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A Scoping Review and Meta-Analysis of Psychosocial and Pharmacological Treatments for Cannabis and Tobacco Use Among African Americans

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Abstract

The rates of co-occurring cannabis and tobacco use are higher among African Americans relative to other racial/ethnic groups. One plausible approach to treating co-use among African Americans is to examine the effectiveness of treatments for the sole use of cannabis and tobacco to identify effective approaches that might be combined to treat the dual use of these substances. The current meta-analysis sought to include studies that reported cannabis and/or tobacco use outcomes from randomized clinical trials (RCTs) with 100% African American samples. A total of 843 articles were considered for inclusion, 29 were reviewed by independent qualitative coders, and 22 were included in the review. There were no articles on cannabis use treatment with a 100% African American sample, resulting in a need to lower the threshold (60%) and conduct a scoping review of cannabis studies. Preliminary evidence from a small number of studies ($k = 7$) supports the use of Motivational Interviewing and Cognitive–Behavioral Therapy to treat cannabis use among African Americans, but not Contingency Management. Results from a meta-analysis of 15 tobacco studies found higher rates of smoking abstinence in the treatment condition relative to control conditions overall and across short and long-term follow-up periods. Significant differences in smoking abstinence were also found when examining the effects of pharmacological treatments relative to their control conditions. The clinical and research implications of these findings for future psychosocial and pharmacological trials for cannabis and tobacco use and co-use among African Americans are described.

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Keywords

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Among African American adults who reported past month cannabis or tobacco use, approximately 28% reported dual use of cannabis and tobacco (Montgomery, 2015). Co-occurring cannabis and tobacco use has been associated with several negative health consequences, such as a greater likelihood of cannabis use disorders (Peters, Budney, & Carroll, 2012) and higher levels of toxicant exposure (e.g., carbon monoxide, carcinogens; Meier & Hatsukami, 2016) relative to either tobacco or cannabis use alone. The high prevalence and negative consequences of co-use highlight a need to identify effective treatments for African Americans who smoke both cannabis and tobacco. In a recent review of cannabis and tobacco co-use literature, Agrawal, Budney, and Lynskey (2012) suggested a need to combine approaches that have been found to be effective for the individual use of cannabis (e.g., Contingency Management [CM]) and tobacco (e.g., Cognitive–Behavioral Therapy [CBT] plus nicotine replacement medications) to treat the dual use of these substances. Historically, African Americans have been underrepresented in clinical research on cannabis (Webb, Striley, & Cottler, 2015) and tobacco (King, Cao, Southard, & Matthews, 2011), thereby making it difficult to determine whether treatment outcomes from randomized clinical trials (RCTs) on cannabis and tobacco equally apply to African Americans (Bernal & Scharrón-del-Río, 2001; Hall, 2001). In an effort to leverage existing treatments to treat the dual use of cannabis and tobacco, a deeper understanding of cannabis and tobacco cessation outcomes among African Americans in existing RCTs is warranted.

Among cannabis users, African American adults (16.8%) display a higher prevalence of cannabis use disorders than their White (10.0%) counterparts (Wu, Zhu, & Swartz, 2016). Heavy cannabis use has been associated with several adverse social and health-related problems, such as relationship conflicts, workplace problems, depression, psychosis, and respiratory problems (e.g., airway obstruction; Bechtold, Simpson, White, & Pardini, 2015; Cerda et al., 2016; Yayan & Rasche, 2016). However, research on the long-term effects of cannabis is inconclusive. To complicate matters further, the high prevalence of cannabis and tobacco co-use, especially among African Americans, contributes to additive health risks from the dual use of cannabis and tobacco (e.g., higher levels of toxicant exposure; Meier & Hatsukami, 2016).

Although African Americans report smoking fewer cigarettes per day and initiating smoking at a later age relative to Whites (Roberts, Colby, Lu, & Ferketich, 2016; Trinidad et al., 2009), African Americans suffer disproportionately from smoking-related diseases, such as lung cancer (Haiman et al., 2006). Moreover, unlike cannabis, the link between tobacco and adverse outcomes (e.g., increased risk of cardiovascular and respiratory disorders) is well established (Mishra et al., 2015). Furthermore, compared with White smokers, African Americans report higher rates of menthol cigarette use (Alexander et al., 2016), which has been associated with a decreased likelihood of smoking cessation at the population level, especially among African Americans (Delnevo, Gundersen, Hrywna, Echeverria, & Steinberg, 2011). The negative social and health effects of cannabis and tobacco among

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smokers overall and among African Americans in particular highlight the need for effective evidence-based treatments (EBTs).

