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A Review of Tobacco Use Treatments in U.S. Ethnic Minority Populations

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Abstract

Background—Tobacco use is the leading preventable cause of disease and death in the United States. Among racial and ethnic minorities, disparities in tobacco use, knowledge of health risks and treatment resources, access to and utilization of treatment contribute to a disproportionate disease burden from tobacco use. Furthermore, racial and ethnic minorities have been under-represented within tobacco treatment studies.

Purpose/Objective—This paper provides a review of published studies examining tobacco treatment interventions among ethnic and minority populations in the United States.

Study Design/Methods—Literature searches were used to identify smoking cessation interventions involving racial/ethnic minority populations. Identified studies were published between 1985 and 2009 involving African American, Latino, Native American, Asian or Pacific Islander smokers. Studies included in the review a) targeted one or more ethnic minority group or had at least 10 percent of study participants from ethnic minority groups and b) reported abstinence outcomes.

Results—Sixty-four studies were included in this review. Of studies meeting inclusion criteria, 28 included a primary focus on African Americans, 10 focused on Latinos, 4 focused on Native Americans, and 3 focused on Asian American smokers. An additional 19 studies reported samples including participants from more than one minority group. Sample inclusion criteria, intervention content and duration, follow-up, abstinence assessment, and limitations of these studies were reviewed.

Conclusions—Individuals from racial and ethnic minority populations are interested in stopping smoking and willing to participate in treatment research. Variations in the content of treatment

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DISCLOSURE OF INTERESTS

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intervention and study design produced a range of abstinence outcomes across studies. Additional research is needed for all groups, including African American smokers, and special attention is warranted for Latino, Native American, and Asian groups given the paucity of published studies. While there were limited evaluations of pharmacotherapy, the existing data support use of pharmacotherapy in addition to counseling for enhancing abstinence outcomes. Further attention to level of individual smoking, variability in smoking patterns, and use of other tobacco products is needed, given known variation within and between racial and ethnic groups. Overall, findings are consistent with recommendations from the *2008 Clinical Practice Guidelines* calling for increased research devoted to evaluating and enhancing tobacco use treatment interventions among racial and ethnic minority populations.

INTRODUCTION

Despite major advances in tobacco control and treatment, tobacco use remains the leading preventable cause of disease and death in the United States.[1] Tobacco use is responsible for 1 in 5 deaths, accounting for approximately 443,600 annual premature deaths between 2000 and 2004.[2, 3] Cigarette smoking is a major cause of heart, cerebrovascular, and lung diseases, and accounts for approximately 30% of all cancers.[1]

Following decades of declining smoking prevalence in the U.S., tobacco use in the general population appears to be reaching a plateau at approximately 20%.[4] Decline in smoking prevalence is not universal across all sub-populations of smokers, and smoking rates for certain groups remain high (e.g., some racial/ethnic minorities, individuals with low socioeconomic status, individuals with psychiatric comorbidities).[4, 5] Smoking prevalence varies greatly based on racial/ethnic group, and often based on gender within group, as shown in Table 1, with some subgroups demonstrating rates of smoking exceeding 40%. The four major racial/ethnic groups in the U.S. (African Americans, Hispanic/Latinos, American Indian/Alaska Native, and Asian American) account for almost 33% of the current population (12.2%, 15.4%, 0.8%, and 4.4%, respectively).[6] By 2050, almost half of the U.S. population will be African American (15%), Latino (21%), American Indian/Alaska Native (1.1%), or Asian American (11%). Addressing tobacco use among growing racial and ethnic minority populations is a critical public health priority.[7, 8]

While the majority of smokers want to stop smoking, minority smokers are less likely to receive advice to stop smoking, to use recommended treatment to aid cessation, or to be successful in achieving or maintaining abstinence.[9–15] Within racial and ethnic minority populations, factors such as lower SES, language barriers, reduced access to healthcare, and lower rates of insurance coverage among some groups contribute to reduced access to treatment.[16] Notable differences between minorities and Whites in smoking prevalence, patterns of use, and treatment outcomes have been well documented elsewhere[10, 17–20] and contribute to the need to evaluate treatment interventions within minority smokers.[4, 21–23] Furthermore, within minority populations, significant differences exist in prevalence, patterns of use, and factors associated with use. Indeed, heterogeneity within these broadly defined groups encompasses multiple cultural factors, acculturation, community affiliation, and country of origin which add further complexity to understanding tobacco use and treatment. Benowitz [24] proposed that because genetic, sociocultural, and pharmacological

determinants of smoking may differ by racial and ethnic group, smoking cessation interventions may produce varying outcomes in smokers of different groups; therefore, empirical evaluation of specific interventions across different groups is warranted.

Recommendations for the treatment of tobacco dependence are found in the United States Public Health Service (USPHS) Clinical Practice Guideline, *Treating Tobacco Use and Dependence: 2008 Update*.[25] The Guideline reflects the review of more than 8,700 research articles to identify effective, experimentally validated treatments and clinical practices. Specific recommendations are provided with the goal of assisting clinicians and healthcare systems to effectively identify and treat all tobacco users. Key recommendations include universal identification of all tobacco users and the treatment of smokers who want to quit using both counseling and pharmacotherapy to aid cessation, unless contraindicated. Guideline recommendations apply to smokers of racial and ethnic minorities, with the acknowledgement of limited inclusion of minority smokers within treatment research. Importantly, the Guideline specifically calls for additional research on effectiveness of smoking cessation interventions among racial/ethnic minority populations, efficacy of culturally adapted versus generic interventions (see also Borrelli[5]), factors salient to treatment, and identification of barriers to enhance access and efficacy of intervention for these groups.[25] To contribute to this call, the goal of the current paper is to provide a review of published studies examining tobacco treatment interventions among ethnic and minority smokers in the United States, building upon previous literature reviews.[26, 27]

METHODS

Articles were identified using a Medline search of smoking cessation interventions on the racial/ethnic minority populations of interest in the United States published from 1985 through 2009. Additional sources utilized for searches included PsychInfo, Social Science Citation Index, conference abstracts, personal files and contacts, as well as author searches from articles found from earlier searches. Search terms used to identify smoking cessation studies included smoking cessation, tobacco use intervention and treatment, and smoking clinical trials. Population-specific search terms used included African American, Black, Hispanic American, Latino, Mexican American, Native American, Alaskan Native, American Indian, Asian American, and Pacific Islander. To be selected for inclusion a study must meet the following criteria, (a) have been conducted in adults 18 years or older, (b) have targeted one or more U.S. ethnic minority group or have at least 10 percent of study participants come from ethnic minority groups, and (c) have reported smoking cessation as an outcome. Articles that met these criteria were reviewed by authors to extract relevant information outlined in Table 2.

RESULTS

The broad initial search yielded approximately 900 publications, but most were not tobacco use treatment studies. Of identified treatment studies, most did not include 10% racial or ethnic minority smokers, and a few did not report smoking abstinence as an outcome. A total of 64 studies met our inclusion criteria and are presented in this review: 28 included a primary focus on African Americans, 10 focused on Latinos, 4 focused on Native

Americans, and 3 focused on Asian American smokers. An additional 19 studies reported samples including participants from more than one minority group. Table 2 presents an overview of study design, intervention, and outcomes arranged by primary racial/ethnic group and year of publication. The study designs of the reviewed publications included 36 individually randomized, 4 cluster-randomized, 14 quasi-experimental, and 10 cohort studies. Assessment of demographics, smoking history, social and psychological correlates of smoking behavior varied across studies, as did duration of intervention and length of follow-up. Outcome measures were not consistent: while all studies included in this review reported smoking abstinence, the definition of abstinence varied from unspecified point-prevalence to 7-day point prevalence to continuous abstinence. Over time, studies increasingly included collection of biochemical measures, e.g., expired air CO, salivary cotinine, and urinary cotinine, although a number of studies did not complete or report biochemical verification. Biochemically verified abstinence was reported within this review when available. Overall findings across pharmacotherapy studies, behavioral interventions, and community-wide interventions are summarized below.

Pharmacotherapy

Nicotine replacement therapy—Eight randomized trials evaluated nicotine replacement therapy (NRT) compared to either placebo[41, 50, 53, 58, 88] or to a non-medication control condition,[45, 54, 91] while one randomized trial examined nicotine patch compared to nicotine nasal spray.[81] While interventions including nicotine gum increased abstinence among African American smokers in the Lung Health Study,[34] no significant benefit of nicotine gum was found among exclusively or predominantly African American samples in three other studies. [50, 53, 91] In contrast, evaluation of nicotine patch demonstrated efficacy with samples of African American[41, 45, 54] and Latino[58] smokers and with a multi-ethnic sample including 12% ethnic minority smokers.[88] Within these nicotine patch studies, abstinence rates in the treatment conditions ranged from 22–49% at end of treatment[41, 58, 88] to 17–30% at long-term follow-up at or beyond 6 months.[41, 45, 54] One randomized study of nicotine patch versus nasal spray among a racially diverse sample of smokers demonstrated similar overall 6-month abstinence rates across the full sample (29% for nicotine patch and 25% for nicotine nasal spray), with a relative benefit from use of nasal spray demonstrated among ethnic minority smokers (sample including 27% African Americans, 3% Latinos, 2% Asian Americans). [81] There were no randomized controlled studies of nicotine lozenge, nicotine inhaler, combination NRT, or NRT combined with bupropion. Other studies of African American,[48, 49, 55] Latino,[62, 63, 67] Alaskan Native,[68] Chinese American,[74] and multiethnic samples[90] have demonstrated the feasibility of patch or other NRT use within cohort studies or randomized evaluation of behavioral interventions.

Non-nicotine pharmacotherapy—Four randomized placebo-controlled studies evaluated bupropion in samples of African American[46] or ethnically diverse smokers.[85, 86, 92] One small multiethnic study of female smokers including 25% African Americans and 5% Latinas found no significant effect for bupropion at 12 months.[92] In contrast, three larger studies found significant effects of bupropion relative to placebo, demonstrating abstinence rates of 21% vs. 14% at 6 months among African American smokers,[46] and 12-month abstinence of 16% vs. 8%[85] and 20% vs. 13%[86] in multiethnic

samples including approximately 10% African American and 2% Asian smokers. A third randomized treatment arm evaluating varenicline was included in two multiethnic studies: findings demonstrated efficacy of varenicline over both bupropion and placebo in the full sample, with 12-month abstinence in varenicline arms approaching 22% [85] and 30%.[86] However, neither of the varenicline studies directly reported efficacy of bupropion or varenicline for minority smokers alone.[85, 86] One final study evaluated silver acetate lozenge versus placebo in a sample of both white and African American smokers and found no main effect of treatment at 12 months.[32]

Behavioral Interventions

The majority of behavioral interventions included multiple components involving some combination of brief or extended counseling, group counseling, telephone counseling, written materials or other educational materials.

