
Commentary

Understanding Tobacco Use Behaviors Among African Americans: Progress, Critical Gaps, and Opportunities

Gary A. Giovino PhD¹, Phillip S. Gardiner DrPH²

¹Department of Community Health and Health Behavior, School of Public Health and Health Professions, University at Buffalo, SUNY, Buffalo, NY; ²Tobacco-Related Disease Research Program, University of California, Office of the President, Oakland, CA

Corresponding Author: Gary A. Giovino, PhD, Department of Community Health and Health Behavior, 310 Kimball Tower, University at Buffalo, Buffalo, NY 14214-8028, USA. Telephone: 716-829-6952; Fax: 716-829-6040; E-mail: ggiovino@buffalo.edu

Abstract

Introduction: Although multiple factors likely influence the differences between African Americans (AAs) and whites in cardiovascular disease and lung cancer mortality rates, historical patterns of tobacco use, particularly cigarette smoking, are the major contributors. This issue of *Nicotine & Tobacco Research* presents original research, a review, and commentaries that will serve to advance our understanding of several relevant behavioral similarities and differences between AAs and whites.

Behavioral Analysis: Here, we illustrate how the diverging trends in cigarette smoking between AA and white high school seniors observed since the mid-1970s were influenced by patterns of ever use and current use among ever users. During 1977 to 2014, the percentage of current users among ever users was higher, but less variable, among whites than AAs. Among adults, trends in self-reported cigarette smoking among non-Hispanic AAs and non-Hispanic whites are available since 1978. The trends observed were likely due in part to the maturation of the high school senior cohorts from the 1970s and 1980s when AA smoking rates declined sharply relative to whites. Later age of initiation among AAs and less quitting among older AAs, relative to whites, also contribute.

Conclusions: Further research on multiple topics, including the continuation of use among ever users, use of multiple combusted and noncombusted products, provision of cessation support services, influence of discrimination, and validity of self-report would expand the science base. Strategies to reduce the marketing and availability of menthol and other characterizing flavorings and to enrich environments would promote the public's health.

Introduction

Understanding patterns of tobacco use behaviors can facilitate the development of interventions to prevent disease and promote health. Tobacco use remains the single leading preventable cause of death in the United States, with cigarette smoking and exposure to secondhand smoke causing approximately 480 000 deaths each year.¹ A substantial proportion of those deaths are among African Americans (AAs).² Mortality rates for coronary heart disease and cerebrovascular disease are higher among AAs than among whites.³ The 2013 mortality rate for malignant neoplasms of the

trachea, bronchus, and lung was 22% higher among AA males than among white males and 8% higher among white females than among AA females.³ Racial differences in tobacco use, obesity, hypertension, diabetes, and survival contribute to racial differences in cardiovascular mortality.^{4,5} Historical patterns of tobacco use and exposure to tobacco carcinogens^{6,7} primarily explain the different rates of lung cancer, although differential exposure to environmental and workplace toxins,^{8,9} differential accumulation of carcinogens in melanin-containing tissues,¹⁰ racial differences in the rate of detoxifying carcinogens,¹¹ a higher rate of menthol cigarette use,¹² and greater tobacco smoke intake per cigarette^{13,14}

might also contribute to the different rates of lung cancer mortality in AA and white adults.

This special issue of *Nicotine & Tobacco Research* has been commissioned by the Office on Smoking and Health of the US Centers for Disease Control and Prevention to improve our understanding of the unique patterns of smoking behaviors among AAs, relative to whites. Seven original investigations,^{12,15–20} two brief reports,^{21,22} one review article,²³ and two commentaries^{24,25} provide useful information and perspectives on a wide range of topics that advance the science base in important ways. Here, we highlight some of the many advances made by the articles in this supplement, followed by elucidation of important research needs and of significant opportunities for disease prevention and health promotion among AAs.

Cigarette Smoking Prevalence Among AA and White Adolescents

Population-based estimates of tobacco use are generally described in terms of prevalence of use, employing representative estimates of the overall population and subgroups using serial cross-sectional analyses to show trends over time. Figure 1 depicts the prevalence of lifetime (ever) cigarette smoking by AA and white high school seniors in the Monitoring the Future (MTF) surveys from 1977 to 2014. It depicts a fairly steady decline of ever smoking among both whites and AAs, with the rate of ever smoking being lower among AAs than whites. A somewhat different pattern is seen for current use (Figure 2), with sharply divergent trends for AAs and whites during 1977–1992.²⁶ Both groups experienced a marked increase in

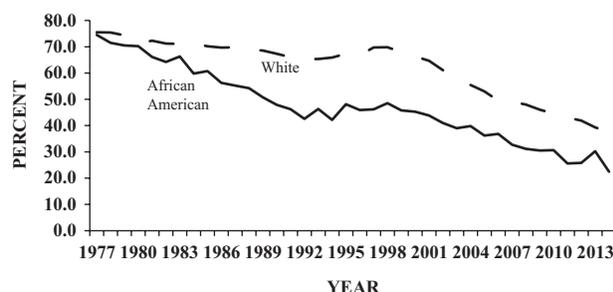


Figure 1. Trends in prevalence (%) of lifetime cigarette smoking among white and African American high school seniors—United States, 1977–2014. Source: Institute for Social Research, University of Michigan, Monitoring the Future Surveys; for racial subgroups, data for the current year and the previous year are combined.

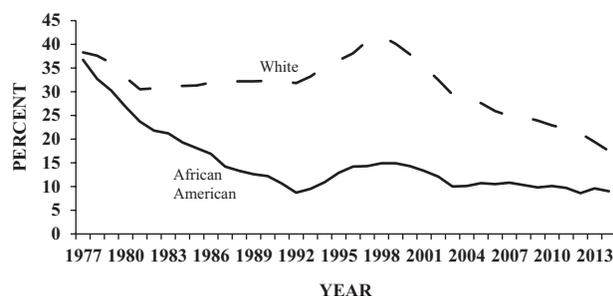


Figure 2. Trends in prevalence (%) of past month cigarette smoking among white and African American high school seniors—United States, 1977–2014. Source: Institute for Social Research, University of Michigan, Monitoring the Future Surveys; for racial subgroups, data for the current year and the previous year are combined.

prevalence in the 1990s (likely influenced by pro-tobacco marketing) followed by a sharp decline among whites from 1998 (41.7%) to 2003 (29.4%) (likely explained by the policies implemented after the Master Settlement Agreement and excise tax increases at the federal, state, and local levels) followed by a slow but steady decline from 2003 until 2014 (17.5%). Among AAs, there was a decrease from 1999 (14.9%) until 2003 (10.0%), followed by very little progress through 2014 (9.0%). In fact, in 1992, 8.7% of AA high school seniors smoked cigarettes, which is essentially the same as in 2014.

Figure 3 helps us understand the differences in the ever use and current use trends. It presents the percentage of ever smokers who are current smokers for AA and white high school seniors. The shapes of the lines in Figure 3 roughly reflect the patterns seen for prevalence of current use through 2003 (Figure 2). Subsequently, however, the percentage of AA ever smokers who continued to smoke increased from 25.4% in 2004 to 40.1% in 2014.

More sophisticated analyses, such as those by Holford, Levy and Meza¹⁶ combine surveys from multiple years and conduct birth cohort analyses to assess patterns of initiation, current use, quitting, and smoking intensity in the 20th and early 21st centuries. Such analyses have the ability to indicate patterns of use that predate the existence of the cross-sectional surveys. Such analyses find patterns that are consistent with the results of serial cross-sectional surveys.² In Holford's work, for example, initiation rates are generally lower for AAs, but particularly so in birth cohorts since the 1960s.¹⁶ Similarly, reconstructed prevalence among youth and young adults is lower in young AAs than whites, particularly in the more recent birth cohorts, consistent with prevalence estimates from youth surveys.^{26–28}

The trends in current cigarette smoking prevalence observed during the 1970s and 1980s (Figure 2) were likely not due to differential dropout status,^{2,29,30} differential misclassification bias,^{2,30,31} differential use of other drugs,^{2,30} or background or lifestyle factors including socioeconomic status.^{2,30,32,33} Garrett and her colleagues²¹ and others^{2,30,34} describe protective factors for AA youth.

So why was prevalence of current cigarette smoking among AA adolescents the same in 2014 (9.0%) as it was in 1992 (8.7%; Figure 2)?²⁶ And why did the conversion rate from ever smoking to current smoking among AA youth nearly double from 20.4% in 1992 to 40.1% in 2014 (Figure 3)? These findings seem counterintuitive, since the real price of cigarettes essentially doubled from 1992 (\$2.93/pack) to 2014 (\$5.76/pack)^{35,36} and AA youth are more price sensitive than white youth.³⁷ Targeted tobacco marketing^{21,38,39} and use of menthol cigarettes^{12,40} might have counteracted the overall price increases. For example, menthol cigarettes are marketed more

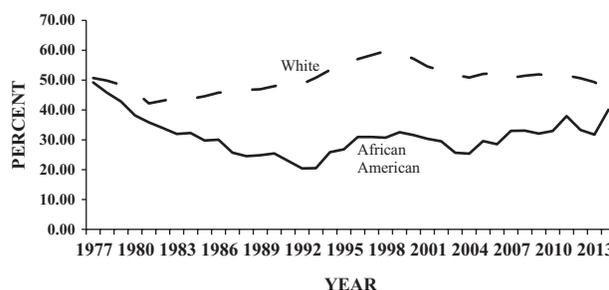


Figure 3. Trends in the percentage of lifetime cigarette smokers who smoked cigarettes during the previous month among white and African American high school seniors—United States, 1977–2014. Source: Institute for Social Research, University of Michigan, Monitoring the Future Surveys; for racial subgroups, data for the current year and the previous year are combined.

heavily in AA neighborhoods and the price of menthol cigarettes is lower in communities with proportionately more AA residents.^{38,41}

Marketing strategies promote the uptake of tobacco products.⁴² Ideally we would have better surveillance of the type, distribution, and intensity of advertising and promotional strategies, including direct mail, and of product placements in television, movies, video games and social media that were seen by children and adolescents over time, by race.⁴³ In addition, we should know more about the product formulations of relevant cigarette brands (eg, Marlboro, Camel, Newport, Kool, Salem) and how they might have changed over time.^{44,45}

Cigarette Smoking Prevalence Among AA and White Adults

Figure 4 presents gender specific estimates of the prevalence of adult cigarette smoking during 1978–1980 and 2011–2013 for non-Hispanic whites and non-Hispanic AAs, using data from National Health Interview Surveys.³ Cigarette smoking prevalence declined by 22.3 percentage points among AA males and by 15.2 percentage points among white males, representing a 46.7% faster rate of decline among AA males. Prevalence also declined faster (by 32.8%) among AA females than among white females, based on a 16.2 percentage point decline in AA females and a 12.2 percentage point decline among white females. The decline among AA males could be due to increased incarceration over time,⁴⁶ which likely resulted in proportionately fewer AA male smokers being within the sample frame of the National Health Interview Survey over time.²² The declines among young adult AA males and females who were high school students in the late 1970s and 1980s also likely contributed to the faster decline in cigarette smoking prevalence among AA males and females as they matured into young adulthood (Figures 5–7).³⁹ So, for example, although the prevalence of cigarette smoking was slightly higher among 25- to 29-year-old AAs than among 25- to 29-year-old whites in the 1980s, AA prevalence dropped well below that of whites in this age group in the 1990s (Figure 6). It is also possible that AA adults who smoke were more likely over time than white adults who smoke to conceal their smoking. Although the article in this issue by Caraballo and his colleagues suggests a role for misclassification bias in comparing AA and white prevalence estimates in recent years,¹⁵ their methods in the current article are

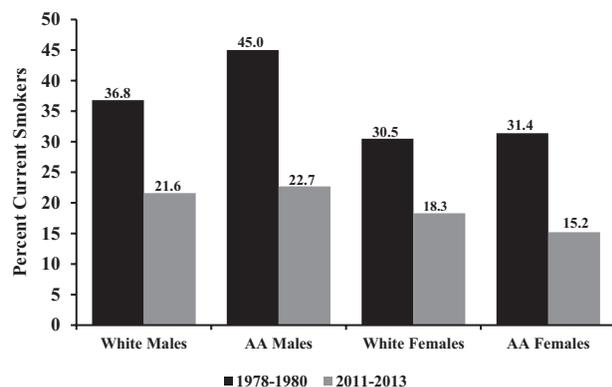


Figure 4. Prevalence (%) of cigarette smoking among non-Hispanic white and non-Hispanic African American adults aged ≥ 18 years—United States, 1978–1980 and 2011–2013. Source: 1978, 1979, 1980, 2011, 2012, and 2013 National Health Interview Surveys; Data presented in Tables 1 and 43 of Chapter 2 of the 1998 report of the Surgeon General² and in Table 54 of Health United States 2014³; AA = African American.

not directly comparable to methods used in previous work, which covered 1988–1991.⁴⁷

It is worth noting that these prevalence estimates are also influenced by a later age of initiation among AAs.^{2,48} Data from the 1994–1995 National Household Surveys on Drug Abuse indicated that among US adults aged 30–39 years who had ever smoked daily, the average ages for first trial and first daily smoking were approximately 1 year higher for AA males compared to white males and 2 years higher for AA females compared to white females.² These relatively small differences in age of initiation do not fully explain the differences in adult prevalence. Indeed, data from the Add Health cohort study demonstrate that even though the prevalence of

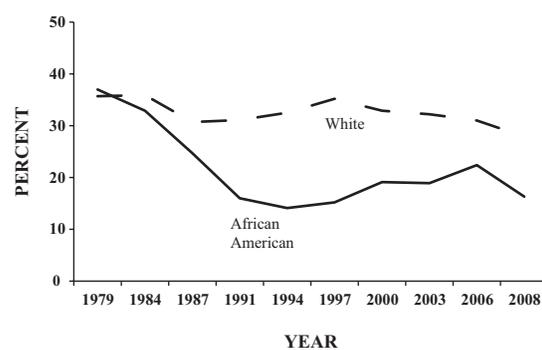


Figure 5. Prevalence (%) of current cigarette smoking among white and African American 20- to 24-year-olds—United States, 1978–2009. Source: National Health Interview Surveys, NCHS; Table 3.1.29 in *Preventing Tobacco Use Among Youth and Young Adults—2012 Report of the Surgeon General*.³⁹

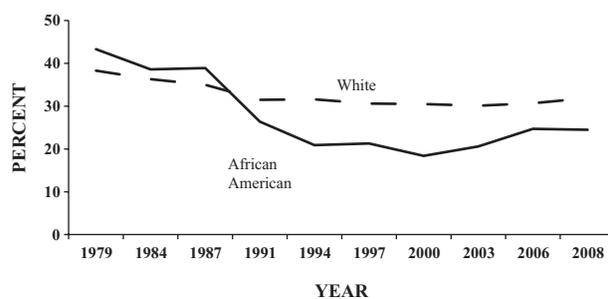


Figure 6. Prevalence (%) of current cigarette smoking among white and African American 25- to 29-year-olds—United States, 1978–2009. Source: National Health Interview Surveys, NCHS; Table 3.1.29 in *Preventing Tobacco Use Among Youth and Young Adults—2012 Report of the Surgeon General*.³⁹

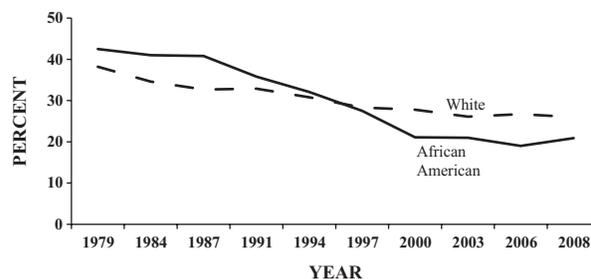


Figure 7. Prevalence (%) of current cigarette smoking among white and African American 30- to 34-year-olds—United States, 1978–2009. Source: National Health Interview Surveys, NCHS; Table 3.1.29 in *Preventing Tobacco Use Among Youth and Young Adults—2012 Report of the Surgeon General*.³⁹

cigarette smoking as the cohort matured increased among AAs after age 18 and decreased among whites, the prevalence among 29-year-old AAs (30.7%) was still substantially lower than the prevalence among 29-year-old whites (40.2%).⁴⁹ Eventually, as Holford and his colleagues¹⁶ demonstrate, cigarette smoking prevalence among AAs generally overtakes that of whites, because of lower cessation probabilities for AAs as they age. This well-documented phenomenon has been referred to as the age-crossover effect.^{50,51}

Impoverished environments contribute to higher rates of smoking.⁵² In two multivariable analyses of national data sets, cigarette smoking prevalence was higher for AAs prior to controlling for indicators of socioeconomic status.^{2,53} After statistical control was made for socioeconomic status, the differences in prevalence were either eliminated² or reversed.⁵³

Use of Other Tobacco Products and Marijuana

While cigarette consumption is declining in the United States, snuff and cigars are increasing.⁵⁴ Recently, Creamer and her colleagues⁵⁵ studied trends from 1999 to 2013 of high school students' use of cigarettes, cigars and smokeless tobacco. A slight increase in the use of smokeless tobacco over time among AA youths relative to whites was detected. An analysis by Kennedy and her colleagues¹⁸ observes that AA young adults were more likely than whites to use marijuana before tobacco and that over time, both groups were increasingly likely to use marijuana before tobacco. In another analysis, the prevalence differences between AA and white youth and young adults were lessened when the use of cigars and marijuana were included in a measure of any combustible tobacco/marijuana use.¹⁷

In 2014, AA high school students were less likely than whites to report use electronic cigarettes (5.6% among AAs vs. 15.3% among whites), hookah (5.6% vs. 9.4%), smokeless tobacco (1.1% vs. 7.8%), and snus (0.6% vs. 2.4%); the prevalence of cigar smoking was statistically similar (8.8% vs. 8.3%).⁵⁶ Prevalence of any tobacco use (17.2% vs. 26.5%) and current use of at least two tobacco products (5.4% vs. 15.1%) were lower among AA high school students, compared to whites. Among current tobacco users, 31% of AAs and 57% of whites reported using at least two tobacco products.

Among US adults in 2012/2013, AAs were less likely than whites to report use of electronic cigarettes (0.8% vs. 2.1%) and smokeless tobacco (1.0% vs. 3.0%) and more likely to report use of cigars (3.7% vs. 1.6%).⁵⁷ A measure of hookah use that included rare use indicated that AA adults were less likely than whites to use hookah (2.0% vs. 3.6%). Although the use of any tobacco product was statistically similar among AAs (22.5%) and whites (20.7%), AA adults were more likely than white adults to use any combustible tobacco product (21.6% vs. 18.2%).

Knowledge Gaps

Although the papers in this supplement expand the science base of tobacco use among AA youth, young adults and adults, knowledge gaps remain to be addressed by future research.

- Studies on how to further reduce initiation, both ever use and the transition from ever use to more established use, are needed. These should continue to analyze marketing strategies, as well as patterns of initiation of marijuana and tobacco use (including electronic cigarette use), given the legalization of marijuana in some states.
- A study of trends among adults in use of multiple tobacco products and marijuana use, expanding upon the methods used by Creamer and her colleagues⁵⁵ and Kennedy and her colleagues,¹⁷ is also needed.

- Studies are needed on how to increase rates of cessation among AA adults. Kulak and her colleagues¹⁹ review the relevant literature, which suggests important strategies for increasing support for quitting.^{58,59}
- Research to clarify how racial discrimination might influence tobacco use initiation and cessation could also improve interventions.⁶⁰
- Although the contribution in this issue by Caraballo and his colleagues¹⁵ suggests a role for misclassification bias in estimating tobacco use, it does not assess whether rates of misclassification have changed over time. Updates of previous work, using identical methods, would be informative.^{31,47}
- The Population Assessment of Tobacco and Health (PATH) study is a large cohort study that measures the use of multiple tobacco products among adolescents and adults in the United States.⁶¹ Race-specific assessments of progression (or not) to regular tobacco use among those who have experimented with multiple tobacco products are needed.

Public Health Opportunities

Reducing the marketing of menthol cigarettes and cigars to AAs would likely reduce initiation and promote cessation.^{38,39,42,62} The banning of menthol as a characterizing flavor in cigarettes and the extension of the FDA ban on other flavors in cigarettes to cigars and smokeless tobacco would also promote health by reducing use of these products.^{63,64}

Supportive and empowering environments are health promoting.⁶¹ Increasing opportunities for exercise, socialization, and learning/advancement, coupled with improved access to healthy foods, could contribute to health promoting changes that would likely lead to reductions in tobacco use.^{52,65,66} Finally, we hope that any end game strategies that might someday be implemented⁶⁷ have consistently positive effects across population strata and not increase disparities.

Funding

GAG received funding from a contract with the Office on Smoking and Health, Centers for Disease Control and Prevention (Carter Consulting Inc. Prime Contract # 200-2009-28537) to prepare this Commentary.

Declaration of Interests

None declared.

Acknowledgments

We thank Drs Ralph Caraballo, Frank Chaloupka, Bridgette Garrett, Lynn Kozlowski, and Italia Rolle for comments on a previous draft and Patrick O'Malley of the University of Michigan for Monitoring the Future 12th grade data on the prevalence of lifetime (ever) cigarette smoking, by race.

Disclaimer

The findings and conclusions are the author's, not necessarily the CDC's.

Supplement Sponsorship

This article appears as part of the supplement "Critical Examination of Factors Related to the Smoking Trajectory among African American Youth and Young Adults," sponsored by the Centers for Disease Control and Prevention contract no. 200-2014-M-58879.

References

1. 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.
2. U.S. Department of Health and Human Services. *Tobacco Use Among U.S. Racial/Ethnic Minority Groups—African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: 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, 1998.
3. National Center for Health Statistics. *Health, United States, 2014: With Special Feature on Adults Aged 55–64*. Hyattsville, MD: National Center for Health Statistics; 2015. www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCQQFjAAAhUKewjMkKfzyYjIAhVHVj4KHQMmBxk&url=http%3A%2F%2Fwww.cdc.gov%2Fncchs%2Fdata%2Fhus%2Fhus14.pdf&usq=AFQjCNG0vCxGHbCmadr-J80gch_MLC9MPg&cad=rja. Accessed September 21, 2015.
4. Bleich SN, Jarlenshi MP, Bell CN, LaVeist TA. Health inequalities: trends, progress, and policy. *Annu Rev Public Health*. 2012;33(1):7–40. doi:10.1146/annurev-pubhealth-031811-124658.
5. Buchholz EM, Shuangge M, Normand ST, Krumholz HM. Race, socioeconomic status, and life expectancy after acute myocardial infarction [published online ahead of print September 14, 2015]. *Circulation*. doi:10.1161/CIRCULATIONAHA.115.017009.
6. Shopland DR. Tobacco and its contribution to early cancer mortality with a special emphasis on cigarette smoking. *Environ Health Perspect*. 1995;103(suppl 8):131–141. doi:10.1289/ehp.95103s8131
7. Park SL, Carmella SG, Ming X, et al. Variation in levels of lung carcinogen NNAL and its glucuronides in the urine of cigarette smokers from five ethnic groups with differing risks from lung cancer. *Cancer Epidemiol Biomarkers Prev*. 2014;24(3):561–569. doi:10.1158/1055-9965.epi-14-1054.
8. Bullard RD, Mohai P, Saha R, Wright B. *Toxic Wastes and Race at Twenty, 1987–2007. A Report Prepared for the United Church of Christ Justice and Witness Ministries*. Cleveland, OH: Justice and Witness Ministries; 2007. www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0CC0QFjACahUKewiE1tPqrYvIAhWC8YAKHX_VBy8&url=https%3A%2F%2Fwww.uvm.edu%2Frsnr%2Fnr6%2FNr6Readings%2FToxicWastesatTwentyExcerpts2007.pdf&usq=AFQjCNG089zKvTv6Ey5YHCJwEWgmwBkwuQ. Accessed September 21, 2015.
9. Jia C, James W, Kedia S. Relationship of racial composition and cancer risks from air toxics exposure in Memphis, Tennessee, U.S.A. *Int J Environ Res Public Health*. 2014;11(8):7713–7724. doi:10.3390/ijerph110807713.
10. Yerger VB, Malone RE. Melanin and nicotine: a review of the literature. *Nicotine Tob Res*. 2005;8(4):487–498. doi:10.1080/14622200600790039.
11. Richie JP, Carmella SG, Muscat JE, Scott DG, Akerkar SA, Hecht SS. Differences in the urinary metabolites of the tobacco-specific lung carcinogen 4-(methylnitrosamino)-1-(3-pyridyl)-1-(butanone) in black and white smokers. *Cancer Epidemiol Biomarkers Prev*. 1997;6(10):783–790. <http://cebp.aacrjournals.org/content/6/10/783>. Accessed September 21, 2015.
12. Alexander L, Sakuma K, Pokhrel P, Clanton M, Moolchan E, Fagan P. Why we must continue to investigate menthol's role in the African American smoking paradox. *Nicotine Tob Res*. 2016;18(S1):S94–S104.
13. Perez-Stable EJ, Herrera B, Jacob P III, Benowitz NL. Nicotine metabolism and intake in black and white smokers. *JAMA*. 1998;280(2):152–156. doi:10.1001/jama.280.2.152.
14. Caraballo RS, Giovino GA, Pechacek TF, et al. Racial and ethnic differences in serum cotinine levels of adult cigarette smokers, third National Health and Nutrition Examination Survey, 1988–1991. *JAMA*. 1998;280(2):135–139. <http://jama.jamanetwork.com/article.aspx?articleid=187724>. Accessed September 21, 2015.
15. Caraballo RC, Sharapova S, Asman KJ. Does a race-gender-age crossover effect exist in current cigarette smoking between non-Hispanic blacks and non-Hispanic whites? United States, 2001–2013. *Nicotine Tob Res*. 2016;18(S1):S41–S48.
16. Holford TR, Levy DT, Meza R. Comparison of smoking history patterns among African American and white cohorts in the U.S. born 1890 to 2000. *Nicotine Tob Res*. 2016;18(S1):S16–S29.
17. Kennedy SM, Caraballo R, Rolle I, Rock VJ. Not just cigarettes: a more comprehensive look at marijuana and tobacco use among African American and white youth and young adults. *Nicotine Tob Res*. 2016;18(S1):S65–S73.
18. Kennedy SM, Patel RP, Cheh P, Hsia J, Rolle IV. Tobacco and marijuana initiation among African American and white young adults. *Nicotine Tob Res*. 2016;18(S1):S57–S64.
19. Kulak JA, Cornelius ME, Fong GT, Giovino GA. Differences in quit attempts and cigarette smoking abstinence between Whites and African Americans in the United States: literature review and results from the ITC United States survey. *Nicotine Tob Res*. 2016;18(S1):S80–S90.
20. Roberts M, Colby S, Lu B, Ferketich A. Understanding tobacco use onset among African Americans. *Nicotine Tob Res*. 2016;18(S1):S49–S56.
21. Garrett BE, Gardiner PS, Wright LC, Pechacek TF. The African American youth smoking experience: an overview. *Nicotine Tob Res*. 2016;18(S1):S11–S15.
22. Kennedy SM, Sharapova S, Beasley D, Hsia J. Cigarette smoking among inmates by race/ethnicity: impact of excluding African American young adult men from national prevalence estimates. *Nicotine Tob Res*. 2016;18(S1):S74–S79.
23. Rolle IV, Beasley D, Kennedy S, Rock V, Neff L. National surveys and tobacco use among African Americans: a review of critical factors. *Nicotine Tob Res*. 2016;18(S1):S30–S40.
24. Agaku I. Race and tobacco use: a global perspective. *Nicotine Tob Res*. 2016;18(S1):S91–S93.
25. Bauer UE. Understanding the African American “smoker.” *Nicotine Tob Res*. 2016;18(S1):S7–S10.
26. Monitoring the Future. Table 8: Cigarettes: Trends in 30-Day Prevalence of Use by Subgroups in Grade 12. 2014. www.monitoringthefuture.org/data/14data.html#2014data-cigs. Accessed September 21, 2015.
27. Centers for Disease Control and Prevention. Cigarette use among high school students—United States, 1991–2009. *MMWR Morb Mortal Wkly Rep*. 2010;59(26):797–801. www.cdc.gov/mmwr/preview/mmwrhtml/mm5926a1.htm. Accessed September 21, 2015.
28. Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance—United States, 2013. *MMWR Morb Mortal Wkly Rep*. 2014;63(4):1–162. www.cdc.gov/healthyyouth/data/yrbs/results.htm. Accessed September 21, 2015.
29. Centers for Disease Control and Prevention. Cigarette smoking among youth—United States, 1989. *MMWR Morb Mortal Wkly Rep*. 1991;40(41):712–715. www.cdc.gov/mmwr/preview/mmwrhtml/00015458.htm. Accessed September 21, 2015.
30. Oredein T, Foulds J. Causes of the decline in cigarette smoking among African American youths from the 1970s to the 1990s. *Am J Public Health*. 2011;101(10):e4–e14. doi:10.2105/AJPH.2011.300289.
31. Caraballo RS, Giovino GA, Pechacek TF. Self-reported cigarette smoking vs. serum cotinine among U.S. adolescents. *Nicotine Tob Res*. 2004;6(1):19–25. <http://ntr.oxfordjournals.org/content/6/1/19>. Accessed September 21, 2015.
32. Wallace JM, Bachman JG. Explaining racial/ethnic differences in adolescent drug use” the impact of background and lifestyle. *Social Problems*. 1991;38(3):333–357. doi:10.2307/800603.
33. Faulkner DL, Escobedo LG, Zhu BP, Chrismon JH, Merritt RK. Race and the incidence of cigarette smoking among adolescents in the United States. *J Natl Cancer Inst*. 1996;88(16):1158–1160. doi:10.1093/jnci/88.16.1158.
34. Gardiner PS. Chapter 14: African American teen cigarette smoking: A review. In: Burns DM, Amacher RH, Ruppert W, ed. *NCI Monograph 14: Changing Adolescent Smoking Prevalence*. Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes

- of Health, National Cancer Institute; 2001. <http://cancercontrol.cancer.gov/brp/tcrb/monographs/14/index.html>. Accessed September 21, 2015.
35. Orzechowski B, Walker R. *The Tax Burden on Tobacco*. Historical Compilation. Vol. 49. Arlington, VA: Orzechowski and Walker; 2014.
 36. Bureau of Labor Statistics CPI Inflation Calculator. 2015. www.bls.gov/data/inflation_calculator.htm. Accessed October 16, 2015.
 37. Tauras JA, Huang J, Chaloupka FJ. Differential impact of tobacco control policies on youth sub-populations. *Int J Environ Res Public Health*. 2013;10(9):4306–4322. doi:10.3390/ijerp10094306.
 38. Lee JGL, Henriksen L, Rose SW, Moreland-Russell S, Ribisl KM. A systematic review of neighborhood disparities in point-of-sale marketing. *Am J Public Health*. 2015;195(9):e8–e18. doi:10.2105/ajph.2015.302777.
 39. U.S. Department of Health and Human Services. *Preventing Tobacco Use Among Youth and Young Adults. A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
 40. Giovino GA, Villanti AC, Mowery PD, et al. Differential trends in cigarette smoking in the USA: is menthol slowing progress? *Tob Control*. 2013;0(1):1–10. doi:10.1136/tobaccocontrol-2013-051159.
 41. Resnick EA, Jackson KL, Barker DC, Chaloupka FJ. *Cigarette Pricing Differs by U.S. Neighborhoods – A BTG Research Brief*. Chicago, IL: Bridging the Gap Program, Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago; 2012. www.bridgingthegapresearch.org. Accessed September 21, 2015.
 42. National Cancer Institute. *NCI Monograph 19: The Role of the Media in Promoting and Reducing Tobacco Use*. Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Cancer Institute; 2008. <http://cancercontrol.cancer.gov/brp/tcrb/monographs/19/index.html>. Accessed September 21, 2015.
 43. Cruz TB. Monitoring the tobacco use epidemic IV. The vector: tobacco industry data sources and recommendations for research and evaluation. *Prev Med*. 2009;48(suppl 1):S24–S34. doi:10.1016/j.ypmed.2008.10.002.
 44. Cummings KM, Morley CM, Horan JK, Steger C, Leavell N-R. Marketing to America's youth: evidence from corporate documents. *Tob Control*. 2002;11(suppl 1):i5–i17. doi:10.1136/tc.11.suppl_1.i5.
 45. Kreslake JM, Wayne GF, Alpert HR, Koh HK, Connolly GN. Tobacco industry control of menthol cigarettes and targeting of adolescents and young adults. *Am J Public Health*. 2008;98(9):1685–1692. doi:10.2105/AJPH.2007.125542.
 46. Dumont DM, Brockmann B, Dickman S, Alexander N, Rich JD. Public health and the epidemic of incarceration. *Annu Rev Public Health*. 2012;33(1):325–339. doi:10.1146/annurev-publhelath-031811-124614.
 47. Caraballo RS, Giovino GA, Pechacek TF, Mowery PD. Agreement between self-reports of cigarette smoking and biochemical measurement of serum cotinine levels in the United States population aged 17 years old and older: NHANES III, 1988–1994. *Am J Epidemiol*. 2001;153(8):807–814. <http://aje.oxfordjournals.org/content/153/8/807>. Accessed September 21, 2015.
 48. Centers for Disease Control and Prevention. Differences in the age of smoking initiation between blacks and whites - United States. *MMWR Morb Mortal Wkly Rep*. 1991;40(44):754–757. www.cdc.gov/mmwr/preview/mmwrhtml/00015531.htm. Accessed September 21, 2015.
 49. Evans-Polce RJ, Vasilenko SA, Lanza ST. Changes in gender and racial/ethnic disparities in rates of cigarette use, regular heavy episodic drinking, and marijuana use: ages 14 to 32. *Addict Behav*. 2015;41:218–222. doi:10.1016/j.addbeh.2014.10.029.
 50. Geronimus AT, Neidert LJ, Bound J. Age patterns of smoking in US black and white women of childbearing age. *Am J Public Health*. 1993;83(9):1258–1264. doi:10.2105/AJPH.83.9.1258.
 51. Kandel D, Schaffran C, Hu MC, Thomas Y. Age-related differences in cigarette smoking among whites and African-Americans: evidence for the crossover hypothesis. *Drug Alcohol Depend*. 2011;118(2–3):280–287. doi:10.1016/j.drugalcdep.2011.04.008.
 52. Carroll ME, Anker JJ, Perry JL. Modeling risk factors for nicotine and other drug abuse in the preclinical laboratory. *Drug Alcohol Depend*. 2009;104(suppl 1):S70–78. doi:10.1016/j.drugalcdep.2008.11.011.
 53. Persokie A, Levya B. Blacks smoke less (and more) than whites: Simpson's paradox in U.S. smoking rates, 2008 to 2012. *J Health Care Poor Underserved*. 2015;26(3):951–956. doi:10.1353/hpu.2015.0085.
 54. Tynan MA, McAfee T, Promoff G, Pechacek T. Consumption of cigarettes and combustible tobacco – United States, 2000–2011. *MMWR Morb Mortal Wkly Rep*. 2012;61(30):565–569. www.cdc.gov/mmwr/preview/mmwrhtml/mm6130a1.htm?s_cid=mm6130a1_x. Accessed September 21, 2015.
 55. Creamer MR, Perry CL, Harrell MB, Diamond PM. Trends in multiple tobacco product use among high school students. *Tobacco Regulatory Science*. 2015;1(3):204–214. doi:10.18001/trs.1.3.2.
 56. Arrazola RA, Singh T, Corey CG, et al. Tobacco use among middle and high school students – United States, 2011–2014. *MMWR Morb Mortal Wkly Rep*. 2015;64(14):381–385. www.cdc.gov/mmwr/preview/mmwrhtml/mm6414a3.htm. Accessed September 21, 2015.
 57. Agaku IT, King BA, Husten CG, et al. Tobacco product use among adults – United States, 2012–2013. *MMWR Morb Mortal Wkly Rep*. 2014;63(25):542–547. www.cdc.gov/mmwr/preview/mmwrhtml/mm6325a3.htm?s_cid=mm6325a3_w. Accessed September 21, 2015.
 58. Burgess DJ, van Ryn M, Noorbaloochi S, et al. Smoking cessation among African American and white smokers in the Veterans Affairs health care system. *Am J Public Health*. 2014;104(suppl 4):S580–S587. doi:10.2105/AJPH.2014.302023.
 59. Webb Hooper M, Kolar SK. Distress, race/ethnicity and smoking cessation in treatment-seekers: implications for disparity elimination. *Addiction*. 2015;110(9):1495–1504. doi:10.1111/add.12990.
 60. Corral I, Landrine H. Racial discrimination and health-promoting behavior vs damaging behaviors among African American adults. *J Health Psychol*. 2012;17(8):1176–1182. doi:10.1177/1359105311435429.
 61. Population Assessment of Tobacco and Health Study. 2015. <https://pathstudyinfo.nih.gov/UI/HomeMobile.aspx>. Accessed September 30, 2015.
 62. Biglan A. *The Nurture Effect. How the Science of Human Behavior can Improve Our Lives and Our World*. Oakland, CA: New Harbinger Publications, Inc.; 2015.
 63. U.S. Food and Drug Administration. Tobacco Products Scientific Advisory Committee's Report and Recommendations on the Impact of the Use of Menthol in Cigarettes on the Public Health. 2015. www.fda.gov/AdvisoryCommittees/CommitteesMeetingMaterials/TobaccoProductsScientificAdvisoryCommittee/ucm247605.htm. Accessed September 21, 2015.
 64. Levy DT, Pearson JL, Villanti AC, et al. Modeling the future effects of a menthol ban on smoking prevalence and smoking-attributable deaths in the United States. *Am J Public Health*. 2011;101(7):1236–1240. doi:10.2105/AJPH.2011.300179.
 65. Walker RE, Keane CR, Burke JG. Disparities and access to healthy food in the United States: a review of food deserts literature. *Health Place*. 2010;16(5):876–884. doi:10.1016/j.healthplace.2010.04.013.
 66. Haibach JP, Homish GG, Giovino GA. A longitudinal evaluation of fruit and vegetable consumption and cigarette smoking. *Nicotine Tob Res*. 2013;15(2):355–363. doi:10.1093/ntr/nts130.
 67. McDaniel PA, Smith EA, Malone RE. The tobacco endgame: a qualitative review and synthesis [published online ahead of print August 28, 2015]. *Tob Control*. doi:10.1136/tobaccocontrol-2015-052356.