EBTs for Cannabis

Most clinical trials to date have examined the effectiveness of Motivational Interviewing/ Motivational Enhancement Therapy (MI/MET), CBT, and CM in treating cannabis use. Several studies support the effectiveness of MI/MET (Martin & Copeland, 2008; Stephens, Roffman, Fearer, Williams, & Burke, 2007), CBT (Copeland, Swift, Roffman, & Stephens, 2001; Sherman & McRae-Clark, 2016), and CM (Budney, Higgins, Radonovich, & Novy, 2000; Schuster et al., 2016) in decreasing cannabis use. Across adolescent and adult samples (Budney et al., 2015; Copeland, Gates, & Pokorski, 2017), the most promising results have been found when MET, CBT, and CM are combined to treat cannabis use. However, studies suggest that the positive effects of MET/CBT/CM for cannabis treatment diminish over time (Sherman & McRae-Clark, 2016).

MET is an adaptation of MI, a collaborative, person-centered form of guiding to elicit and strengthen motivation to change (Rollnick, Butler, Kinnersley, Gregory, & Mash, 2010). MI/MET includes one or more client feedback sessions in which normative feedback is presented and discussed. The aims of MI/MET are to increase intrinsic motivation to change a particular behavior by helping clients resolve ambivalence and increase their self-efficacy and commitment to change (Rollnick et al., 2010). CBT is a short-term, goal-oriented psychotherapeutic approach based on the assumption that negative patterns of thinking play a role in psychological distress and behaviors (Hollon & Beck, 2013). The major goal of CBT is to modify patterns of thinking to facilitate emotional and behavioral change. CM is a behavioral intervention that uses tangible reinforcers to promote abstinence from cannabis and other drugs. In exchange for positive treatment outcomes (e.g., negative urine samples, treatment attendance), patients receive vouchers or prizes (e.g., Kamon, Budney, & Stanger, 2005; Stanger, Budney, Kamon, & Thostensen, 2009).

As of 2017, there are currently no Food and Drug Administration (FDA) approved pharmacological treatments for cannabis. However, several studies are examining the effectiveness of pharmacological interventions to treat cannabis use disorders (Sherman & McRae-Clark, 2016; Weinstein & Gorelick, 2011), including the use of antidepressants and anxiolytics, agonist therapy and agents targeting specific neurotransmitters thought to be involved in the addiction process. For instance, studies have found promising effects of N-acetylcysteine (NAC), a medication used to treat several physical (e.g., cystic fibrosis) and psychiatric (e.g., bipolar disorder) conditions, on the reduction of cannabis use and cravings among adolescents and young adults (Asevedo, Mendes, Berk, & Brietzke, 2014; Gray et al., 2012; Gray, Watson, Carpenter, & Larowe, 2010). Pharmacological studies have also examined the effectiveness of medications to treat withdrawal symptoms, such as anxiety, irritability, and muscle pain, (e.g., Nefazodone; Haney, Hart, Ward, & Foltin, 2003) and co-occurring psychiatric and cannabis use disorders (e.g., Venlafaxine for depression and cannabis use; Levin et al., 2013).

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EBTs for Tobacco

Similar to cannabis, many RCTs have focused on CBT (Killen et al., 2008), CM (Morean et al., 2015), MI/MET (Lai, Cahill, Qin, & Tang, 2010), and a combination of these approaches (Cavallo et al., 2007) for smoking cessation. Two systematic reviews have found the effectiveness of individual (Lancaster & Stead, 2005) and group (Stead & Lancaster, 2005) counseling, including interventions that incorporated techniques from MI/MET and CBT, were more effective than self-help treatments. In a meta-analysis of 19 CM trials (Cahill & Perera, 2011), only one trial found enhanced long-term cessation rates among participants who received incentives (e.g., lottery tickets, vouchers for groceries). In an updated review of 21 studies, Cahill, Hartmann-Boyce, and Perera (2015) found that incentives appear to boost cessation rates, but is likely only a feasible option for independently funded smoking cessation programs who serve individuals who are relatively affluent and educated. Furthermore, CM appeared to be effective for pregnant smokers at the end of pregnancy and at subsequent follow-ups. Other studies also support the effectiveness of brief advice from medical providers and tobacco quitlines for smoking cessation (Prochaska & Benowitz, 2016). Although several studies report the effectiveness of psychosocial treatments for smoking cessations, the most promising results have been found when psychosocial and pharmacological treatments are combined (Stead, Koilpillai, Fanshawe, & Lancaster, 2016).

Several FDA-approved pharmacological treatments exist for tobacco, including bupropion, varenicline, and nicotine replacement therapy (NRT) in the form of patches, gum, spray, inhalers, and lozenges. For example, a systematic review of NRT in all forms found a 50% to 70% increase in quitting rates, regardless of the setting and independent of additional support received by the patient (Stead et al., 2012). In addition, combined pharmacotherapy, such as bupropion and varenicline, has displayed greater efficacy than monotherapy (e.g., varenicline alone) in smoking cessation (Vogeler, McClain, & Evoy, 2016).

Purpose of Meta-Analysis

Although RCTs have identified several effective psychosocial and pharmacological treatments for cannabis and tobacco, African Americans are often underrepresented in RCTs and/or treatment outcomes by race/ethnicity are not reported. Despite these barriers to advancement in clinical research among African Americans, studies suggest that African Americans are willing to participate in health-related research studies (Lang et al., 2013) and have participated in cannabis and tobacco RCTs, albeit in small numbers. One potential approach to advancing psychosocial and pharmacological research for cannabis and tobacco among African Americans is to gain a better understanding of the existing research among African Americans who have participated in RCTs. The current study will identify cannabis and tobacco RCTs with 100% African American samples, conduct a meta-analysis and provide implications for future psychosocial and pharmacological RCTs for African Americans who smoke cannabis and/or tobacco. The current study will serve as the first review of cannabis treatment studies for African Americans and will provide an update to existing tobacco treatment reviews for African Americans (Cox, Okuyemi, Choi, & Ahluwalia, 2011; Doolan & Froelicher, 2006; Kong, Singh, & Krishnan-Sarin, 2012; Lawrence et al., 2003; Liu et al., 2013; Pederson, Ahluwalia, Harris, & McGrady, 2000;

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Robles, Singh-Franco, & Ghin, 2008; Webb, 2008). Because of the lack of previous reviews on cannabis use treatments among African Americans, no a priori hypotheses were postulated for cannabis use outcomes. Based on previous tobacco studies among African American cigarette smokers (Cox et al., 2011; Webb, 2008), it was hypothesized that (1) African Americans in the treatment condition would display higher rates of abstinence than their counterparts in the control condition. We also explored the effects of time (short-term and long-term follow-ups) and treatment type (pharmacological and culturally tailored treatments) on treatment outcomes.

Method

Study Identification and Selection

This study is a meta-analysis of RCTs for cannabis and tobacco use treatment among African Americans. Figure 1 displays the search strategy that identified relevant articles as recommended by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. Studies were identified by searching through the following databases: PubMed, PsycINFO, the Cochrane Library, EMBASE, and ProQuest Dissertations. The first search was on November 1, 2016, and the last search took place on June 21, 2017. Several relevant keywords were included in each search. For example, the keywords (“marijuana” OR “cannabis” OR “hashish” OR “cannabis use disorder” OR “cannabis abuse” OR “cannabis dependence”) OR (“tobacco” OR “smok” OR “cigarette”) AND (“randomized clinical trial” OR “randomized control trial”) AND (“pharmacotherapy” OR “behavioral” OR “psychosocial”) AND (“African American” OR “Black”) were used in the search of titles and abstracts in the PubMed database. In addition, backward searches were conducted, which consisted of reviewing the reference section of each article that met inclusion criteria. Studies that met the following criteria were included in the meta-analysis: (a) 100% of the sample was African American or Black, (b) reported on the effects of treatment assignment using data from a RCT comparing psychosocial and/or pharmacological treatments, and (c) had at least one self-report or biochemically verified cannabis or tobacco use outcome. