.30, 3.77)	38.4	(35.52, 41.33)
Perceived harm of cigarettes	Not at all harmful	0.7	(0.55, 0.77)	45.0	(35.39, 55.09)
	Slightly/somewhat harmful	8.4	(8.09, 8.80)	44.0	(41.98, 46.01)
	Very/extremely harmful	90.9	(90.53, 91.27)	14.0	(13.56, 14.39)
Ever tobacco user[d]	Never tobacco user	27.8	(26.69, 28.97)	3.0	(2.49, 3.55)
	Ever tobacco user[e]	72.2	(71.03, 73.31)	22.0	(21.50, 22.55)
Former tobacco user[f]	No	76.8	(75.93, 77.64)	17.5	(16.89, 18.06)
	Yes	23.2	(22.36, 24.07)	13.5	(12.57, 14.53)
Former cigarette smoker	Long-term former cigarette smoker[g]	91.7	(90.76, 92.46)	8.6	(7.58, 9.64)

		Total		Interested in an MRTP[a]	
	Variable	**%**	**95% CI**	**%**	**95% CI**
	Recent former cigarette smoker[h]	8.4	(7.54, 9.24)	25.8	(22.05, 29.86)
Any current (established or experimental) tobacco use[i]					
	No	71.7	(70.99, 72.33)	4.2	(3.84, 4.63)
	Yes	28.3	(27.67, 29.01)	48.4	(47.52, 49.30)
Established tobacco use[j]					
	Any established tobacco use	21.5	(20.89, 22.08)	52.4	(51.46, 53.40)
	Established cigarette user	18.2	(17.67, 18.73)	54.4	(53.31, 55.39)
	Established cigar user	1.2	(1.08, 1.26)	39.1	(35.33, 42.97)
	Established filtered cigar user	0.7	(0.61, 0.77)	54.9	(49.74, 59.94)
	Established e-cigarette user	0.3	(0.24, 0.36)	55.0	(46.37, 63.30)
	Established pipe user	0.3	(0.29, 0.38)	44.4	(37.14, 51.85)
	Established hookah user	0.4	(0.38, 0.51)	53.9	(48.17, 59.47)
	Established snus user	0.3	(0.29, 0.41)	47.4	(40.01, 54.97)
	Established smokeless user	2.4	(2.22, 2.59)	47.9	(44.96, 50.90)
	Established dissolvable tobacco user	-	-	-	-
Experimental tobacco use[k]	Any experimental tobacco use	14.3	(13.90, 14.70)	46.0	(44.95, 47.08)
	Experimental cigarette user	3.2	(3.01, 3.34)	51.3	(48.86, 53.64)
	Experimental cigar user	3.3	(3.09, 3.44)	36.3	(33.97, 38.61)
	Experimental cigarillo user	2.9	(2.78, 3.10)	47.1	(44.64, 49.53)
	Experimental filtered cigar user	1.3	(1.15, 1.38)	52.3	(48.34, 56.13)
	Experimental e-cigarette user	5.2	(4.94, 5.40)	56.2	(54.47, 58.00)
	Experimental pipe user	0.8	(0.68, 0.87)	43.1	(38.27, 47.98)
	Experimental hookah user	3.6	(3.38, 3.82)	40.3	(38.25, 42.33)
	Experimental snus user	0.4	(0.36, 0.47)	53.1	(46.70, 59.30)
	Experimental smokeless user	0.7	(0.60, 0.76)	52.9	(47.68, 58.11)
	Experimental dissolvable tobacco user	0.1	(0.07, 0.11)	-	-

- Suppressed due to n<50 or relative standard error > 30%

[a] Participants who responded that they were "very likely" and "somewhat likely" to using a tobacco product claiming reduced harm.

[b] Defined as Hispanic, Latino/Latina, or of Spanish Origin

[c] Never users of all the following substances: alcohol, marijuana, painkillers, Ritalin, cocaine, stimulants, and “other drugs like heroin or ecstasy” are classified as “Low”.

[d] Tobacco use includes use of cigarettes, cigars, e-cigarettes, filtered cigars, cigarillos, pipe tobacco, hookah, snus, smokeless tobacco, and dissolvable tobacco.

[e] Ever tobacco use was defined as having used at least one tobacco product in their lifetime, even 1 or 2 puffs/times.

[f] Former tobacco use was defined as having consumed 100 lifetime units of any product and currently using the product “not at all”.

[g] Long-term former users had consumed 100 lifetime units of a certain tobacco product, but did not currently use the product some days or every day and quit more than 12 months ago.

[h] Recent former users were similar to long-term former users, but quit using the product within the past 12 months.

[i] Current experimental or established tobacco use was defined as reporting current some day or everyday use, regardless of lifetime unites consumed.

[j] Current established use was defined as having consumed 100 lifetime units of a certain product and currently using the product some days or every day.

[k] Current experimental use was defined as not having consumed 100 lifetime units of a certain product, but reporting current some day or everyday use.

95% CI = 95% confidence interval

HS = high school

GED = General Education Development

GAIN = Global Appraisal of Individual Needs

Missingness: MRTP (0.6%), age (0.1%), race (0.2%), education (0.6%), sexual orientation (3.1%), health status (0.2%), internalizing scale (1.4%), externalizing scale (2.6%), substance use scale (2.6%), ever tobacco use (0.2%), former tobacco use (1.2%), long-term/recent former cigarette use (0.6%), perception of harmfulness (0.2%), current (established or experimental) tobacco use (0.9%), established tobacco use (1.1%), experimental tobacco use (1.2%), cigarette use (0.5%), cigar use (0.1%), cigarillo use (0.2%), filtered cigar use (0.2%), e-cigarette use (0.3%), pipe use (0.3%), hookah use (0.1%), snus use (0.0%), smokeless use (0.1%), and dissolvable use (0.0%). Individuals with missing data or “don’t know” responses on any item used in a variable were excluded from analyses.

Table 2

Weighted proportion and adjusted prevalence ratios for interest in using a modified risk tobacco product (MRTP) among US adult non-, former, current experimental, and current established cigarette smokers by sociodemographic characteristics and tobacco product use; 2013–2014 Population Assessment of Tobacco and Health (PATH) Study.

		Non-cigarette smokers (59% of sample; 5.3% reported interest[a])		Former cigarette smokers (20% of sample; 10.0% reported interest[a])		Experimental cigarette smokers (3% of sample; 55.5% reported interest[a])		Established cigarette smokers (18% of sample; 56.5% reported interest[a])	
		aPR	**95% CI**	**aPR**	**95% CI**	**aPR**	**95% CI**	**aPR**	**95% CI**
Age									
	18–24	**1.30**	**(1.02, 1.65)**	1.09	(0.78, 1.52)	1.03	(0.61, 1.73)	**0.85**	**(0.79, 0.91)**
	25–29	0.94	(0.74, 1.19)	1.10	(0.82, 1.47)	0.60	(0.20, 1.84)	**0.85**	**(0.78, 0.93)**
	30–34	1.07	(0.76, 1.51)	1.26	(0.90, 1.76)	0.70	(0.28, 1.78)	**0.93**	**(0.88, 0.99)**
	35–44	1.14	(0.86, 1.50)	1.09	(0.84, 1.42)	1.49	(0.88, 2.53)	**0.90**	**(0.84, 0.96)**
	45–64	REF		REF		REF		REF	
	65+	0.83	(0.57, 1.21)	**0.55**	**(0.39, 0.78)**	1.32	(0.42, 4.13)	1.05	(0.95, 1.17)
Gender									
	Male	REF		REF		REF		REF	
	Female	0.93	(0.78, 1.12)	1.11	(0.90, 1.38)	1.09	(0.79, 1.50)	**1.15**	**(1.10, 1.22)**
Race									
	White	REF		REF		REF		REF	
	Black/African American	**1.33**	**(1.09, 1.61)**	1.08	(0.71, 1.62)	1.02	(0.76, 1.38)	0.98	(0.91, 1.06)
	American Indian/Alaska Native	1.42	(0.82, 2.47)	1.90	(0.78, 4.63)	0.92	(0.27, 3.17)	0.88	(0.69, 1.12)
	Asian American	**1.76**	**(1.17, 2.65)**	**2.00**	**(1.01, 3.98)**	0.47	(0.03, 7.61)	1.13	(0.94, 1.36)
	Native Hawaiian / Pacific Islander	1.44	(0.80, 2.59)	1.22	(0.35, 4.23)	1.02	(0.23, 4.47)	1.11	(0.85, 1.44)
	2+ Races	0.95	(0.66, 1.37)	1.51	(0.98, 2.31)	1.21	(0.53, 2.76)	0.93	(0.81, 1.06)
Ethnicity									
	Non-Hispanic	REF		REF		REF		REF	
	Hispanic	**1.28**	**(1.04, 1.59)**	0.96	(0.65, 1.42)	0.84	(0.53, 1.33)	0.96	(0.88, 1.05)

		Non-cigarette smokers (59% of sample; 5.3% reported interest[a])		Former cigarette smokers (20% of sample; 10.0% reported interest[a])		Experimental cigarette smokers (3% of sample; 55.5% reported interest[a])		Established cigarette smokers (18% of sample; 56.5% reported interest[a])	
		aPR	**95% CI**	**aPR**	**95% CI**	**aPR**	**95% CI**	**aPR**	**95% CI**
Education									
	< HS	**1.50**	**(1.16, 1.94)**	**1.74**	**(1.26, 2.41)**	0.91	(0.59, 1.40)	1.01	(0.94, 1.09)
	GED	**1.96**	**(1.28, 3.02)**	0.93	(0.66, 1.29)	0.94	(0.51, 1.77)	**1.09**	**(1.01, 1.17)**
	HS diploma	1.14	(0.94, 1.38)	**1.47**	**(1.15, 1.88)**	0.92	(0.64, 1.33)	1.06	(1.00, 1.12)
	Some college	REF		REF		REF		REF	
	College degree or greater	0.83	(0.66, 1.06)	0.82	(0.63, 1.05)	1.13	(0.25, 5.15)	0.98	(0.91, 1.06)
GAIN internalizing scale									
	Low	REF		REF		REF		REF	
	Moderate	0.96	(0.78, 1.17)	1.11	(0.88, 1.41)	0.87	(0.57, 1.34)	**1.08**	**(1.02, 1.14)**
	High	1.00	(0.78, 1.27)	1.30	(0.94, 1.78)	1.22	(0.68, 2.19)	**1.09**	**(1.02, 1.17)**
GAIN externalizing scale									
	Low	REF		REF		REF		REF	
	Moderate	1.17	(0.98, 1.39)	1.02	(0.85, 1.23)	0.88	(0.59, 1.31)	1.06	(1.00, 1.12)
	High	1.06	(0.86, 1.32)	0.78	(0.55, 1.12)	0.77	(0.42, 1.42)	1.03	(0.96, 1.11)
GAIN substance use scale[b]									
	Low	REF		REF		REF		REF	
	Moderate	**1.47**	**(1.22, 1.76)**	**1.41**	**(1.11, 1.79)**	0.99	(0.72, 1.36)	1.03	(0.96, 1.10)
	High	**1.39**	**(1.03, 1.89)**	1.24	(0.89, 1.71)	0.97	(0.56, 1.69)	1.02	(0.93, 1.12)
Perceived harm of cigarettes									
	Not at all harmful	REF		REF		REF		REF	
	Slightly/somewhat harmful	0.39	(0.21, 0.70)	1.07	(0.56, 2.03)	0.53	(0.23, 1.25)	1.17	(0.70, 1.98)
	Very/extremely	0.23	(0.13, 0.41)	0.56	(0.30, 1.02)	0.53	(0.24, 1.16)	1.09	(0.64, 1.84)
Current experimental tobacco use[c]									
	No experimental tobacco use	**0.30**	**(0.26, 0.35)**	**0.59**	**(0.46, 0.75)**	-	-	0.98	(0.91, 1.07)

		Non-cigarette smokers (59% of sample; 5.3% reported interest[a])		Former cigarette smokers (20% of sample; 10.0% reported interest[a])		Experimental cigarette smokers (3% of sample; 55.5% reported interest[a])		Established cigarette smokers (18% of sample; 56.5% reported interest[a])	
		aPR	**95% CI**	**aPR**	**95% CI**	**aPR**	**95% CI**	**aPR**	**95% CI**
	Experimental tobacco use (no snus/e-cig) *	REF		REF		REF		REF	
	Experimental snus use	0.70	(0.44, 1.12)	1.03	(0.39, 2.72)	1.59	(0.87, 2.89)	0.96	(0.72, 1.28)
	Experimental e-cig use	1.12	(0.90, 1.40)	**1.70**	**(1.33, 2.18)**	0.78	(0.56, 1.10)	**1.13**	**(1.03, 1.24)**
	Experimental snus and e-cig use	1.18	(0.90, 1.55)	-	-	2.35	(1.00, 5.52)	**1.46**	**(1.17, 1.83)**
Current established tobacco use[d]									
	No established tobacco use	**0.16**	**(0.14, 0.20)**	**0.29**	**(0.24, 0.36)**	1.06	(0.73, 1.53)	-	-
	Established tobacco use (no snus/e-cig) *	REF		REF		REF		REF	
	Established snus use	0.81	(0.51, 1.31)	1.12	(0.76, 1.65)	0.59	(0.10, 3.39)	0.98	(0.72, 1.32)
	Established e-cig use	2.09	(0.60, 7.28)	1.09	(0.70, 1.69)	0.53	(0.09, 3.15)	1.24	(1.00, 1.53)
	Established snus and e-cig use	-	-	**2.53**	**(1.24, 5.20)**	-	-	-	-
Quit in past 12 months									
	No			REF					
	Yes			**1.52**	**(1.20, 1.92)**				
Intention to quit									
	More than 7 days					REF		REF	
	Next 7 days					0.73	(0.41, 1.27)	**0.77**	**(0.69, 0.86)**
Thoughts about tobacco harm									
	Never/rarely					REF		REF	
	Sometimes					1.25	(0.83, 1.87)	1.04	(0.96, 1.12)
	Often/very often					1.00	(0.63, 1.58)	0.98	(0.90, 1.06)
Tobacco use within 5 min of waking									
	No					REF		REF	
	Yes					1.85	(0.97, 3.52)	1.03	(0.94, 1.14)

	Non-cigarette smokers (59% of sample; 5.3% reported interest[a])		Former cigarette smokers (20% of sample; 10.0% reported interest[a])		Experimental cigarette smokers (3% of sample; 55.5% reported interest[a])		Established cigarette smokers (18% of sample; 56.5% reported interest[a])	
	aPR	**95% CI**	**aPR**	**95% CI**	**aPR**	**95% CI**	**aPR**	**95% CI**
Quit attempt in the past year								
No					REF		REF	
Yes					0.90	(0.67, 1.21)	0.95	(0.90, 1.01)

[a]Reported interest among individuals in the analytic sample for each cigarette smoking status. Individuals with missing data or "don't know" responses on any item used in a variable were excluded from analyses.

[b]Never users of all of the following substances: alcohol, marijuana, painkillers, Ritalin, cocaine, stimulants, and "other drugs like heroin or ecstasy" are classified as "Low."

[c]Current experimental use was defined as not having consumed 100 lifetime units of a certain product, but reporting current some day or everyday use.

[d]Current established use was defined as having consumed 100 lifetime units of a certain product and currently using the product some days or every day.

aPR = adjusted prevalence ratio

95% CI = 95% confidence interval

HS = high school

GED = General Education Development

GAIN = Global Appraisal of Individual Needs

REF = Reference category

--no study participants

Tobacco use includes use of cigarettes, cigars, e-cigarettes, filtered cigars, cigarillos, pipe tobacco, hookah, snus, smokeless tobacco, and dissolvable tobacco unless otherwise specified.

*Excludes cigarette use for non-smokers and former smoker groups