Epidemiology, determinants, and consequences of cigarette smoking in African American women: An integrative review

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Abstract

Tobacco smoking is a national public health problem that has been associated with numerous adverse health effects, including increased disease and cancer rates. Previous review articles on smoking in specific demographic populations have focused on smoking in women and on smoking in African Americans, but have not considered the dual roles of ethnicity and gender in smoking behavior. African American women (AAW) are an important subgroup to study because they are distinct from non-AAW and their male African American counterparts on biopsychosocial factors that are relevant to smoking behavior. The purpose of the present review paper is to integrate and summarize the current literature on the epidemiology, determinants, and consequences of cigarette smoking among AAW, by contrasting them to relevant comparison groups (non-AAW and African American men). Evidence suggests that AAW are generally more likely to be light smokers and initiate smoking later. The prevalence rates of AAW smokers have decreased over the past 25 years, yet AAW are disproportionately affected by several smoking-related illnesses when compared to their ethnic and gender comparison groups. AAW smokers are distinct from relevant comparison groups in metabolic sensitivity to nicotine, aspects of smoking topography, and several psychosocial factors that influence smoking. Although a small literature on smoking in AAW is emerging, further empirical research of AAW smokers could inform the development of tailored interventions for AAW.

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1. Introduction

Smoking is a national public health problem among US adults, and adverse health effects related to cigarette smoke account for approximately 1 in 5 deaths each year (CDC, Morbidity and Mortality Weekly Report, 2008). The most recent census figures approximated that over 18 million US residents are African American females (US Census Bureau, 2007). However, African American women (AAW) are at a dual disadvantage because they are historically underrepresented in research as African Americans and as women (Daunt, 2003; Geller, Adams, & Carnes, 2006; Saddler et al., 2005). Despite minority status in population number, AAW are considered a “vulnerable population” due to their over-representation in poor health outcomes in general (Flaskerud & Winslow, 1998). Accordingly, research of smoking in AAW is a priority.

There are relatively large literatures that have examined smoking among women (Barker, Orleans, Halpin, & Barry, 2004; Cepeda-Benito, Reynoso, & Erath, 2004; Collins et al., 2004; Patel, Bach, & Kris, 2004; Pauly, 2008; Reichert, Seltzer, Efferen, & Kohn, 2004; Schnoll, Patterson, & Lerman, 2007; Wetter et al., 1999) and among African Americans (Brook, Saar, Zhang, & Brook, 2009; King, Polodnak, Bendel, & Hovey, 1999; Lawrence, Graber, Mills, Meissner, & Warnecke, 2003; Woolchian et al., 2007; Okuyemi, Pulvers, et al., 2007; Payne & Diefenbach, 2003; Pederson, Ahluwalia, Harris, & McGrady, 2000; Webb, 2008). Review articles on these topics have typically focused on differences between women and men without considering the concomitant role of ethnicity, or they have often focused on differences between African Americans and other ethnic groups without considering the role of gender (but see Sanchez-Johnsen 2005 for a review on smoking and obesity). While these reports are informative for understanding smoking among AAW, there are several reasons why it is important to identify the epidemiology, determinants, and consequences of smoking in the specific population of AAW.

Among females, AAW are known to be different than non-AAW in several demographic, psychosocial, and physiological characteristics (Ahmed, Brown, Gary, & Saadatmand, 1994; Andrews, Felton, Ellen, Wewers, Waller, & Tingen, 2007; Clemens, Klesges, Slawson, & Bush, 2003; Collins et al., 2004; Delva, et al., 2006; Ensminger, Smith, Juen, Pearson, & Robertson, 2009; Harrell & Gore, 1998; King et al., 2006; Manson, Sammel, Freeman, & Grasso, 2001; Rosenberg, Palmer, Rao, & Adams-Campbell, 2002; Sartor et al., 2009; Wolff, Britton, & Wilson, 2003). Similarly, within the African American population, psychosocial and physiological factors differ between women and their male counterparts (Artinian, Washington, Flack, Hockman, & Jen, 2004; Fox, et al., 2004; King et al., 1999; Lockery & Stanford, 1996; Murtaugh, Borde-Perry, Campbell, Gidding, & Falkner, 2002; Nollen, Catley, Davies, Hall, & Ahluwalia, 2005; Pulvers et al., 2004; Qureshi, Suri, Zhou, & Divani, 2006; Savoca et al., 2009; Woods, Harris, Ahluwalia, Schmelzel, & Mayo, 2001). In addition, considering the concomitant role of ethnicity and gender is important because these two characteristics may potentially interact to influence factors relevant to smoking, such that AAW may be disproportionately represented in comparison to other groups (which is the case in obesity outcomes; Cook, Nies, & Hdepworth, 2000; Klesges et al., 1998; Pomerleau et al., 2005; Sanchez-Johnsen, 2005).

Indeed, there is a small emerging empirical literature on tobacco use specifically among AAW. However, these findings have yet to be summarized and integrated in a comprehensive fashion. This is a notable gap in the literature because an up-to-date review may: (a) provide practitioners and researchers who work with this population with information that may be useful for tailoring treatment approaches; and (b) stimulate future research that targets important areas that have been previously neglected.

Accordingly, the present article reviews and integrates the current literature on the epidemiology, determinants, and consequences of cigarettes smoking specifically among AAW. The aims are to: (1) describe current epidemiological data, trends, and smoking behavior patterns for AAW smokers; (2) discuss biological and psychosocial factors that may influence smoking behavior in AAW; (3) review the health consequences of smoking in AAW; and (4) suggest important avenues that should be targeted in future research of smoking in AAW. For the purpose of this review, African Americans are defined as residents of the US who have “origins in any of the Black racial groups of Africa” (US Census Bureau, 2000). The term is used to refer to individuals of African descent who define themselves as African American or Black with African roots. This is in contrast to individuals who primarily consider themselves to be “Black” with Hispanic or other roots. We compare African Americans with Caucasian Americans in the present review because Caucasian Americans currently represent the ethnic majority (US Census Bureau, 2000). We use the term “Caucasian American” to refer to individuals who identify themselves as Americans, report their race as “White,” and have descendants in Europe, North Africa, or some areas within the Middle East (US Census, 2000).

Some guiding questions to be considered in this paper are as follows: are AAW different from their male African American counterparts in the epidemiology, determinants, and consequences of smoking? Among women, are AAW different from non-AAW? Do ethnicity and gender interact in their influence on tobacco use patterns, determinants, and consequences?

2. Epidemiology of tobacco use and associated characteristics among AAW

2.1. Prevalence and heaviness of smoking

According to data collected in 2007, AAW currently appear to be the least likely to smoke (15.9%) when compared to African American men (23.4%), Caucasian American women (18.5%), and Caucasian American men (22.2%) (CDC, NCHS, 2008). That is, ethnicity and gender appear to have interactive effects on smoking risk such that the differences in smoking prevalence between Caucasian American men and women are less prominent than the corresponding differences between AAW and African American men, with AAW being at disproportionately lower risk (CDC, NCHS, 2008).

Ethnic and gender differences in current epidemiologic smoking prevalence rates are best interpreted in reference to changes in smoking rates in the U.S. population over the past 25 years. Notably, trends in recent years suggest that the rates of smoking among AAW have decreased. According to national data from the Centers for Disease Control and Prevention, (CDC, NCHS, 2008), there was a 30.9% smoking prevalence among AAW in 1985, and 20.7% prevalence in 2000 (NCHS, 2008), until rates fell to their current level of 15.9%. For African American men, smoking prevalence rates also considerably decreased from 1985 (40.2% smoked) to 2000 (25.7%), and again in 2007 (23.4%) (NCHS, 2008). Thus, it appears that smoking prevalence rates comparatively decreased more among African American men than AAW between 1985 and 2007, with rates among African American men decreasing by 16.8% and rates for AAW decreasing by 15.3%.

Recent comparisons of AAW to Caucasian American women suggest that both groups have shown recent declines in smoking prevalence, although reductions have been more dramatic among AAW (CDC National Center for Health Statistics, 2008). Data from the US Surgeon General’s Report on Women and Smoking (2001) indicated that 27.9% of Caucasian American women smoked in 1985; this was lower than the 30.9% of AAW who reported smoking in 1985. By the year 2000, however, more Caucasian American women smoked (22%) than AAW (20.7%), and this gap had widened by 2007 (18.3% of Caucasian American women vs. 15.8% of AAW, respectively) (CDC NCHS, 2008).

1 African American women is abbreviated as AAW.
Regarding the heaviness of smoking, reports have suggested that AAW are more likely to be "light" smokers than African American men and Caucasian American women (Okuyemi, Ahluwalia, Richter, Mayo, & Resnicow, 2001; US DHHS, 1998). While there is no clear consensus for "light vs. heavy smoking" (Okuyemi et al., 2002), the criteria that has been used in previous research with AAW categorized light smokers as those having <10 or 15 cigarettes per day (Ahluwalia et al., 2006; Okuyemi, Ebersole-Robinson, Nazir, & Ahluwalia, 2004; Webb & Carey, 2008). Using the cutoff of smoking less than 15 cigarettes per day to identify "light smoking" (US DHHS Surgeon General’s Report on Tobacco Use Among Racial/Ethnic Minorities, 1998), national data have suggested that 67.1% of AAW are light smokers. That is in comparison to 61.1% of African American men and 42% of Caucasian American women.

2.2. Mentholated cigarettes

African Americans are more likely to smoke mentholated cigarettes as a group (Businelle, et al., 2009; Castro, 2004; Gardiner, 2004; Giovino et al., 2004; Okuyemi et al., 2004; Savitz, Dole, Terry, Zhou, & Thorp, 2001). Accordingly, studies have suggested that some 70% or more African Americans smoke menthol cigarettes (Ahluwalia, Harris, Catley, Okuyemi, & Mayo, 2002; Okuyemi, Faseru, Sanderson Cox, Bronars, & Ahluwalia, 2007). Although women are generally more likely to smoke mentholated cigarettes than men (Giovino et al., 2004), AAW in particular appear more likely to smoke mentholated cigarettes than African American men (Allen & Unger, 2007) and Caucasian American women (Robles, Singh-Frano, & Gin, 2008; Savitz et al., 2001). These findings extend to pregnant smokers, as a large community sample of pregnant women (N = 2418), and AAW showed a significantly higher preference for mentholated cigarettes than Caucasian American women (95% vs. 26%, respectively) (Savitz et al., 2001). Among non-pregnant women, similar findings have been established. When given a choice, AAW smokers were significantly more likely to choose mentholated cigarettes as their usual preferred brand (Ahijevych, Weed, & Clarke, 2004).

This is notable given results of a recent focus group study of African Americans, which found that participants were likely to believe that women have lower risk to continue to develop smoking-related health problems. This evidences a greater need for research to assess the epidemiology of nicotine dependence among AAW to inform future interventions.

2.3. Nicotine dependence and withdrawal

Nicotine dependence is a constellation of symptoms involving tolerance, withdrawal, and difficulty controlling tobacco use (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision (DSM-IV-TR), 2000) and is a predictor of more pervasive and persistent smoking (Horn, Fernandes, Dino, Massey, & Kalsekar, 2003). Results on nicotine dependence have been mixed. For example, the definitions of nicotine dependence from the CARDIA Study (Coronary Artery Risk Development in Young Adults, N = 3933, 1991–1992) have been defined as “having one’s first cigarette within 30 minutes of awakening” (Son, Markovitz, Winders, & Smith, 1997). National data on cigarette smoke and nicotine dependence from the CARDIA Study were stratified by gender and ethnicity and included a cross-sectional sample of AAW, African American men, Caucasian American men, and Caucasian American women. In the study, AAW were more likely to be nicotine dependent than Caucasian American women (15% vs. 8.2%, respectively), but were less likely to be nicotine dependent than African American men. In the sample, 19% of African American men were defined as nicotine dependent, as compared to 15% of AAW. The African American men in the CARDIA Study also appeared more likely to be nicotine dependent than Caucasian American men in this sample (19% vs. 12.6%, respectively). This is consistent with widespread national data which suggests that men are more likely to be nicotine dependent than women [National Epidemiologic Survey on Alcohol and Related Conditions, N = 43,093 (Grant, Hasin, Chou, Stinson, & Dawson, 2004)]. Between the two ethnic groups, African Americans were more likely to be nicotine dependent. More specifically, the results of the CARDIA study indicated that AAW were more likely to be nicotine dependent than Caucasian American women.

Other data suggests that AAW may be less likely to be nicotine dependent than non-AAW, such as Caucasian American women. National data from the Surgeon General’s report on Women and Smoking (US DHHS, 2001) indicate several differences between AAW and Caucasian American women in the prevalence of self-reported nicotine dependence symptoms. Data gathered were based on the National Household Survey on Drug Abuse (1992–1994). The women in the study were asked to report on nicotine dependence symptoms (NHSDA, 1992; NHSDA, 1994).

African American women who smoked <15 cigs/day evidenced similar self-reported (i.e., “felt dependent on cigarettes”) rates of nicotine dependence symptoms (36%) to those who smoked 16–25 cigs/day (53%). Rates of nicotine dependence symptoms among AAW who smoke >25 cigs/day were expectedly quite high (71%). By contrast, Caucasian American women who smoked <15 cigs/day indicated considerably lower rates of nicotine dependence symptoms (65%) than those smoked 16–25 cigs/day (82%) and those who smoked >25 cigs/day (79%) (US DHHS Surgeon General’s Report, 2001), which were not substantially different from each other. These data show that Caucasian American women reported higher rates of nicotine dependence than AAW at each level of smoking heaviness. In addition, this suggests that increases in the prevalence of nicotine dependence symptoms across higher levels of smoking heaviness occur in a different fashion in AAW versus non-AAW. To date, AAW appear to be more likely to be light smokers. However, results are mixed on whether AAW are more likely to be dependent than non-AAW. Still, there is considerable research to suggest that AAW are at risk to continue to develop smoking-related health problems. This evidences a greater need for research to assess the epidemiology of nicotine dependence among AAW to inform future interventions.

Nicotine withdrawal is a syndrome that may occur upon the cessation of tobacco use, which includes symptoms such as anxiety, anger, depression, headaches, impatience, irritability, increased appetite and weight gain, difficulty concentrating, restlessness and insomnia ((Hughes, 2007); also see Diagnostic and Statistical Manual of Mental Disorder, 4th Edition, Text Revision (DSM-IV-TR)). In multi-ethnic samples, women (as compared to men) have been shown to report greater increases in negative affect, withdrawal-related distress, and a desire to smoking in order alleviate negative affect as a result of tobacco withdrawal (Leventhal et al., 2007). Similar findings were noted in a sample restricted to African American participants, as AAW reported significantly higher negative affect reduction as a reason to continue smoking when compared to African American men (Pulvers et al., 2004). Thus, preliminary evidence suggests that the withdrawal syndrome among women is characterized by high levels of aversive symptoms and this appears to be consistent across ethnicities, although there is a lack of data that has examined whether gender and ethnicity interact to influence tobacco withdrawal.

2.4. Smoking topography

Smoking topography, also known as “puffing behavior,” refers to the way an in individual smokes and the specific behavioral
patterns involved (Hammond, Fong, Cummings, & Hyland, 2005). Investigating smoking topography is particularly important for understanding nicotine dependence and increased risk of exposure to tar and carcinogens (Shields, 2000). Few studies have explored the smoking topography differences between African Americans and Caucasian Americans without considering the role of gender (Patterson et al., 2003; Strasser, Pickworth, Patterson, & Lerman, 2004; Moolchan, Hudson, Schroeder, & Sehnett, 2004; Melikian et al., 2007). Results have been mixed, with some studies finding significant ethnic differences while others did not. One study found that African Americans demonstrate higher CO boosts following smoking than Caucasian Americans (Patterson et al., 2003). There is some evidence to suggest that this finding is consistent in samples comprised of only women, as a previous study found that AAW had higher pre and post CO levels and CO boosts than Caucasian American women (Ahijevych & Gillespie, 1997). The AAW in the study also had higher cotinine per cigarette ratios and higher overall plasma cotinine levels than the Caucasian female participants.

In a study of smoking topography in AAW, Ahijevych et al. (1996) stratified a small, community-based sample of AAW and Caucasian American women into groups based on race and menthol or non-menthol cigarette preference (N = 37). A two-way factorial design was employed to observe differences between groups. While there were no significant differences in menthol preference in this study, the contents of the cigarettes chosen by AAW when compared to Caucasian American women were remarkable. Regarding exposure to nicotine, AAW women had significantly higher carbon monoxide (CO) boosts than Caucasian American women. There was also a non-significant trend for AAW to have higher nicotine boosts than their Caucasian counterparts in this study (21.4 ng/ml vs. 15.9 ng/ml, respectively). While there were no race-menthol interaction effects, Caucasian American women who smoked mentholated cigarettes were observed to have the lowest CO boost of all groups. Non-menthol AAW smokers had the highest CO boost of all groups, followed by Caucasian American non-menthol smokers and AAW menthol smokers (Ahijevych, Gillespie, Demirici, & Jagadeesh, 1996). Given the significant differences in carbon monoxide boost and rates of menthol cigarette smoking between AAW and Caucasian American women, AAW appear to be distinct from Caucasian American women. Evidence also suggests that AAW who are smokers smoke mentholated cigarettes more than African American males. Thus, additional research of menthol smoking in AAW is warranted to further understand potential health risks associated with menthol smoke and specific smoking topography patterns associated with mentholated cigarette smoking.

Few studies of smoking topography between AAW and African American men exist without menthol as a part of the investigation (see Henningfield et al., 2003) and Okuyemi, Faseru, et al. (2007) for literature which also investigates differences related to mentholated smoking). While research with mentholated cigarettes provide relevant information regarding brand preference and other sociocultural factors among African Americans (Allen & Unger, 2007; Richter et al., 2008), there is conceivably more to understand about smoking topography patterns in AAW as compared to African American men who do not smoke mentholated cigarettes, especially given that mentholated cigarettes may provide a cooler smoke that can change smoking topography to increase tar, nicotine and carcinogenic absorption (Shields, 2000). However, there are exceptions. For example, Melikian et al. (2007) found that African American men had longer puff duration and volume than AAW, though AAW had significantly more puffs per cigarette. Evidently, findings are mixed to date. The present scarcity of research and mixture of findings highlight the need for continued research on smoking topography differences between AAW and their comparison groups.

2.5. Smoking across the lifespan

African American women appear more likely to initiate smoking later than Caucasian American women (18.5 years) and African American men (18.0 years) (CDC, National Health Interview Survey, 2000; Chatila et al., 2004; US DHHS, 1998). On average, national data suggests that AAW initiate smoking at 19.28 years, well into late adolescence and later than their relevant comparison groups (as cited in Moon-Howard (2003), data collected by the CDC, National Health Interview Survey, 2000).

Despite a later smoking initiation onset, some national trends of smoking prevalence across different age groups among AAW are noteworthy. Cross-sectional survey data (National Centers for Health Statistics, 2008) indicate that rates of smoking among AAW were 14.8% for women between ages 18-24, 15.4% for those between 25 and 34 year-olds, 21% for 35 to 44 year-olds, 25.5% of 45 to 64 year-olds, and 9.3% for AAW over 65. By contrast, smoking rates among Caucasian American women were 20.7% for women between ages 18-24, 23.7% for those between 25 and 34 year-olds, 22% for 35 to 44 year-olds, 18.8% of 45 to 64 year-olds, and 8.4% for Caucasian American women over 65. Overall, these data suggest smoking is less prevalent among AAW (vs. Caucasian American women) in young adulthood, but more common in AAW in older adulthood.

These later life data are noteworthy and could potentially be explained by generational differences across women of different ethnicities. Perhaps younger women have received more education about smoking and smoking-related illness in present times, and AAW have responded with lower smoking. By contrast, older AAW were socialized in earlier generations and may have had less access and exposure to smoking interventions than their Caucasian American female counterparts of the same age bracket. Although there are several potential explanations that could account for ethnic differences in smoking across the lifespan in women, the disproportionately high number of AAW smokers after age 45 highlights the need for assessment and intervention due to the potential for smoking-related illness and health problems in later adulthood.

3. Putative determinants of tobacco use among AAW

3.1. Biological determinants

Several potential biological determinants should be considered for AAW smokers. A relatively large body of literature has demonstrated that there is variability in the way that nicotine is metabolized between African Americans and other ethnic groups (Ahijevych & Wewers, 1994; Benowitz, Herrera, & Jacob, 2004; Krous & Hauck, 1998; Mustonen, Spencer, Hoskinson, Sachs, & Garvey, 2005; Schoedel, Hoffmann, Rao, Sellers, & Tyndale, 2004; Wagenknecht, Manolio, Sidney, Burke, & Haley, 1993). CYP2A6 is the primary enzyme that metabolizes nicotine into cotinine (Mwenifumbo, Sellers, & Tyndale, 2007; Schoedel et al., 2004). Polymorphisms in the gene that codes for the CYP2A6 enzyme affect smoking behavior, and African Americans are more likely than other ethnic groups to have certain variants in this gene linked with increased nicotine metabolism (Fukami et al., 2007). Relatedly, investigations of CYP2A6 enzyme activity among African American light smokers have demonstrated that, within this group, slower metabolizers have higher plasma nicotine levels and that higher CYP2A6 activity has been associated with greater cigarette consumption (Ho et al., 2009; Mwenifumbo et al., 2007).

Research focusing specifically on women has found that plasma cotinine levels of AAW were higher than Caucasian American women (Ahijevych & Gillespie, 1997). Because AAW appear to have higher plasma cotinine levels per cigarette smoked than Caucasian American women, differences in metabolism of nicotine may play a role in differential risk between AAW and Caucasian women for nicotine
dependence among light smokers (Ahijevych & Gillespie, 1997; Caraballo, et al., 1998).

Genetic variation in systems other nicotine metabolism may also play a role in smoking among AAW. For example, African Americans with risk-related variants of dopamine D2 receptor (DRD2) or dopamine transporter (SLC6A3) gene had stronger cigarette cravings than non-carriers of the gene (Erblich, Lerman, Self, Diaz, & Bovbjerg, 2005). It is unclear whether there are any gender differences in DRD2 and SLC6A3 affects on smoking-related phenotypes among individuals of African American heritage; however, this information would be of interest.

Family studies also provide evidence of a genetic basis of smoking in AAW. A recent twin study showed that significant portions of variance in smoking-related variables (43%–80%) among AAW were accounted for by genetic influences (Sartor et al., 2009; Whitfield et al., 2007), similar research exists for Caucasians (Sullivan & Kendler, 1999). It remains unclear whether the extent to which genetic variance explains smoking behavior is larger or smaller among AAW in contrast to other groups remains relatively unclear.

3.2. Psychosocial determinants

3.2.1. Environment

The role of psychosocial stress on AAW smoking behaviors has been previously investigated and discussed to some extent (Ensminger et al., 2009; Fernander, Schumacher, Wei, Crooks, & Wedlund, 2008; Jun & Acevedo-Garcia, 2007; Ludman et al., 2002; Webb & Carey, 2008). A particular cluster of stressors comes with urban setting and low income status which is particularly prevalent among AAW, and several authors have studied the role of these factors in the smoking habits of AAW for that reason (Artinian, et al., 2006; Bell, Zimmerman, Mayer, Almgren, & Huebner, 2007; Delva, et al., 2006; Elizabeth Joste, Graham, & Swanson, 2006; Harrell & Gore, 1998; Woods et al., 2001). In essence, AAW who live in urban, poorer environments are at an increased risk to smoke potentially in response to the stress of residing in such environments.

Research also indicates that geographic setting may be a potential environmental factor for AAW. In fact, AAW who resided in the northeastern part of the United States were significantly less likely to smoke than their AAW counterparts in the northeast (King et al., 2006). One hypothesis is that fast paced, highly populated, and more expensive urban areas are likely to contribute to higher overall stress levels among AAW who live these areas. Unsurprisingly, both AAW and African American men living in urban environments with more reported “hassles” also smoked more cigarettes per day (Romano, Bloom, & Syme, 1991). Examples of hassles included: “being out of work for a month or longer”, “being concerned about living in an unsafe area”, and “not having enough money for food, clothing, housing or other necessities of life.” While the authors did not directly measure the use of smoking as a coping mechanism, Romano et al. (1991) indicated that smoking may represent a coping behavior that assuages the psychological impact of stressful environment.

Finally, because AAW are members of a historically disadvantaged minority group, particular examples of social stress may also include racism and discrimination. Both racism and discrimination experiences have been shown to be positively associated with smoking (Guthrie, Young, Williams, Boyd, & Kintner, 2002; Landrine & Klontoff, 2000). Thus, multiple forms of environmental stress may potentially contribute to smoking among AAW.

3.2.2. Education

Lower levels of education are an apparent contributor to smoking behaviors among AAW. Never smoking, initiating smoking at later ages, and quitting were found to be associated with higher educational attainment among a large, national survey sample including AAW (National Health Interview Survey, 1995, 1997–2001, N = 14,903) (King et al., 2006).

A sample of AAW were a part of a neighborhood, inner city longitudinal study that followed African American males and females from age 6 to 42 to examine the associations between social disadvantage, poverty, and educational attainment. Only AAW were included in the analyses for this study (N = 457) and the women were approximately 42 years of age at time of measurement. Over half of the high school dropouts reported being smokers. Smokers were less likely to enroll in college and were more likely to have fair or unsatisfactory math grades dating back to the first grade. Poverty during young adulthood was also significantly associated with being a current smoker (Ensminger et al., 2009).

In another low-income community sample of 263 AAW, Webb and Carey (2008) found that the number of cigarettes smoked per day was inversely associated with education among AAW. Evidently, the positive association between smoking and education among AAW cuts across small, homogenous samples and large multi-ethnic and multi-gendered samples. It is speculated that the link between smoking and education is a function of knowledge. As an individual becomes more educated in general, he or she may grow more exposed to the risks of smoking via formal curriculum (e.g., health and biology courses) and informal knowledge sources (e.g., campus health fairs, informal presentations, visits to student health centers). These factors may also extend to knowledge about the effects of smoking on fetal development, as a recent study found that AAW with lower levels of education were also more likely to report smoking during pregnancy. Among AAW, 47.8% of smokers had less than a high school education and 15.5% of non-smokers had less than a high school education in this study (maybe added in a statistic regarding the percent of AAW with lower levels who are pregnant) (Elizabeth Jesse et al., 2006). The association between education and smoking among pregnant women highlights a critical need for further investigation and further complicates the picture.

Pregnancy and single parenthood have been identified as stressors that may contribute to increased smoking among AAW (Bell, et al., 2007; Frost et al., 1994; Harrell & Gore, 1998; Jun & Acevedo-Garcia, 2007). Indeed, research suggests that nearly one-half of AAW are single parents who maintain the household (McAdoo & Younge, pg. 103; as cited in Neville, Tynes, and Utsey (2009)). Interventions for pregnant and parenting AAW smokers have been designed to decrease stress and minimize smoking impact on children of smoking mothers. Several successful interventions to date have been directed at building social support networks and prenatal healthcare assistance to alleviate stress (Jesse, Walcott-McQuigg, Mariella, & Swanson, 2005; Klerman et al., 2001; Savitz et al., 2001). Still, as almost one-half of all AAW mothers are head-of-household, it is important to continue to investigate the role that parenting has on smoking status and behaviors.

3.2.3. Intrapersonal and psychiatric factors

Psychological and psychiatric factors appear to uniquely contribute to smoking behaviors among AAW. There significant associations between nicotine dependence and Axis I and II psychiatric disorders in the general American population (Grant et al., 2004). Examination of gender differences in the smoking-psychiatric disturbance link indicates that women who smoke are significantly more likely to experience current or past depression in their lifetime than men (Husky, Mazure, Faliwal, & Mckee, 2008). In a multi-ethnic sample, Leventhal et al. (2007) found that women were more likely to report
spiritual in et al., 1991). Further evidence suggests that religious affiliation, smoking among AAW, but not among African American men (Romano et al., 2005) and environmental contributors to smoking and predicting smoking behavior among African Americans. Specifically, strong social networks were associated with lower likelihood of smoking among AAW (Nollen et al., 2005) and between initiation of cigarette smoking and alcohol, and between initiation of cigarette smoking and other behavioral factors, such as smoking, as part of the Black Women's Health Study (1995, N = 64,500). Heavy drinking was associated with smoking status among AAW across several geographic regions in the US (Rosenberg et al., 2002). In a smaller longitudinal sample of AAW twins (N = 463), both smoking and alcohol initiation rates shared strong genetic variances (62% and 44%, respectively). Significant associations were also found between initiation of cigarette smoking and alcohol, and between initiation of cigarette smoking and cannabis use (Sartor et al., 2009). While genetics may account for some overlap between substance use and smoking among AAW, environmental contributors to smoking and substance comorbidities among AAW should be explored.

3.2.4. Other substance use

According to data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC, N = 41,654), there is a strong comorbidity between smoking behaviors and other substance use (e.g., alcohol) within the general population (Grant et al., 2004). Consistent with this finding, a large, multi-ethnic community sample of women over 50 was surveyed about their current smoking status and alcoholic beverage consumption (N = 946). The sample population was solely comprised of AAW and Caucasian American women, and a significant association was found between positive smoking status and greater alcoholic beverage consumption between both groups (Friedman et al., 1999). Further, a cross-sectional study of national sample of AAW, ages 21 to 69, were surveyed about their alcohol consumption and other behavioral factors, such as smoking, as part of the Black Women's Health Study (1995, N = 64,500). Heavy drinking was associated with smoking status among AAW across several geographic regions in the US (Rosenberg et al., 2002). In a smaller longitudinal sample of AAW twins (N = 463), both smoking and alcohol initiation rates shared strong genetic variances (62% and 44%, respectively). Significant associations were also found between initiation of cigarette smoking and alcohol, and between initiation of cigarette smoking and cannabis use (Sartor et al., 2009). While genetics may account for some overlap between substance use and smoking among AAW, environmental contributors to smoking and substance comorbidities among AAW should be explored.

3.2.5. Social support, spirituality and religion

Two crucial protective psychosocial factors for AAW are social support and religion. Social support has been shown to be inversely associated with smoking status among AAW (Nollen et al., 2005) and increases in social support have been shown to predict smoking abstinence (Andrews et al., 2007). Regarding social support, there is an interaction between social support and gender in predicting smoking behavior among African Americans. Specifically, strong social networks were associated with lower likelihood of smoking among AAW, but not among African American men (Romano et al., 1991). Further evidence suggests that religious affiliation and spiritual influences contribute to decreased smoking behaviors among AAW specifically (Ahmed et al., 1994; Elizabeth Jesse, et al., 2006; Lehman, McKeown, Bacon, Vesselino, & Bush, 2007). Ensinger et al. (2009) found several associations between smoking and social disadvantage (e.g., poverty, low education) in a large metropolitan, longitudinal sample of AAW. Despite significant social disadvantages, the researchers found that AAW who reported attending church less than a few times a month were significantly more likely to endorse current smoking than those who endorsed never or former smoking. Protective factors, such as social support, religious affiliation, and spirituality, may further reduce the effects of demonstrated social stress or disadvantages that are experienced among AAW. Such protective factors may ultimately assist with smoking prevention or cessation in this group. Because AAW are members of a historically disadvantaged minority group, particular examples of social stress may also include racism and discrimination. Both racism and discrimination experiences have been shown to be positively associated with smoking (Guthrie et al., 2002; Landrine & Klonoff, 2000).

Culturally-tailored social support interventions for AAW that include counseling and/or religious or spiritual elements enhance odds of cessation success (Andrews et al., 2007; Sanchez-Johnsen, 2005), which further supports and combines the roles of social support and religion in reducing smoking risk in women. Yet, it is unknown whether these interventions if used in combination with pharmacological treatments, standard smoking cessation counseling, and education about biological genetic factors about nicotine metabolism, would be particularly effective for AAW. It is possible that a more comprehensive intervention that aims to address multisystem factors involved in smoking could lead to greater cessation rates for AAW.

4. Consequences

Although the prevalence of smoking is lower in AAW than other demographic groups, when examined in detail, several statistics are alarming and represent significant health disparities that singly exist for AAW. In general, African Americans are more likely to develop smoking-related illnesses, including cerebrovascular disease, hypertension, lung and bronchial cancer and stroke (CDC, NCHS, 2008; American Cancer Society, 2007), which speaks to general ethnic health disparities without considering gender. The American Cancer Society has tracked the incidence of smoking-related illness and cancers specifically among AAW (ACS, 2007). There appear to be interactions between gender and ethnicity in predicting risk of lung and bronchial cancers, which are the second most commonly diagnosed cancer among African Americans. While AAW are less likely to smoke and develop lung or bronchial cancer than African American men (112.2 vs. 53.1 per 100,000 individuals), differences in the incidence of lung and bronchial cancers between Caucasian American men and women are less pronounced (81.7 vs. 54.7 per 100,000 individuals).

There are also noteworthy disparities in smoking-related cancers (e.g., lung, bronchial) between AAW and Caucasian American women. For example, the incidence of lung and bronchial cancers between AAW and Caucasian American women were almost identical (53.1 vs. 54.7 per 100,000 persons, respectively). At first glance, this statistic may not seem significant. However, it is especially alarming when considering that Caucasian American women are more likely to be smokers and are more often “heavy” smokers than AAW according to national statistics (CDC, NCHS, 2008). If smoking status is lower among AAW, one would expect smoking-related cancer rates to be much lower. Contrarily, this not the case, as AAW appear to be approximately equivalent in lung or bronchial cancer diagnoses. Additional evidence indicates that AAW are more likely to develop cancer of the larynx, esophageal cancer, cerebrovascular disease, and cardiovascular disease than Caucasian American women (ACS, 2007). Furthermore, smoking trends in the last 25 years demonstrate that smoking has decreased among AAW, but smoking-related illnesses have not (ACS, 2007; CDC Mortality and Morbidity Weekly Report, 2008; US DHHS, 1998).

Several factors could potentially contribute to the relative discrepancy between smoking rates and lung and bronchial cancers in AAW. Underreporting of smoking behavior is one potential factor. In one sample of AAW, the underreporting percentages varied, but were considerable. Eight–six percent of light smokers underreported smoking when reports were contrasted with cotinine values.
Moderate and heavy AAW smokers also underreported (70% and 21%, respectively), though percentages suggest that they did so less than light smokers (Ahijevych & Wevers, 1994). This finding is suggestive that self-identified “light” AAW smokers may be heavier smokers then they report. Another potential explanation is that AAW are differentially sensitive to the carcinogenic effects of smoking when compared to Caucasian American women (Ahijevych & Wevers, 1994). Finally, the rate of smoking-related diseases among AAW may simply be explained by the relatively high prevalence of smoking among older AAW (CDC, NCHS, 2008). There is a relatively high prevalence of smoking in older AAW. Thus, trends indicating high rates of smoking-related diseases among AAW could be a product of smoking during late adulthood, which is when several smoking-related diseases onset (Moolchan et al., 2007). Health disparities could also be due to other lifestyle and health factors such as diet and nutrition, overweight status/obesity, physical inactivity, cardiovascular disease, second hand smoke and other comorbid health problems (American Cancer Society, 2007; CDC, NCHS, 2008; Daroszewski, 2004). Nonetheless, these findings highlight a greater need for exploration of factors involved in smoking-related illness for AAW.

5. Summary

This article reviewed and integrated the current literature on the epidemiology, determinants, and consequences of smoking among AAW. Several notable trends were identified, which speak to the need for research and practice to consider the unique factors that play a role in smoking among the AAW.

In comparison to African American men and Caucasian women, AAW are less likely to smoke, initiate smoking later, are more likely to smoke mentholated cigarettes, and more likely to be classified as “light” smokers, and less likely to be nicotine dependent. Despite starting later and smoking less, AAW appear more likely to smoke with older age, which is a high risk period for health problems. This may, in part, explain why AAW continue to have high rates of smoking-related diseases. There are some unique etiologic influences on smoking among AAW, including metabolic and genetic factors. In addition, AAW appear to be prone to smoking because of its negative affect reducing properties, which may be useful to help cope against the unique and considerable psychosocial stressors that AAW face (e.g., urban environment, low economic resources, single parent-hood). In essence, AAW are products of unique biological, psychoso- cial, and sociocultural factors, which may play a role in smoking.

Implications for future research and practice can be drawn from the trends noted in this review of the literature. Additional research is needed to understand why smoking prevalence in AAW has decreased over the years. Perhaps if specific protective factors that account for these declining trends were identified, interventions to reduce and prevent smoking among AAW could be developed. Relatedly, it will be important for future research to investigate unique factors that potentially link smoking behavior to tobacco-related diseases among AAW, given epidemiologic trends for smoking-related illnesses among AAW continue to indicate high risk.

Given the present state of the etiology literature for smoking among AAW, additional research clarifying smoking topography indices among AAW and their potential linkages with biochemical determinants of smoking (e.g., nicotine metabolism) is warranted. Because there is now a reasonable degree of evidence indicating the important role of psychosocial stressors and negative affect in smoking vulnerability in AAW, tailored treatments targeting these determinants may be particularly effective in AAW smokers. AAW appear to have benefited from interventions that utilize social support and counseling models to address some distinct psychosocial issues associated with smoking (Ahmed et al., 1994; Li et al., 1984). Thus, tailored interventions designed to help AAW deal with stress and negative affect may be useful if methods to enhance social support and religious community involvement are emphasized (Ensminger et al., 2009; Nollen et al., 2005). AAW have been historically underrepresented in research as African Americans and as women. Undoubtedly, continued research of epidemiology, determinants, and consequences of smoking in AAW is a worthwhile endeavor that could ultimately reduce the public health burden of tobacco use.

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Conflict of Interest

There is no conflict of interest on behalf of any of the authors on this manuscript.

References