Culturally adapted interventions—Of studies targeting a single racial or ethnic group, most incorporated some elements of intervention defined by the investigators as culturally tailored. These components included written materials (described below); video for African American,[33, 36, 94] Latino,[60] and American Indian[70] smokers; audio components for African American[33] and Latino[59] smokers; and television and radio messages for Latino[57] and Vietnamese American[72, 73] smokers. One study directly evaluated a non-tailored intervention using telephone counseling and written materials to an equivalent intervention with tailored telephone counseling and tailored written materials[39] for African American smokers: while no significant difference in abstinence outcomes occurred at 6 month follow-up, participants reported statistically greater abstinence in the tailored group (25%) compared to standard intervention (15%) at 12 months. Another study provided nicotine patch therapy to African American smokers and evaluated adjunct self-help materials comparing either culturally sensitive video and guide to non-tailored video and guide.[55] While 6-month abstinence was similar between the culturally tailored (18%) and standard (14%) interventions ($p > 0.05$), a significant treatment by racial identity interaction suggested standard materials may be less effective for smokers with stronger racial identity.[55]

Printed materials—Of the 64 studies reviewed here, 32 (50%) included some form of printed smoking cessation materials. In most cases, studies incorporating written materials into an intervention provided these materials to all smokers across treatment conditions. In addition to standard stop smoking materials published by the American Lung Association, American Cancer Society, and National Cancer Institute, written materials have been specifically developed for African American, Latino, and Asian smokers involving language-appropriate content for non-English speaking smokers. The tailored guide *Pathways to Freedom* included culturally specific images and content related to African American smoking and health and demonstrated benefit relative to standard materials in two multi-component studies[39, 94] described above. Pérez-Stable and colleagues developed a culturally tailored and language appropriate Spanish-language guide, *Guía para Dejar de Fumar*, which has been used widely within Latino interventions.[56, 59–61, 64] Another Spanish-language guide, *Tomando control de su Vida*, was developed specifically to address

mood management within treatment: this manual demonstrated significant efficacy in promoting abstinence in Latino smokers when combined with the *Guía* (25% abstinence at 6 months), relative to using the *Guía* alone (9%).[59] Tobacco use treatment materials have been developed for American Indians and are currently under evaluation.[95] Special written materials have also been included within interventions for pregnant smokers, such as *Time for a Change: A Program for Healthy Moms and Babies* [77] and *Quitting for You 2*.[80]

Counseling

Theoretical approach: The theoretical approach reflected within counseling was not defined consistently across studies. Common approaches included motivational counseling,[53, 62, 74, 83] cognitive behavioral therapy,[45, 84, 88, 92] health education,[53, 74] and supportive counseling.[28, 60, 92] One study examined case management.[52] Two studies directly compared motivational interviewing (MI) and health education (HE) counseling with smokers interested in quitting and willing to use pharmacotherapy to aid cessation, and provided 6 month outcomes.[53, 74] Within a sample of African American smokers, HE doubled quit rates relative to MI (17% vs. 9%, biochemically verified abstinence).[53] In contrast, a sample of Chinese Americans found a doubling effect of MI over HE (67% vs. 32%, self-reported abstinence).[74] Reasons for this notable difference in findings are unclear.

Content of counseling: Content of counseling varied from brief advice, single session counseling, and multiple session counseling. Interventions varied from face-to-face, combined face-to-face and telephone follow-up counseling, group counseling, combined individual and group counseling, and telephone counseling only. While two studies examined brief advice alone compared to usual care and found no increase in abstinence,[42, 51] brief advice within a multi-component intervention and interventions with more extensive counseling commonly produced increased abstinence relative to usual care in African American smokers.[29, 43, 44] Two studies reported higher abstinence rates for individuals who completed more sessions of counseling: one study included African American smokers[50] and the second included Latino smokers.[64] The majority of studies did not describe treatment engagement or adherence (e.g., the proportion of counseling sessions completed). Although social support was included within many interventions, social support as a specific component of intervention was not directly tested.

Telephone counseling: All five studies evaluating telephone counseling supported the efficacy of this mode of individual counseling. Telephone counseling outperformed printed smoking cessation materials alone among African American[43] and a mixed sample of smokers.[82] Tailored telephone counseling produced higher rates of abstinence relative to standard telephone counseling.[39] In an evaluation of Latino smokers using the telephone quitline, Wetter and colleagues[64] found extended intervention up to 4 calls produced significantly higher abstinence (27%) compared to a single call (21%), providing additional evidence for a dose-response relationship in behavioral intervention. Further support for state telephone quitlines was provided by Maher and colleagues[90] who found similarly strong 3-month abstinence outcomes across racial/ethnic groups within a diverse sample, with 30% self-reported abstinence among non-Hispanic Whites, 33% among Asian/Pacific Islanders, and 35% among African Americans, Latinos, and American Indian/Alaska

Natives. Other studies also incorporated telephone counseling following initial face-to-face intervention.[28, 38, 46, 53, 61, 62]

Group counseling: Interventions involving group therapy were largely effective. Of five controlled studies of group therapy compared to minimal intervention, four (80%) demonstrated significant benefit including long-term efficacy (6 months – 5 years) in African American smokers[29, 45, 54] and short-term efficacy (8 weeks) among Latinos.[60] One study with African American smokers showed no added benefit of group counseling within a multi-component intervention.[33] Four other studies involving group therapy for all participants demonstrated notable rates of abstinence following treatment for Latino,[63] Alaska Native,[68] and mixed samples of smokers.[81, 88]

Lay Health Providers/Promotores—Community volunteers, lay health providers, or 'promotores de salud' were utilized within multi-component interventions for African American,[47] Latino,[57, 61] American Indian,[70] and mixed ethnic samples of smokers.[80] Woodruff and colleagues[61] evaluated promotores-delivered counseling combined with culturally tailored written materials and video for Latino smokers compared to referral to the state telephone counseling quitline and found significantly greater abstinence at 3 months within the intervention group (21%) relative to control (9%). While the other interventions did not directly test the efficacy of lay providers per se, these studies provided examples of considering community members to enhance cultural relevance within roles of identifying and recruiting smokers, conducting data collection, delivering intervention, and/or facilitating retention.

Novel behavioral intervention components—Four studies examined smoking cessation interventions alone or with an added experimental treatment component and found mixed results as follows. Biomarker feedback regarding genetic susceptibility to lung cancer produced significantly higher rates of 6-month term abstinence in African American smokers when combined with nicotine patch and self-help materials compared to the intervention without feedback (19% vs. 10%),[48] although this significant difference was not sustained at 12 months (15% vs. 10%). No significant elevation in abstinence was seen among smokers in a multi-ethnic sample receiving feedback about their carbon monoxide levels in concert with motivational interviewing compared to a standard intervention.[83] Within another multi-ethnic sample, the addition of exercise to a cognitive behavioral intervention demonstrated significant benefit at 3 months but not at 12 months.[84] Finally, a mood management intervention for Latino smokers significantly increased rates of abstinence at 6 months compared to a culturally tailored intervention alone (25% vs. 9%).[59]

Community-wide interventions

Of seven quasi-experimental studies evaluating community-wide smoking cessation interventions,[34, 37, 40, 54, 57, 72, 73] five (71%) demonstrated a significant impact on abstinence. Three of four studies within African American communities found significant reduction in smoking status relative to comparison communities with interventions extending from 6 to 24 months.[37, 40, 54] Intervention components included mass media, community organizing activities, door-to-door campaigns, smoking cessation classes, and a

Gospel festival.[37, 40] A culturally tailored intervention targeting African American women, *Sister to Sister*, incorporated community health workers with nurse-delivered "empowerment" group counseling, and provided free nicotine patches for 6 weeks: significant effect of intervention was demonstrated in 28% abstinence at 6 months within the intervention community compared to 6% in the control community.[54] In contrast, one multi-component smoking cessation intervention for African American smokers found no significant increase in abstinence when compared to an intervention focusing on alternate health behaviors (e.g., diet, exercise).[34] One program for Latino smokers, "Programma A Su Salud", combined language and culturally relevant television, radio, and newspaper stories with community volunteers, counseling, and written materials and found 17% abstinence at 2 years to be significantly greater than 7% within a control community,[57] while a cohort study found 14% abstinence at 12 months following community-wide intervention including broad distribution of culturally tailored self-help materials.[56] Finally, two similar multi-component interventions focused on smoking cessation among men in Vietnamese American communities and found differing outcomes.[72, 73] Both interventions included tailored mass media, community events and health education materials. One study found no difference between intervention and control communities following a 24-month campaign[72] while a second study which further added student and family activities, physician education, and business events produced higher rates of abstinence among Vietnamese men at 39 months.[73] The investigators suggested the potential importance of broadening the reach of intervention and continuing community efforts over time.

Special considerations

Differential participant response within treatment—Seven studies demonstrated racial or ethnic differences in response to intervention.[29, 32, 38, 49, 77, 79, 87] Two large studies among military personnel under a tobacco use ban demonstrated poorer abstinence outcomes among white smokers relative to minority smokers in one study[79] and relative to Latino and African American smokers in a second study,[87] while the second study also demonstrated Asian American smokers had relatively poorer abstinence outcomes.[87] In two studies intervening with pregnant female smokers, African American women demonstrated higher rates of abstinence following intervention relative to White smokers[29] and Latina smokers.[77] African American smokers were more likely to quit smoking, relative to White smokers, in a study of brief nurse-delivered counseling[38] and a randomized study of silver acetate lozenge.[32] In contrast, one study of nicotine patch with or without adjuvant counseling found rates of abstinence among African American smokers (9%) to be significantly lower than White smokers (14%) at 12-months.[49]

Two other studies found notable within-group differences in treatment response. Bock and colleagues[62] evaluated nicotine patch and brief counseling for Latino and non-Latino White smokers and found significantly greater self-reported abstinence among less acculturated Latinos (21%) compared to bicultural Latino (9%) or White (13%) smokers. Furthermore, among evaluation of African American and Latino smokers who received individual clinical treatment for tobacco use, non-menthol users were twice as likely to be abstinent at 6 months compared to menthol users.[93]

Short-term and long-term abstinence—Some interventions demonstrated significant effects on short-term (e.g., 3 months) but not long-term (e.g., 12 months) abstinence in samples of African American,[32, 48] Latino,[60] and ethnically diverse groups of smokers.[84] These mixed outcomes demonstrate the need for intervention components to prevent relapse and facilitate long term smoking behavior change.

DISCUSSION

This review provided a summary of two decades of tobacco use treatment evaluation among racial and ethnic minority smokers in the United States. Although ethnic minority smokers remain underrepresented within smoking cessation research, the literature clearly supports the feasibility of recruiting and treating minority smokers within both clinical trials and community interventions. Within the existing research, African Americans have the greatest representation, with fewer studies evaluating Latino smokers, and limited attention given to Native American and Asian American smokers. Overall, the literature broadly supports the *Clinical Practice Guidelines*' recommendations for a) intervention for all tobacco users, with application of pharmacotherapy and counseling to promote abstinence, and b) needed research to further establish evidence-based treatments for racial and ethnic minority smokers.[25]

Given the limited evaluation of tobacco use treatment among minority smokers and the need to further establish evidence-based interventions, additional research focused on specific racial and ethnic groups is called for. Because smoking prevalence, smoking initiation, patterns of tobacco use, and factors associated with smoking behavior and behavior change differ across segments and subgroups of our population,[17] clinicians and investigators cannot assume treatments are appropriate and effective for all smokers.[22] Until investigators have the means available to "deconstruct racial and ethnic differences into genetic vs. social vs. pharmacologic differences, and their interactions," empirical evaluation of the efficacy of different interventions across racial and ethnic subgroups is required.[24] Evaluation of environmental, sociocultural, psychological, and biological factors that contribute to tobacco use and treatment response,[96] and identification of protective or risk factors related to treatment engagement and outcome, would contribute to enhanced interventions for all smokers.

The current review provided support for pharmacotherapy to aid cessation, with evidence for nicotine patch use for Latino smokers, and nicotine patch, nicotine nasal spray, and bupropion for African American smokers. To date, studies of nicotine gum use in African American smokers demonstrated no efficacy. Other studies demonstrated acceptability of use of nicotine patch among Alaska Natives and Chinese Americans, nicotine lozenge, and gum for Latinos. Studies also demonstrated acceptability of bupropion for Latinos as well as acceptability of bupropion and varenicline among ethnically diverse samples including small numbers of African American and Asian smokers. While counseling and multi-component behavioral interventions have demonstrated mixed results, the overall body of literature supports counseling and written materials to aid smoking abstinence. Positive outcomes were seen within individual and group counseling interventions. Interventions commonly included behavioral strategies, support and general relapse prevention. Further evidence

supported use of written materials and telephone counseling across all groups. In summary, these findings support tobacco use treatment intervention for minority smokers.

Given the potential for pharmacotherapy to double or triple rates of abstinence within treatment,[25] careful evaluation of pharmacotherapy is needed. Within pharmacotherapy studies, explicit description of the medication protocol is needed, including type of pharmacotherapy, dose, and length of treatment. No studies have previously tested the efficacy of nicotine lozenge, nicotine inhaler, combined use of nicotine replacement therapy (NRT), combined use of NRT and bupropion, or use of varenicline in any ethnic minority sample. Studies have not evaluated efficacy of nicotine gum, nasal spray, or bupropion in Latino, American Indian, Alaska Native, Asian, or Pacific Islander samples. Furthermore, given efficacy of the nicotine patch demonstrated in African American and Latino smokers, it also merits examination within Native American and Asian American smokers. These studies could include examination of sociocultural, psychological, and biological factors contributing to treatment efficacy within groups. Furthermore, for products demonstrating efficacy, effectiveness studies are also needed to examine acceptability, utilization, and potential barriers to use within different populations.

The degree to which cultural adaptation of evidence-based interventions is necessary or preferable remains unclear. Language-specific adaptation is clearly needed for non-English speaking populations. While many studies support the implementation of other culturally tailored components within interventions, only two studies specifically evaluated non-tailored versus tailored interventions. Culturally tailored intervention may be more or less acceptable or effective given individual differences within groups, and these within-group differences should also be considered during evaluation.[55, 97, 98] Borrelli[5] articulated considerations for cultural adaptation of evidence-based treatment for smoking cessation, and further supported the call for theory-based intervention to improve our understanding of the treatment process and smoking behavior change. In addition, innovative formative research within specific populations will provide further contributions to advancing treatment.

The primary outcome examined within this review was smoking abstinence. Variations in outcome assessment, follow-up, and method of analysis restricted comparison of findings across studies. Indeed, when examining abstinence rates reported within this review, consideration should be given to methodology used in assessing abstinence within the original studies. This review found instances of undefined self-reported abstinence, limited collection of biochemical verification of smoking abstinence, and exclusion of participants lost to follow-up within outcome analyses. The Society for Research on Nicotine and Tobacco (SRNT) subcommittees on abstinence outcome measures[99] and biochemical verification[100] developed recommendations for outcome assessment. The recommended primary outcome was prolonged abstinence (defined as continuous abstinence following a two-week grace period), using seven- and 30-day point prevalence as a secondary outcome: six and/or 12 month follow-up are recommended to examine long-term treatment effects.[99] Recommended validation of self-reported smoking abstinence included expired breath carbon monoxide (CO) and cotinine in plasma, urine, or saliva. Recently, new biochemical standards were proposed for distinguishing differences in smoking status for specific racial

and ethnic groups.[101] Collection of biochemical samples may not be feasible for some large-population/low-intensity interventions. However, it is recommended that both self-report and biochemical data are reported when possible to allow comparisons of outcomes.[100] Finally, careful reporting of participants who drop out or are lost to follow-up, combined with intent to treat analysis would further promote comparisons of findings across studies.

Reporting other outcomes related to smoking behavior could contribute to evaluation of treatment effects and further our understanding of how to promote behavior change. Secondary outcomes to consider include treatment engagement/adherence, number of quit attempts,[39] change in smoking level (e.g., reduction in cigarettes per day),[59] and changes in intention or motivation[33, 34, 44] or other cognitive processes that may contribute to behavior change.[46]

Future research must articulate the racial/ethnic characteristics of study participants, and studies including multi-ethnic cohorts are recommended to report outcomes for each group. Studies should clearly define the smoking characteristics of study participants. Most studies within this review specifically defined participants by smoking level (cigarettes per day), others did not report smoking level, and few reported smoking frequency (e.g., daily or non-daily use). Only a handful of studies specifically reported inclusion of smokers who used fewer than 10 cigarettes per day,[59, 83, 84, 91] only one study focused intervention specifically for light smokers,[53] and no study evaluated treatment for non-daily smokers. Few studies reported type of tobacco use, specifically menthol use. Given the repeated finding that menthol users have poorer treatment outcomes,[93, 102, 103] assessment and reporting of menthol use is important. Given the prevalence of light and non-daily smoking and menthol use within some minority populations, there is an essential need for innovative research in these areas. Finally, limited data exist on minority populations' use of chewing tobacco, snuff, cigars, and other forms of tobacco. In effort to reduce tobacco-related morbidity and mortality and to treat nicotine dependence, other forms of tobacco must not be overlooked.

Overall utilization of effective treatment to aid cessation is low in the United States,[20] but is particularly low among racial and ethnic minority smokers.[10] Barriers to treatment include availability of services, knowledge of smoking cessation resources, healthcare access, cost, and availability of language specific resources. Therefore, in addition to identifying effective interventions, efforts are needed to increase implementation of interventions, availability and awareness of treatment resources, and demand for treatment among minority smokers.

The current evaluation is limited to four primary ethnic minority groups in the United States. Additional evaluation of tobacco use treatment interventions is needed for other understudied populations including adolescent and elderly smokers, lesbian, gay, bisexual, and transgender (LGBT) groups, economically disadvantaged smokers, and smokers with specific medical or psychiatric co-morbidities with the goal of enhancing treatment for these smokers.

Summary

Individuals from racial and ethnic minority populations are interested in stopping smoking and willing to participate in treatment. Studies generally supported behavioral counseling

and pharmacotherapy to aid cessation. However, additional research to establish effective treatment is needed for all groups, including African American smokers, and special attention is warranted for Latino, Native American, and Asian groups. The need for cultural adaptation of intervention to maximize efficacy merits further evaluation. Taken as a whole, the findings from this review provide a mandate to healthcare providers to intervene with and treat minority smokers, and to investigators to conduct further research to establish effective interventions for minority smokers and to increase the representation of minority smokers within tobacco treatment research.

SO WHAT?

Although tobacco use is the leading preventable cause of morbidity and mortality in the United States, racial and ethnic minorities have been under-represented within tobacco treatment research. This paper provides a comprehensive review of published studies examining tobacco treatment among African American, Latino, Native American, and Asian American smokers. Data demonstrate minority smokers are interested in stopping smoking and willing to participate in treatment research. Findings are consistent with the *2008 Clinical Practice Guidelines* [25] recommendations for tobacco use treatment including pharmacotherapy and counseling to promote abstinence and calling for increased research devoted to evaluating and enhancing tobacco use treatment interventions among racial and ethnic minority populations. The health risks of continued tobacco use and benefits of smoking cessation provide an ethical imperative for treating tobacco use among racial and ethnic minorities, with the overall goal of promoting health and decreasing tobacco-related health disparities.

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References

1. ACS. Society AC. Cancer Facts and Figures 2009. Atlanta: 2009.
2. CDC. Smoking-attributable mortality, years of potential life lost, and productivity losses--United States, 2000–2004. MMWR Morb Mortal Wkly Rep. Nov 14; 2008 57(45):1226–1228. [PubMed: 19008791]
3. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. JAMA. Mar 10; 2004 291(10):1238–1245. [PubMed: 15010446]
4. CDC. Cigarette smoking among adults and trends in smoking cessation - United States, 2008. MMWR Morb Mortal Wkly Rep. Nov 13; 2009 58(44):1227–1232. [PubMed: 19910909]
5. Borrelli B. Smoking cessation: next steps for special populations research and innovative treatments. J Consult Clin Psychol. Feb; 2010 78(1):1–12. [PubMed: 20099945]
6. Census Bureau US. Annual Estimates of the Resident Population by Sex, Race, and Hispanic Origin for the United States: April 1, 2000 to July 1, 2008 (NC-EST2008-03). 2010. http://www.census.gov/popest/national/asrh/NC-EST2008-srh.html
7. Fagan P, King G, Lawrence D, et al. Eliminating tobacco-related health disparities: directions for future research. Am J Public Health. Feb; 2004 94(2):211–217. [PubMed: 14759929]
8. Moolchan ET, Fagan P, Fernander AF, et al. Addressing tobacco-related health disparities. Addiction. Oct; 2007 102(Suppl 2):30–42. [PubMed: 17850612]

9. USDHHS. Services USDoHaH. Tobacco Use Among US Racial/Ethnic Minority Groups-African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A Report of teh Surgeon General. Atlanta: USDHHS, Public Health Service, Centers of Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1998;
10. Fu SS, Kodl MM, Joseph AM, et al. Racial/Ethnic disparities in the use of nicotine replacement therapy and quit ratios in lifetime smokers ages 25 to 44 years. Cancer Epidemiol Biomarkers Prev. Jul; 2008 17(7):1640–1647. [PubMed: 18583471]
11. Bansal MA, Cummings KM, Hyland A, Giovino GA. Stop-smoking medications: who uses them, who misuses them, and who is misinformed about them? Nicotine Tob Res. Dec; 2004 6(Suppl 3):S303–310. [PubMed: 15799593]
12. Houston TK, Scarinci IC, Person SD, Greene PG. Patient smoking cessation advice by health care providers: the role of ethnicity, socioeconomic status, and health. Am J Public Health. Jun; 2005 95(6):1056–1061. [PubMed: 15914833]
13. Levinson AH, Perez-Stable EJ, Espinoza P, Flores ET, Byers TE. Latinos report less use of pharmaceutical aids when trying to quit smoking. Am J Prev Med. Feb; 2004 26(2):105–111. [PubMed: 14751320]
14. Levinson AH, Borrayo EA, Espinoza P, Flores ET, Perez-Stable EJ. An exploration of Latino smokers and the use of pharmaceutical aids. Am J Prev Med. Aug; 2006 31(2):167–171. [PubMed: 16829334]
15. Fu SS, Burgess D, van Ryn M, Hatsukami DK, Solomon J, Joseph AM. Views on smoking cessation methods in ethnic minority communities: a qualitative investigation. Prev Med. Mar; 2007 44(3):235–240. [PubMed: 17175016]
16. Lurie N, Dubowitz T. Health disparities and access to health. JAMA. Mar 14; 2007 297(10):1118–1121. [PubMed: 17356034]
17. Fagan P, Moolchan ET, Lawrence D, Fernander A, Ponder PK. Identifying health disparities across the tobacco continuum. Addiction. Oct; 2007 102(Suppl 2):5–29. [PubMed: 17850611]
18. Okuyemi KS, Ahluwalia JS, Banks R, et al. Differences in smoking and quitting experiences by levels of smoking among African Americans. Ethn Dis. 2004; 14(1):127–133. Winter. [PubMed: 15002932]
19. King G, Polednak A, Bendel RB, Vilsaint MC, Nahata SB. Disparities in smoking cessation between African Americans and Whites: 1990–2000. Am J Public Health. Nov; 2004 94(11): 1965–1971. [PubMed: 15514238]
20. Shiffman S, Brockwell SE, Pillitteri JL, Gitchell JG. Individual differences in adoption of treatment for smoking cessation: demographic and smoking history characteristics. Drug Alcohol Depend. Jan 11; 2008 93(1–2):121–131. [PubMed: 17996399]
21. Schlundt DG, Niebler S, Brown A, et al. Disparities in smoking: data from the Nashville REACH 2010 project. J Ambul Care Manage. Apr-Jun;2007 30(2):150–158. [PubMed: 17495684]
22. Benowitz NL, Perez-Stable EJ, Herrera B, Jacob P 3rd. Slower metabolism and reduced intake of nicotine from cigarette smoking in Chinese-Americans. J Natl Cancer Inst. Jan 16; 2002 94(2): 108–115. [PubMed: 11792749]
23. CDC. Cigarette smoking among adults--United States, 2004. MMWR Morb Mortal Wkly Rep. Nov 11; 2005 54(44):1121–1124. [PubMed: 16280969]
24. Benowitz NL. Smoking cessation trials targeted to racial and economic minority groups. JAMA. Jul 24–31; 2002 288(4):497–499. [PubMed: 12132983]
25. Fiore, MC.; Jaen, CR.; Baker, TB., et al. Service USDoHaHSPH. Clinical Practice Guideline. Rockville, MD: May. 2008 Treating Tobacco Use and Dependence: 2008 Update.
26. Lawrence D, Graber JE, Mills SL, Meissner HI, Warnecke R. Smoking cessation interventions in U.S. racial/ethnic minority populations: an assessment of the literature. Prev Med. Feb; 2003 36(2):204–216. [PubMed: 12590996]
27. Robles GI, Singh-Franco D, Ghin HL. A review of the efficacy of smoking-cessation pharmacotherapies in nonwhite populations. Clin Ther. May; 2008 30(5):800–812. [PubMed: 18555928]

28. Jason L, Tait E, Goodman D, Buckenberger L, Gruder C. Effects of a televised smoking cessation intervention among low-income and minority smokers. Am J Community Psychol. Dec; 1988 16(6):863–876. [PubMed: 3223489]
29. Windsor R, Lowe J, Perkins L, et al. Health education for pregnant smokers: its behavioral impact and cost benefit. Am J Public Health. Feb; 1993 83(2):201–206. [PubMed: 8427323]
30. Royce J, Ashford A, Resnicow K, Freeman H, Caesar A, Orlandi M. Physician- and nurse-assisted smoking cessation in Harlem. J Natl Med Assoc. Apr; 1995 87(4):291–300. [PubMed: 7752283]
31. Ahijevych K, Wewers M. Low-intensity smoking cessation intervention among African-American women cigarette smokers: a pilot study. Am J Health Promot. May-Jun;1995 9(5):337–339. [PubMed: 10150764]
32. Hymowitz N, Eckholdt H. Effects of a 2.5-mg silver acetate lozenge on initial and long-term smoking cessation. Prev Med. Sep-Oct;1996 25(5):537–546. [PubMed: 8888321]
33. Voorhees C, Stillman F, Swank R, Heagerty P, Levine D, Becker D. Heart, body, and soul: impact of church-based smoking cessation interventions on readiness to quit. Prev Med. May-Jun;1996 25(3):277–285. [PubMed: 8781005]
34. Schorling J, Roach J, Siegel M, et al. A trial of church-based smoking cessation interventions for rural African Americans. Prev Med. Jan-Feb;1997 26(1):92–101. [PubMed: 9010903]
35. Gielen A, Windsor R, Faden R, O'Campo P, Repke J, Davis M. Evaluation of a smoking cessation intervention for pregnant women in an urban prenatal clinic. Health Educ Res. Jun; 1997 12(2): 247–254. [PubMed: 10168576]
36. Resnicow K, Vaughan R, Futterman R, et al. A self-help smoking cessation program for inner-city African Americans: results from the Harlem Health Connection Project. Health Educ Behav. Apr; 1997 24(2):201–217. [PubMed: 9079579]
37. Fisher E, Auslander W, Munro J, Arfken C, Brownson R, Owens N. Neighbors for a smoke free north side: evaluation of a community organization approach to promoting smoking cessation among African Americans. Am J Public Health. Nov; 1998 88(11):1658–1663. [PubMed: 9807532]
38. Gebauer C, Kwo C, Haynes E, Wewers M. A nurse-managed smoking cessation intervention during pregnancy. J Obstet Gynecol Neonatal Nurs. Jan-Feb;1998 27(1):47–53.
39. Orleans C, Boyd N, Bingler R, et al. A self-help intervention for African American smokers: tailoring cancer information service counseling for a special population. Prev Med. Sep-Oct;1998 27(5 Pt 2):S61–70. [PubMed: 9808825]
40. Darity W, Chen T, Tuthill R, et al. A multi-city community based smoking research intervention project in the African-American population. Int Q Community Health Educ. 2006; 26(4):323–336. [PubMed: 17890179]
41. Ahluwalia J, McNagny S, Clark W. Smoking cessation among inner-city African Americans using the nicotine transdermal patch. J Gen Intern Med. Jan; 1998 13(1):1–8. [PubMed: 9462488]
42. Allen BJ, Pederson L, Leonard E. Effectiveness of physicians-in-training counseling for smoking cessation in African Americans. J Natl Med Assoc. Oct; 1998 90(10):597–604. [PubMed: 9803724]
43. Lipkus I, Lyna P, Rimer B. Using tailored interventions to enhance smoking cessation among African-Americans at a community health center. Nicotine Tob Res. Mar; 1999 1(1):77–85. [PubMed: 11072391]
44. Manfredi C, Crittenden K, Warnecke R, Engler J, Cho Y, Shaligram C. Evaluation of a motivational smoking cessation intervention for women in public health clinics. Prev Med. Jan; 1999 28(1):51–60. [PubMed: 9973588]
45. Murray R, Connett J, Buist A, Gerald L, Eichenhorn M. Experience of Black participants in the Lung Health Study smoking cessation intervention program. Nicotine Tob Res. Nov; 2001 3(4): 375–382. [PubMed: 11694205]
46. Ahluwalia J, Harris K, Catley D, Okuyemi K, Mayo M. Sustained-release bupropion for smoking cessation in African Americans: a randomized controlled trial. JAMA. Jul 24–31; 2002 288(4): 468–474. [PubMed: 12132977]

47. Campbell M, Tessaro I, DeVellis B, et al. Effects of a tailored health promotion program for female blue-collar workers: health works for women. Prev Med. Mar; 2002 34(3):313–323. [PubMed: 11902848]
48. McBride CM, Bepler G, Lipkus IM, et al. Incorporating genetic susceptibility feedback into a smoking cessation program for African-American smokers with low income. Cancer Epidemiol Biomarkers Prev. Jun; 2002 11(6):521–528. [PubMed: 12050092]
49. Fiore MC, McCarthy DE, Jackson TC, et al. Integrating smoking cessation treatment into primary care: an effectiveness study. Preventive Medicine. Apr; 2004 38(4):412–420. [PubMed: 15020174]
50. Cooper TV, Klesges RC, Debon MW, Zbikowski SM, Johnson KC, Clemens LH. A placebo controlled randomized trial of the effects of phenylpropanolamine and nicotine gum on cessation rates and postcessation weight gain in women. Addict Behav. Jan; 2005 30(1):61–75. [PubMed: 15561449]
51. Hennrikus DJ, Lando HA, McCarty MC, et al. The TEAM project: the effectiveness of smoking cessation intervention with hospital patients. Prev Med. Mar; 2005 40(3):249–258. [PubMed: 15533536]
52. Murphy JM, Mahoney MC, Cummings KM, Hyland AJ, Lawvere S. A randomized trial to promote pharmacotherapy use and smoking cessation in a Medicaid population (United States). Cancer Causes Control. May; 2005 16(4):373–382. [PubMed: 15953979]
53. Ahluwalia JS, Okuyemi K, Nollen N, et al. The effects of nicotine gum and counseling among African American light smokers: a 2 × 2 factorial design. Addiction. Jun; 2006 101(6):883–891. [PubMed: 16696632]
54. Andrews JO, Felton G, Ellen Wewers M, Waller J. The effect of a multi-component smoking cessation intervention in African American women residing in public housing. Res Nurs Health. Feb; 2007 30(1):45–60. [PubMed: 17243107]
55. Nollen N, Ahluwalia JS, Mayo MS, et al. A randomized trial of targeted educational materials for smoking cessation in African Americans using transdermal nicotine. Health Educ Behav. Dec; 2007 34(6):911–927. [PubMed: 17576774]
56. Perez-Stable EJ, Sabogal F, Marin G, Marin BV, Otero-Sabogal R. Evaluation of “Guia para Dejar de Fumar,” a self-help guide in Spanish to quit smoking. Public Health Rep. Sep-Oct;1991 106(5): 564–570. [PubMed: 1910191]
57. McAlister A, Ramirez A, Amezcua C, Pulley L, Stern M, Mercado S. Smoking cessation in Texas-Mexico border communities: a quasi-experimental panel study. Am J Health Promot. Mar-Apr; 1992 6(4):274–279. [PubMed: 10148752]
58. Leischow S, Hill A, Cook G. The effects of transdermal nicotine for the treatment of Hispanic smokers. American Journal of Health Behavior. 1996; 20(5):304–311.
59. Munoz R, Marin B, Posner S, Perez-Stable E. Mood management mail intervention increases abstinence rates for Spanish-speaking Latino smokers. Am J Community Psychol. Jun; 1997 25(3):325–343. [PubMed: 9332966]
60. Nevid J, Javier R. Preliminary investigation of a culturally specific smoking cessation intervention for Hispanic smokers. Am J Health Promot. Jan-Feb;1997 11(3):198–207. [PubMed: 10165099]
61. Woodruff SI, Talavera GA, Elder JP. Evaluation of a culturally appropriate smoking cessation intervention for Latinos. Tob Control. Dec; 2002 11(4):361–367. [PubMed: 12432162]
62. Bock BC, Niaura RS, Neighbors CJ, Carmona-Barros R, Azam M. Differences between Latino and non-Latino White smokers in cognitive and behavioral characteristics relevant to smoking cessation. Addict Behav. May; 2005 30(4):711–724. [PubMed: 15833576]
63. Dornelas E, Fischer E. Effect of season, city size, and recruitment source on Latinos’ participation in a statewide smoking cessation program. Journal of Smoking Cessation. 2007; 2(2):17–22.
64. Wetter DW, Mazas C, Daza P, et al. Reaching and treating Spanish-speaking smokers through the National Cancer Institute’s Cancer Information Service. A randomized controlled trial. Cancer. Jan 15; 2007 109(2 Suppl):406–413. [PubMed: 17149758]
65. Reitzel LR, Costello TJ, Mazas CA, et al. Low-level smoking among Spanish-speaking Latino smokers: relationships with demographics, tobacco dependence, withdrawal, and cessation. Nicotine Tob Res. Feb; 2009 11(2):178–184. [PubMed: 19246627]

66. Castro Y, Reitzel LR, Businelle MS, et al. Acculturation differentially predicts smoking cessation among Latino men and women. Cancer Epidemiol Biomarkers Prev. Dec; 2009 18(12):3468–3475. [PubMed: 19959697]

67. Sias JJ, Urquidi UJ, Bristow ZM, Rodriguez JC, Ortiz M. Evaluation of smoking cessation behaviors and interventions among Latino smokers at low-income clinics in a US-Mexico border county. Addict Behav. Feb; 2008 33(2):373–380. [PubMed: 18006240]

68. Hensel M, Cavanagh T, Lanier A, et al. Quit rates at one year follow-up of Alaska Native Medical Center Tobacco Cessation Program. Alaska Med. Apr-Jun;1995 37(2):43–47. [PubMed: 7661325]

69. Johnson K, Lando H, Schmid L, Solberg L. The GAINS project: outcome of smoking cessation strategies in four urban Native American clinics. Giving American Indians No-smoking Strategies. Addict Behav. Mar-Apr;1997 22(2):207–218. [PubMed: 9113215]

70. Hodge F, Casken J. Characteristics of American Indian women cigarette smokers: prevalence and cessation status. Health Care Women Int. Sep-Oct;1999 20(5):455–469. [PubMed: 10776115]

71. Henderson P, Rhoades D, Henderson J, Welty T, Buchwald D. Smoking cessation and its determinants among older American Indians: the Strong Heart Study. Ethn Dis. 2004; 14(2):274–279. Spring. [PubMed: 15132214]

72. McPhee S, Jenkins C, Wong C. Smoking cessation intervention among Vietnamese Americans: A controlled trials. Tobacco Control. 1995; 4(Suppl 1):S16–S24.

73. Jenkins C, McPhee S, Le A, Pham G, Ha N, Stewart S. The effectiveness of a medialed intervention to reduce smoking among Vietnamese-American men. Am J Public Health. Jun; 1997 87(6):1031–1034. [PubMed: 9224191]

74. Wu D, Ma GX, Zhou K, Zhou D, Liu A, Poon AN. The effect of a culturally tailored smoking cessation for Chinese American smokers. Nicotine Tob Res. Dec; 2009 11(12):1448–1457. [PubMed: 19915080]

75. Berman B, Gritz E, Braxton-Owens H, Nisenbaum R. Targeting adult smokers through a multi-ethnic public school system. J Cancer Educ. 1995; 10(2):91–101. Summer. [PubMed: 7669541]

76. Kendrick J, Zahniser S, Miller N, et al. Integrating smoking cessation into routine public prenatal care: the Smoking Cessation in Pregnancy project. Am J Public Health. Feb; 1995 85(2):217–222. [PubMed: 7856781]

77. Lillington L, Royce J, Novak D, Ruvalcaba M, Chlebowski R. Evaluation of a smoking cessation program for pregnant minority women. Cancer Pract. May-Jun;1995 3(3):157–163. [PubMed: 7599672]

78. Lopes C, Sussman S, Galaif E, Crippins D. The impact of a videotape on smoking cessation among African-American women. Am J Health Promot. Mar-Apr;1995 9(4):257–260. [PubMed: 10150728]

79. Klesges R, Haddock C, Lando H, Talcott G. Efficacy of forced smoking cessation and an adjunctive behavioral treatment on long-term smoking rates. J Consult Clin Psychol. Dec; 1999 67(6):952–958. [PubMed: 10596516]

80. Malchodi C, Oncken C, Dornelas E, Caramanica L, Gregonis E, Curry S. The effects of peer counseling on smoking cessation and reduction. Obstet Gynecol. Mar; 2003 101(3):504–510. [PubMed: 12636954]

81. Lerman C, Kaufmann V, Rukstalis M, Patterson F, Perkins K, JA-M. Individualizing nicotine replacement therapy for the treatment of tobacco dependence: a randomized trial. Ann Intern Med. Mar 16; 2004 140(6):426–433. [PubMed: 15023708]

82. McAlister AL, Rabius V, Geiger A, Glynn TJ, Huang P, Todd R. Telephone assistance for smoking cessation: one year cost effectiveness estimations. Tob Control. Mar; 2004 13(1):85–86. [PubMed: 14985603]

83. Borrelli B, Novak S, Hecht J, Emmons K, Papandonatos G, Abrams D. Home health care nurses as a new channel for smoking cessation treatment: outcomes from project CARES (Community-nurse Assisted Research and Education on Smoking). Prev Med. Nov-Dec;2005 41(5–6):815–821. Epub 2005 Sep 2022. [PubMed: 16182355]

84. Marcus BH, Lewis BA, Hogan J, et al. The efficacy of moderate-intensity exercise as an aid for smoking cessation in women: a randomized controlled trial. Nicotine Tob Res. Dec; 2005 7(6): 871–880. [PubMed: 16298722]

85. Gonzales D, Rennard SI, Nides M, et al. Varenicline, an alpha4beta2 nicotinic acetylcholine receptor partial agonist, vs sustained-release bupropion and placebo for smoking cessation: a randomized controlled trial. JAMA. Jul 5; 2006 296(1):47–55. [PubMed: 16820546]

86. Jorenby DE, Hays JT, Rigotti NA, et al. Efficacy of varenicline, an alpha4beta2 nicotinic acetylcholine receptor partial agonist, vs placebo or sustained-release bupropion for smoking cessation: a randomized controlled trial. JAMA. Jul 5; 2006 296(1):56–63. [PubMed: 16820547]

87. Klesges RC, DeBon M, Vander Weg MW, et al. Efficacy of a tailored tobacco control program on long-term use in a population of U.S. military troops. J Consult Clin Psychol. Apr; 2006 74(2): 295–306. [PubMed: 16649874]

88. Shiffman S, Scharf DM, Shadel WG, et al. Analyzing milestones in smoking cessation: illustration in a nicotine patch trial in adult smokers. J Consult Clin Psychol. Apr; 2006 74(2):276–285. [PubMed: 16649872]

89. Swartz LHG, Noell JW, Schroeder SW, Ary DV. A randomised control study of a fully automated internet based smoking cessation programme. Tob Control. Feb; 2006 15(1):7–12. [PubMed: 16436397]

90. Maher JE, Rohde K, Dent CW, et al. Is a statewide tobacco quitline an appropriate service for specific populations? Tob Control. Dec; 2007 16(Suppl 1):i65–70. [PubMed: 18048635]

91. Okuyemi KS, James AS, Mayo MS, et al. Pathways to health: a cluster randomized trial of nicotine gum and motivational interviewing for smoking cessation in low-income housing. Health Educ Behav. Feb; 2007 34(1):43–54. Epub 2006 Jun 2015. [PubMed: 16778147]

92. Schmitz JM, Stotts AL, Mooney ME, Delaune KA, Moeller GF. Bupropion and cognitive-behavioral therapy for smoking cessation in women. Nicotine Tob Res. Jun; 2007 9(6):699–709. [PubMed: 17558827]

93. Gandhi KK, Foulds J, Steinberg MB, Lu SE, Williams JM. Lower quit rates among African American and Latino menthol cigarette smokers at a tobacco treatment clinic. Int J Clin Pract. Mar; 2009 63(3):360–367. [PubMed: 19222622]

94. Ahluwalia JS, Richter KP, Mayo MS, Resnicow K. Quit for Life: A randomized trial of culturally sensitive materials for smoking cessation in African Americans. Journal of General Internal Medicine. 1999; 14(Suppl 2):6.

95. Makosky Daley C, Cowan P, Nollen NL, Greiner KA, Choi WS. Assessing the scientific accuracy, readability, and cultural appropriateness of a culturally targeted smoking cessation program for American Indians. Health Promot Pract. Jul; 2009 10(3):386–393. [PubMed: 18323536]

96. TRIG. The Tobacco Research Implementation Plan 1998. 2010. http://cancercontrol.cancer.gov/TCRB/TRIP/html/intro.html

97. Webb MS, de Ybarra DR, Baker EA, Reis IM, Carey MP. Cognitive-behavioral therapy to promote smoking cessation among African American smokers: a randomized clinical trial. J Consult Clin Psychol. Feb; 2010 78(1):24–33. [PubMed: 20099947]

98. Webb MS, Francis J, Hines BC, Quarles FB. Health disparities and culturally specific treatment: perspectives and expectancies of African American smokers. J Clin Psychol. Dec; 2007 63(12): 1247–1263. [PubMed: 17972299]

99. Hughes JR, Keely JP, Niaura RS, Ossip-Klein DJ, Richmond RL, Swan GE. Measures of abstinence in clinical trials: issues and recommendations. Nicotine Tob Res. Feb; 2003 5(1):13–25. [PubMed: 12745503]

100. SRNT. Biochemical verification of tobacco use and cessation. Nicotine Tob Res. May; 2002 4(2): 149–159. [PubMed: 12028847]

101. Benowitz NL, Bernert JT, Caraballo RS, Holiday DB, Wang J. Optimal serum cotinine levels for distinguishing cigarette smokers and nonsmokers within different racial/ethnic groups in the United States between 1999 and 2004. Am J Epidemiol. Jan 15; 2009 169(2):236–248. [PubMed: 19019851]

102. Okuyemi KS, Faseru B, Sanderson Cox L, Bronars CA, Ahluwalia JS. Relationship between menthol cigarettes and smoking cessation among African American light smokers. Addiction. Dec; 2007 102(12):1979–1986. [PubMed: 17916223]

103. Okuyemi KS, Ebersole-Robinson M, Nazir N, Ahluwalia JS. African-American menthol and nonmenthol smokers: differences in smoking and cessation experiences. J Natl Med Assoc. Sep; 2004 96(9):1208–1211. [PubMed: 15481749]

Table 1

Smoking prevalence based on racial/ethnic group and gender for 2008.

	Females	Males	Total
Caucasian	20.6%	23.5%	22.0%
African American	17.8%	25.6%	21.3%
Latino	10.7%	20.7%	15.8%
American Indian/ Alaska Native	22.4%	42.3%	32.4%
Asian American	4.7%	15.7%	9.9%

Data from the Centers for Disease Control and Prevention.[4]

Table 2

Table of included studies.

Lead Author / Year	Sample	Description of Intervention	Follow-up / Biochemical Verification	Outcomes	Considerations
Interventions with African American (AA) Smokers					
Jason (1988) [28]	165 96% AA	Randomized controlled trial. Smokers were randomly assigned to a comprehensive intervention or to a no-intervention control condition. The intervention consisted of providing the smokers a self-help manual, the televised broadcast, weekly support meetings, and supportive phone calls.	4 months None	At a 4-month follow-up, 20% of treatment participants were abstinent compared to 9% of controls ($p < 0.06$).	Pre-intervention motivation was higher in intervention group: however, motivation was not associated with abstinence.
Windsor (1993) [29]	814 52 % AA	Randomized controlled trial. Pregnant smokers were randomly assigned to an experimental group (E) who received individual and group counseling, printed materials, and social support, or to a control (C) group.	32 weeks Salivary cotinine	Among African American participants, abstinence rates were 18.1% for experimental and 10.7% for control groups ($p = 0.03$).	Female sample. African Americans had a higher rate of abstinence than White participants.
Royce (1995) [30]	153 100% AA	Cohort, non-randomized. Physicians and nurses previously trained in the NCI smoking cessation program received 3 one-hour booster sessions. Patients received a self-help cessation video (KICKIT!), culturally tailored manual and newsletters, and a brief physician counseling.	7 months None	Self-reported quit rate was 21%. Additional 27% reduced the number of cigarettes smoked per day by >50 percent.	Lack of comparison group. Only 50% of health care providers attended training sessions.
Ahijevych (1995) [31]	64 100% AA	Randomized controlled trial. Participants were randomly assigned to intervention (individual nurse-delivered counseling and 4 weekly mailings of cessation materials), one-time cessation advice, or control.	3 months Salivary cotinine	No participant in any of the groups had verified abstinence.	Female sample. Participants had ≥14ng/ml baseline salivary cotinine.
Hymowitz (1996) [32]	500 49% AA ≥10 cpd	Randomized, double-blind, placebo-controlled trial of 2.5mg Silver Acetate lozenge and placebo, self-help materials, video.	12 months CO and/or Urine cotinine	Short-term (3 week) abstinence significantly higher in lozenge group (26%) compared to placebo (16%; $p = 0.048$). No significant effect at 12 months.	African Americans were more successful in quitting than Whites.
Voorhees (1996) [33]	292 100% AA	Randomized controlled trial. 22 churches were randomly assigned to either an intensive culturally-specific intervention or a minimal self-help intervention. Intervention include individual counseling and group sessions; print/video/audio.	12 months CO and salivary cotinine	Validated abstinence rates at follow-up were not significantly different between groups (19.6% and 15.1% for intensive and minimal groups, respectively).	Participants in the intensive intervention were nearly twice as likely to progress in stages of change.
Schorling (1997) [34]	644 100% AA	Quasi-experimental. Intervention community had church-based smoking cessation (individual counseling plus self-help materials) and community-wide activities (gospel anti-smoking	18 months None	No significant difference in 30-day continuous abstinence between intervention and control	Intervention community had higher prevalence of smoking and made greater progress in stage of change.

Lead Author / Year	Sample	Description of Intervention	Follow-up / Biochemical Verification	Outcomes	Considerations
		nights, poster contest for children). Comparison community efforts focused on hypertension, diet/exercise.		quit rates (0.6% vs. 5.4%; p = 0.18).	
		nights, poster contest for children). Comparison community efforts focused on hypertension, diet/exercise.			
		nights, poster contest for children). Comparison community efforts focused on hypertension, diet/exercise.			
Gielen (1997) [35]	391 85% AA	Randomized controlled trial. Smokers were randomly assigned to an experimental (E) group to receive usual care plus prenatal and postpartum print materials and individual counseling or to a control (C) group to receive only usual care.	8 months Salivary cotinine	Quit rates in the third trimester were 6.2% and 5.6% for the experimental and control groups, respectively.	Female sample. Follow-up period was variable depending when first prenatal visit occurred.
Resnicow (1997)[36]	1364 100% AA	Randomized cluster design. Smokers were randomly assigned to receive either a multi-component smoking cessation intervention (printed guide, culturally-specific video, and phone booster call) or health education materials unrelated to smoking.	6 months None	At 6 months, point prevalence abstinence rates were 11.2% and 7.9% in intervention and control groups, respectively (p = 0.06).	Only 31% of participants were contacted for booster calls.
Fisher (1998) [37]	504 80% AA	Quasi-experimental design. Community organization approach including smoking cessation classes, billboards, door-to-door campaign, “Gospelfest”. 3 intervention and 4 control communities.	24 months None	Smoking prevalence declined from 34% to 27% in intervention communities (p = 0.028), 34% to 33% in control (p = 0.641), and 40% to 27% among those aware of the program (p = 0.001).	Reduction in smoking prevalence was consistent across demographically-defined subsamples, e.g. age, gender, ethnicity.
Gebauer (1998) [38]	178 41% AA	Prospective, non-randomized, with control (clinic contact only) group. Intervention was 15-minute individualized counseling delivered by an advanced-practice nurse, combined with a telephone contact by 7–10 days after the clinic visit.	3 months Salivary cotinine	Intervention group had a abstinence rate of 15.5% percent, compared with 0% in the control group (p < 0.001).	African Americans were more likely to quit, compared with White participants.
Orleans (1998) [39]	1422 100% AA	Radio-based media campaign. Participants were randomly assigned to receive standard smoking cessation telephone counseling and guide or telephone counseling and a guide (Pathways to Freedom) tailored to African American smokers.	12 months None	7-day abstinence rates were 25% and 15.4% in the tailored and standard groups, respectively (p = 0.034).	Tailored guide was rated as having more appealing. Quit attempts and use of pre-quitting strategies were higher in the tailored group.
Darity (1998)[40]	2544 100% AA	Quasi-experimental. Active Intervention consisted of community organizing strategies, direct interpersonal educational activities, and mass media; Passive Intervention consisted of mass media only.	18 months None	Abstinence was significantly higher in Active (16.7%) compared to Passive Intervention communities (11.8%; p = 0.012).	8 communities: 4 received Active and 4 received Passive interventions.
Ahluwalia (1998) [41]	410 100% AA ≥10 cpd	Randomized, double-blind, placebo-controlled. Patients received 10 weeks treatment with nicotine transdermal patch (21mg/d for 6 weeks, 14mg/d for 2 weeks, and 7mg/d for 2 weeks) or placebo patch. All patients received the *Pathways to Freedom* guide, other print cessation materials, and an audiocassette.	6 months None	Abstinence rates at 10 weeks were 21.5% and 13.7% (p = 0.03), and at 6 months were 17.1% and 11.7% (p = 0.08) for the nicotine patch and placebo groups, respectively.	High attrition rates.

Lead Author / Year	Sample	Description of Intervention	Follow-up / Biochemical Verification	Outcomes	Considerations
Allen (1998)[42]	1086 100% AA	Randomized controlled design. Resident physicians received 2-hr smoking cessation training. Patients were randomly assigned to receive brief (3–5 minutes) physician counseling or usual care.	12 months CO and Salivary cotinine	Abstinence was 2% and 1.8% at 3 months, and 2.2% and 2.8% at 12 months in intervention and control groups, respectively.	106 Resident physicians: only two-thirds of the physicians completed smoking cessation training.
Lipkus (1999) [43]	160 100% AA	Randomized. Patients were randomly assigned to one of three study groups: 1) provider prompting only, 2) provider prompting with tailored print materials, or 3) provider prompting with tailored print materials plus tailored telephone counseling.	18 months None	Abstinence rates were 13.2%, 19.2%, and 32.7% in groups 1, 2, and 3, respectively ($p < 0.05$).	Provider compliance with prompting was low (48%).
Manfredi (1999) [44]	1747 68% AA	Matched-pair random assignment. Multi-component intervention included motivational video, posters, brief provider advice, reminder letter from provider, and chart flagging with “smoker” sticker.	2 months None	The intervention group had significantly higher abstinence that control (14.5% vs. 7.7%; $p < 0.01$).	High attrition. Intervention group showed greater progress in stage of change and motivation to quit.
Murray (2001) [45]	200 100% AA	Randomized controlled trial. Participants were randomized into either: smoking intervention (SI) with bronchodilator therapy, SI with placebo inhalers, or usual care. The SI consisted of a 12-week group program using cognitive behavioral approach with nicotine gum.	5 years CO and Salivary cotinine	African Americans in SI had 30% abstinence compared to 17% in usual care.	This study was a secondary analysis of the Lung Health Study.
Ahluwalia (2002) [46]	600 100% AA	Randomized, double-blind, placebo-controlled. Participants were randomized to receive 150 mg of bupropion SR or placebo twice daily for 7 weeks. Brief motivational counseling was provided in-person at baseline, quit day, weeks 1 and 3, end of treatment (week 6), and by telephone at day 3 and weeks 5 and 7.	26 weeks CO and Serum cotinine	Abstinence rates were 21.0% and 13.7% for active bupropion and placebo groups, respectively ($p = 0.02$).	Compared to placebo, those taking bupropion experienced a greater mean reduction in depressive symptoms at week 6 and gained less weight.
Campbell (2002) [47]	859 50% AA	Cluster randomized design. 9 workplaces were randomly assigned to either a) health intervention consisting of two computer-tailored magazines and a natural helpers program over 18 months or b) delayed intervention conditions. Delayed worksites received one tailored magazine.	18 months	Smoking rates were not significantly different between intervention and control (27% and 19% respectively): rates were 3% lower than baseline for both groups.	9 small to mid-sized work places. Intervention was not specific for smoking but was a general health promotion program.
McBride (2002) [48]	557 100% AA	Randomized controlled trial. Participants were randomly assigned to one of two conditions: (1) Enhanced Usual Care (EUC) or (2) Biomarker Feedback (BF). All received a self-help manual and nicotine patches. BF smokers were also offered genetic testing for susceptibility to lung cancer, test result booklet and tailored feedback, and 4 counseling calls.	6 and 12 months Salivary cotinine	Self-reported 7-day point prevalence abstinence for BF and EUC were 19% vs. 10% at 6 months ($p < 0.006$), and 15% vs. 10% ($p = 0.12$) at 12 months.	Because only 39% of salivary cotinine samples were returned, outcomes were based on self-report.
Fiore (2004) [49]	1869 27% AA ≥10 cpd	Participants were selected or randomly assigned to receive free nicotine patch therapy alone or in combination with smoking cessation counseling.	12 months	No significant treatment effect ($p > 0.10$). Overall, 13% were abstinent: 14.4%	

Lead Author / Year	Sample	Description of Intervention	Follow-up / Biochemical Verification	Outcomes	Considerations
				for Caucasians and 8.6% for African Americans ($p < 0.01$).	
Cooper (2005)[50]	439 12.5% AA ≥10 cpd	Randomized controlled trial. Participants were randomly assigned to one of three conditions: 2mg nicotine gum, 8.33mg Phenylpropanolamine (PPA) gum, or placebo gum. All participants received a behavioral intervention focused on relapse prevention and weight management.	6 and 12 months CO	No significant differences were found between the treatment and placebo groups in cessation status at posttest (20.2%; $p = 0.26$), 6 months (12.5%; $p = 0.56$), or 1 year (12.2%; $p = 0.49$).	Female sample. Participants who attended more sessions were more likely to be abstinence.
Hennrikus (2005)[51]	2095 16.3% AA	Randomized controlled trial. Hospital inpatients were randomly assigned to one of three smoking cessation interventions: modified usual care, brief advice, or brief advice plus extended counseling during and after hospitalization.	12 months Salivary cotinine	No significant differences in between usual care (8.8%), brief advice (10%), or extended counseling (9.9%) groups ($p > 0.05$).	The number of sessions was dependent on when participants set their quit date: median = 4 sessions.
Murphy (2005)[52]	608 42.4% AA ≥10 cpd	Randomized controlled trial. Randomly assigned to one of three intervention groups to increase the use of the Medicaid smoking cessation pharmacotherapy benefit: (1) Minimal (verbal information on benefit; *n* = 197), (2) Self-Help (verbal information, plus written self help information materials; *n* = 205) and (3) Case Management (verbal information, self help information, plus aid in facilitating access to benefit; *n* = 206).	≥ 90 days CO	No significant differences between groups ($p > 0.05$): abstinence rates were 4.6% for self-report, and 1.8% bioverified.	Focus of intervention on pharmacotherapy benefit utilization.
Ahluwalia (2006)[53]	755 100% AA≤10cpd	Randomized, placebo control trial. Participants randomized to one of four conditions: 2 mg nicotine gum plus health education (HE), placebo gum plus HE, 2 mg nicotine gum plus motivational interviewing counseling (MI), placebo plus MI.	6 months CO, serum and salivary cotinine	Verified abstinence rate for nicotine gum was not significantly greater than placebo gum (14.2% versus 11.1%; $p = 0.232$), however, HE had significantly higher abstinence than MI groups (16.7% versus 8.5%; $p = 0.008$).	Did not measure dose used or adherence to gum.
Andrews (2007)[54]	103 100% AA	A quasi-experimental, repeated measures design. Two communities randomly assigned to control (health education) or culturally tailored intervention (*Sister to Sister)* including nurse-delivered empowerment counseling in a group format, nicotine patches for 6 weeks, and contact with community health workers to enhance self-efficacy, support, and spiritual well being.	6 months	Self-reported continuous abstinence was 27.5% for the intervention group and 5.7% of the control group.	Female sample. Increased social support and self-efficacy were associated with 6-month abstinence; spiritual well-being did not moderate smoking abstinence.
Nollen 2007[55]	500 100% AA	A randomized, investigator-blinded trial, comparing a culturally sensitive videotape and guide (*Pathways to Freedom*) with usual care (a commonly available videotape and guide),	6 months CO	7-day point prevalence abstinence at 6 months was similar between groups: 18.0% and 14.4% in the	More participants in the culturally sensitive group read most or all of the guide

Lead Author / Year	Sample	Description of Intervention	Follow-up / Biochemical Verification	Outcomes	Considerations
		alongside nicotine replacement, brief counseling, and booster phone calls. alongside nicotine replacement, brief counseling, and booster phone calls.		culturally sensitive and usual care groups, respectively (p = 0.27).	compared to control (68.8% vs. 59.6%).
Interventions with Latino and Hispanic American Smokers					
Pérez-Stable (1991) [56]	431 100% Latino	Prospective cohort study. Guidebook "Guía para Dejar de Fumar" includes multiple topics and culturally tailored messages, as part of a community-wide intervention. No control group.	12 months Salivary cotinine	Self-reported abstinence was 13.7% of community participants.	40% of sample lost to follow-up.
McAlister (1992) [57]	295 100% Latino	Quasi-experimental design comparing smokers in two communities exposed to a community-wide campaign "Programma A Su Salud" including television, radio, and newspaper stories, individual counseling, written materials, neighborhood volunteers.	2 years	Self-reported abstinence was significantly higher in the intervention group (17.0%) compared to the control group (7.0%).	Communities were located on US-Mexican border. Over 90% of participants were Mexican or Mexican-American.
Leischow (1996) [58]	108 100% Latino ≥10 cpd	Randomized, double-blind, placebo-controlled study of nicotine patch (10 week, 22mg stepped dosing) and "Committed Quitters" manual (English/Spanish).	10 weeks CO	Continuous abstinence was significantly higher for nicotine patch (46%) vs. placebo (26%; p = 0.05).	88% of Latino participants were Mexican-American. No long-term follow-up.
Muñoz (1997) [59]	136 100% Latino ≥3 cpd	Randomized. Mailed mood management program for smoking cessation included guidebook, self-administered mood management audiotape and written materials "Tomando control de su Vida" (included relaxation exercises, mood monitoring, increasing pleasant activities), and "Guía" smoking cessation manual. Guidebook ("Guía") only control (delayed control received mood management at 3 months).	6 months Salivary cotinine	Self-reported 7-day point prevalence abstinence was significantly higher for the intervention group (25.4%) compared to the control (9.2%; p < 0.01).	Diverse Latino sample. Only half of sample completed cotinine. Efficacy independent of history of Major Depressive Episode. Intervention had significant effect on reduction in cpd.
Nevid (1997) [60]	93 100% Latino	Randomized controlled trial. Participants randomized to culturally tailored intervention (clinic-based group program of 8 weekly sessions, videotape 'cuento'/story therapy, ALA Lifetime of Freedom from Smoking and "Guía" guidebooks, buddy support system, bi-weekly telephone calls) or enhanced self-help control (1 session, guidebooks, telephone follow-up).	12 mo Salivary cotinine	No significant group difference: 7-day point prevalence abstinence was 8% and 7% for intervention and control groups, respectively.	Diverse Latino sample included 66% from Central/ South America, 25% Caribbean. Participants required to have at least one previous quit attempt.
Woodruff (2002) [61]	312 100% Latino	Randomized controlled design. Participants randomized to either "Proyecto Sol" (lay health advisors or "promotores" provided 4 home visits and 3 telephone calls, video "Me Muero por Fumar", and guidebook "Rompa con el Vicio") or control (referred to state telephone quitline).	3-month intervention	7-day point prevalence was significantly greater for intervention (20.5%) compared to control (8.7%; p = 0.014).	Diverse Latino sample. Abstainers completed significantly more sessions (4.68) than continuing smokers (3.19).
Bock (2005)[62]	615 32% Latino ≥10 cpd	Non-randomized cohort study. Primary care patients were given a brief smoking cessation intervention and nicotine patches to determine if less acculturated Latinos (LA) would differ in quit status compared to bicultural Latinos (BC) or	6 months None	Self-reported abstinence was significantly higher for LA (21.3%) compared to BC (9.2%) or NL (12.9%)	Acculturation moderated the relationship between abstinence, confidence in quitting, and nicotine dependence.

Lead Author / Year	Sample	Description of Intervention	Follow-up / Biochemical Verification	Outcomes	Considerations
		non-Latino Whites (NL). Visits consisted of initial motivational counseling followed by 2 telephone counseling sessions.		groups at 6 months ($p < 0.05$).	
		non-Latino Whites (NL). Visits consisted of initial motivational counseling followed by 2 telephone counseling sessions.			
		non-Latino Whites (NL). Visits consisted of initial motivational counseling followed by 2 telephone counseling sessions.			
Dornelas (2007)[63]	186 100% Latino	Non-randomized. Spanish-speaking smokers recruited in Connecticut to attend 6 weekly group counseling sessions, conducted by Spanish-speaking group leaders. Participants offered free nicotine patch or gum and Spanish-language handouts.	End of treatment CO	CO verified abstinence at end of treatment was 14%. Self-reported abstinence at 3 and 6 months was 18% and 13%, respectively.	Groups held in summer and winter had lower attendance than those held in the fall.
Wetter (2007)[64]	297 100% Latino	Randomized controlled trial of NCI's CIS telephone counseling for Spanish-speaking smokers (Adiós al Fumar) randomized to one session standard counseling (SC) or enhanced counseling (EC) including SC plus 3 proactive calls. Both groups included written materials including the "Guía".	12 weeks None	Controlling for demographic and tobacco-related variables, EC reported significantly higher abstinence (27.4%) than SC (20.5%; $p < 0.05$).	Low-level smoking was not associated with abstinence;[65] greater acculturation predicted abstinence in men but not women.[66]
Sias (2008)[67]	94 100% Latino	Non-randomized, observational study of Latino smokers from low-income clinics who received NRT for smoking cessation. Participants used patch (82%), lozenge (53%), and/or gum (29%): 24% used NRT in combination with bupropion.	6 months None	Self-reported abstinence at 6 months was 44%.	Medication adherence not reported.
Interventions with American Indian, Native American, and Alaskan Native (AI/AN) Smokers					
Hensel (1995) [68]	193 100% Alaska Native	Non-randomized, cohort study. Alaska Native Medical Center tobacco cessation program. Cessation program consisted of both group counseling sessions and nicotine patches. For counseling, patients had choice of American Cancer Society's Fresh Start or American Lung Association's Freedom from Smoking.	3, 6, 9, and 12 months None	Self-reported abstinence rates at 3, 6, 9, and 12 months were 31%, 30%, 24%, and 21%, respectively.	Convenience sample with no comparison group. 24% of participants were medical center employees. Attrition of 27% at 12 months.
Johnson (1997) [69]	601 100% Native American	Clinic based intervention with two sites per condition. Intervention group targeted to all adult patients in urban Indian health clinics who smoke using the GAINS intervention, a modified Doctors Helping Smokers model. Control sites received smoking cessation materials but no DHS training.	12 months Salivary cotinine	Validated abstinence rates were 6.7% for intervention group and 6.8% for control group. Of patients exposed to intervention, self-reported abstinence was 7.1% vs. 4.9%.	Many patients not exposed to intervention. Intent-to-treat analysis influenced by high non-response rate (30%) in one intervention site.
Hodge (1999) [70]	1,369 100% Native American	Cluster randomized, controlled trial. 14 Indian Health Clinics randomized to usual care (7 clinics: standard medical care) or intervention (7 clinics). Intervention included option of nicotine gum and patch, physician counseling, "It's Your Life" tailored motivational film, self-help guides, and two visits from community health representative.	18 months None	No significant difference (p=0.07) in abstinence between intervention (5.7%) and usual care (3.1%).	
Henderson (2004) [71]	998 100% Native American	Nested observational cohort study. Data for the present study were obtained from the Strong	4 years None	21% of smokers reported abstinence. Abstinence	487 smokers lost to follow-up.

Lead Author / Year	Sample	Description of Intervention	Follow-up / Biochemical Verification	Outcomes	Considerations
		Heart Study – a longitudinal, population-based study examining cardiovascular disease among a large and diverse cohort of American Indians (Arizona, Oklahoma Heart Study – a longitudinal, population-based study examining cardiovascular disease among a large and diverse cohort of American Indians (Arizona, Oklahoma Heart Study – a longitudinal, population-based study examining cardiovascular disease among a large and diverse cohort of American Indians (Arizona, Oklahoma Heart Study – a longitudinal, population-based study examining cardiovascular disease among a large and diverse cohort of American Indians (Arizona, Oklahoma		
Interventions with Asian American or Pacific Islander (A/PI) Smokers					
McPhee (1995) [72, 73]	5,376 100% Vietnamese American	Quasi-experimental. Community-based intervention in Santa Clara, CA, with pre/posttest surveys. This study used an untreated control group design with separate pretest and post-test samples. Intervention components consisted of newspaper ads, television ads, billboards, community meetings and events.	24 months None	Smoking prevalence remained constant in the intervention community and also the control community between pretest and post-test timepoints.	Sampling bias may have occurred due to interviewing only those households with listed telephone numbers.
Jenkins (1997) [73]	5,125 100% Vietnamese American	Quasi-experimental. Community-based intervention in San Francisco with a pre/posttest measures; Houston was a control community. Intervention was a 2 year media-led campaign targeting Vietnamese population, and included billboards, newspaper ads, television ads, community events, health education materials.	39 months None	At posttest, the odds of being a smoker were significantly lower (O.R. 0.82) and the odds of being abstinent were significantly higher (O.R.=1.65) in San Francisco than in the comparison community.	Male sample. design was limited to 2 communities.
Wu (2009)[74]	122 100% Chinese American	Randomized trial of NRT combined with 4 sessions of either motivational interviewing (MI) or health education (HE). Low income Chinese American sample.	6 months CO	Self-reported abstinence was significantly greater (p<0.001) in the MI (67%) versus HE (32%) groups.	88 of 122 completed CO: 82% agreement between self-report and CO.
Interventions including multiple minorities					
Berman (1995) [75]	446: 83.4% Latino, 14.4% African American	Quasi-experimental design. Students K-12 and their parents were randomly assigned at school level to intervention and control. Intervention included Spanish (“Guía para Dejar de Fumar”) or English language self-help materials.	12 months Salivary cotinine	No difference (p=0.911) in abstinence rates between intervention and control groups (16.9% and 16.3% respectively).	40% attrition at follow-up.
Kendrick (1995) [76]	5,572: 16.4% African American, 6.1% Latino, 1.8% other non-White	Stratified randomized design. Clinics providing prenatal care were randomly assigned to intervention or control groups. Multi-component intervention, varied by state. Intervention generally took place at first prenatal visit and included printed manual, behavioral exercises and individual counseling.	4–6 months Urine cotinine	Cotinine-verified abstinence rates not significantly different between the intervention (6.1%) and control (5.9%) groups. Self-reported abstinence was higher in intervention (13.0%) than control (9.5%).	Pregnant female smokers. 64 clinics participated.
Lillington (1995) [77]	225: 77% African American 20% Latina	Quasi-experimental, 4 sites randomized to 2 conditions. Brief 15-minute counseling w/ bilingual health educator, guidebook “Time for a Change: A Program for Healthy Moms and Babies”, booster postcard at 1 mo., incentive	6 wk post-partum Salivary cotinine	Self-reported abstinence was significantly greater for the intervention compared to control at 9 months (43.0% vs. 24.7%;	Pregnant female smokers. At both time-points, significant effect for both Whites and African Americans but not for

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		contest. Usual care control received brief quit smoking message and printed information.		p = 0.005) and 6 weeks post-partum (25.3% vs. 11.6%; p = 0.008) for the full sample.	Latinas. Only 45% completed cotinine.
Lopes (1995) [78]	511: 72% African American, 18% Latino	Single-group test-retest. Participants watched a 30-minute anti-smoking video followed by a 10-minute group discussion.	6 weeks None	Self-reported abstinence was 4.6%.	Female participants.
Klesges (1999) [79]	5,223: 12.5% African American, 8.7% Latino, 3.5% Asian American	Randomized controlled study. All participants were under a 6-week ban from tobacco products: 75% were randomized to a brief smoking cessation intervention (50-min. group discussion with computer-interactive format, role playing, commitment cards); 25% randomized to a control condition.	12 months None	No significant difference between self-reported abstinence in intervention (18%) and control (17%) in full sample (p > 0.05). Significant effect (p < 0.01) found within minority participants (23% vs. 19%).	Women, ethnic minorities, and those intending to stay quit at baseline were more likely to be abstinent.
Malchodi (2003) [80]	142: 63% Latino, 12% African American	Randomized controlled trial. Participants randomized to intervention including physician advice, guidebook “Quitting for You 2” (English or Spanish), and median 6 contacts with lay provider, or to an advice and guidebook only control.	36 weeks gestation CO and Urinary cotinine	No significant difference (*p*=0.84) in abstinence rates between intervention (24%) and control (21%) groups. High abstinence within control group.	Female sample. Main effect of intervention on reduction in cpd among those who continued to smoke.
Lerman (2004)[81]	299: 27% African American, 3% Latino, 2% Asian American	Randomized, open-label clinical trial exploring the efficacy of nicotine patch (21mg x 4 weeks, 14 mg x 2 weeks, 7mg x 2 weeks) versus nicotine nasal spray (1 mg dose/spray; tapering after 4 weeks), in addition to behavioral group counseling.	6 month CO and Plasma cotinine	No significant difference (p > 0.02) in abstinence rates between patch (28.5%) and spray (24.5%). Whites had higher abstinence with patch; minority groups had higher abstinence with spray.	Inclusion criteria required participants to have FTND score of ≥7.
McAlister (2004)[82]	1014: 20% African American, 5% Latino	Randomized controlled trial. Participants were randomly assigned to receive either self-help booklets for smoking cessation only (control) or to booklets plus telephone counseling.	12 months Salivary cotinine	Abstinence rates were 10.3% in the counseling condition and 5.8% in the control condition (*p*<0.01).	High attrition: follow-up included only 275 counseling and 204 control participants.
Borrelli (2005)[83]	273: 12.2% African American, 2.2% Latino, 1.4% Native American ≥3 cpd	Nurses were randomly assigned to deliver either motivational enhancement (ME; motivational interviewing with carbon monoxide feedback) or standard care (SC; using AHCPR guidelines).	12 month CO	No significant differences in intent-to-treat verified continuous abstinence, 4.2% (SC) vs. 8.7% (ME).	Smokers receiving the ME intervention reported more quit attempts (8.7%) than the SC condition (4.2%).
Marcus (2005)[84]	217: 6.9% African American, 6% Latino ≥5 cpd	Randomized controlled trial. Participants were randomly assigned to an 8 week cognitive behavioral therapy (CBT) smoking cessation program plus moderate intensity exercise or to CBT alone. Participants were offered the nicotine patch (dosage depended on smoking level and weight).	3 and 12 months CO and Salivary cotinine	CBT plus exercise had higher abstinence (11.9%) compared to CBT alone (4.6%) at 3 months (p = 0.04). No group differences were found at 12 months (7.3% and 8.3%, respectively; p = 0.49).	Female sample. Nicotine replacement was added to the intervention after recruitment of initial cohort of participants.

Lead Author / Year	Sample	Description of Intervention	Follow-up / Biochemical Verification	Outcomes	Considerations
Gonzales (2006)[85]	1025: 10.2% African American, 1.1% Asian ≥10 cpd	Randomized controlled trial. Participants were randomly assigned to receive brief smoking cessation counseling and varenciline (1mg bid), buproprion SR (150mg bid), or placebo for 12 weeks	12 months CO	For weeks 9 through 52, continuous abstinence rates were 21.9% for varenicline, 16.1% for bupropion, and 8.4% for placebo ($p < 0.001$).	Outcomes based on racial ethnic group were not reported.
Jorenby (2006)[86]	1027 : 9% African Americans, 2.3% Asian ≥10 cpd	Randomized controlled trial. Participants were randomly assigned to receive brief smoking cessation counseling and varenciline (1mg bid), buproprion SR (150mg bid), or placebo for 12 weeks.	12 months CO	For weeks 9 through 52, continuous abstinence rates were 29.7% for varenicline, 20.2% for bupropion, and 13.2% for placebo ($p < 0.05$).	Attrition rate of 35%, primarily in the placebo group.
Klesges (2006)[87]	10,538: 25% African American, 10% Latino, 7% Asian, 3.5% Native Americans	Of 33,215 participants, 7,974 individuals (smokers and nonsmokers) were assigned to a control condition (general health education video), while all others were assigned to tobacco intervention based on tobacco use. Smokers not already in the control group (10,538) were assigned to a cessation intervention (tobacco health education information, relapse prevention, and role playing, optional 2mg nicotine gum).	12 months None	Among all baseline smokers, continuous abstinence rates at 12 months were 15.47% for intervention compared to 13.74% for control (O.R. 1.23; 95% CI=1.07, 1.41). Latinos (O.R. 1.61; 95% CI=1.35, 1.91) and African Americans (O.R. 1.45; 95% CI=1.24, 1.70) were significantly *more* likely to have quit than Caucasians or Asians.	Individuals who chose to take the nicotine gum were significantly *less* likely to be abstinent at follow-up (OR=0.54, 95% CI = 0.47, 0.63): no assessment of gum adherence was reported.
Shiffman, (2006)[88]	324: 10.8% African American, 1.5% Native American ≥15 cpd	Randomized, double-blind, placebo controlled. Smokers were randomly assigned to receive a 35-mg nicotine patch (NP, n = 188) or placebo (n = 136); all received 6 sessions of group cognitive behavioral cessation counseling and used handheld electronic diaries for 6 weeks to record when they smoked.	6 weeks None	7-day point prevalence abstinence rates were significantly (p<0.01) higher for active patch (49%) than placebo (34%) at 6 weeks.	Active nicotine patch decreased risk of lapse and progression to relapse.
Swartz (2006)[89]	351: 6.6% African American, 4.3% Latino, 2% Native American	Randomized controlled trial. Participants were randomly assigned to receive either an internet based smoking cessation counseling or no intervention (control).	3 months None	Self-reported abstinence rates were significantly (p=0.002) greater in the internet group (24.1%) compared to control (8.2%).	
Maher (2007)[90]	1271: 12.1% Latino, 11.6% AA, 7.9% AI/AN, 4.5% A/PI	Observational, survey. Smokers who completed survey were Washington State Quit Line callers and received at least one call and mailed stop smoking kit. Some callers were eligible for 8 weeks of NRT and 4 proactive calls.	3 months None	Self-reported abstinence did not differ significantly ($p = 0.42$) between groups at 3 months: White (30%), Latino (35%), AA (35%), AI/AN (35%), A/PI (33%).	Abstinence did not differ significantly by race/ ethnicity, education, or gender.
Okuyemi (2007)[91]	173: 83% African American, 3% Latino.	Cluster-randomized trial of 20 public housing developments randomly assigned to a treatment (smoking cessation plus 4mg nicotine gum) or a	6 month CO and Salivary cotinine	No difference ($p = 0.73$) between biochemically-verified 7 day abstinence	Wide variations in the number of participants enrolled in each housing

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	≥5 cpd	comparison intervention to increase fruit and vegetable consumption. Both groups received educational materials and MI counseling related to their targeted behavior.		rates between cessation (7.6%) and control (9.35%) groups.	development; many did not meet the anticipated accrual number.
Schmitz (2007)[92]	154: 25.3% African American, 4.6% Latino. ≥10 cpd	Randomized, two level factorial design to examine the effects of medication (bupropion 300mg/day vs. placebo) and group psychotherapy (CBT vs. supportive therapy) on cessation rates. Also measured medication compliance.	12 month CO and Salivary cotinine	Abstinence was significantly higher ($p < 0.05$) when bupropion was delivered with CBT (17%) compared to ST (2%); however, bupropion and CBT was not significantly different than either placebo condition ($p > 0.05$).	Female sample. Limited sample (33–36 women) per treatment condition.
Gandhi (2009)[93]	1688: 22% African American, 8.8% Latino, 4.7% other	Retrospective cohort analysis including evaluation of menthol use. 1688 consecutive patients from outpatient clinic received individual treatment. Average number of appointments attended was 4.5. 88% of patients used some form of pharmacotherapy.	6 months CO	African American and Latino non-menthol smokers had significantly higher abstinence rates than menthol smokers (36% vs. 18% for AA, $p = 0.001$; 28% vs. 11% for Latinos, $p = 0.009$).	Latinos and African Americans were more likely to smoke menthol than non-Hispanic White patients.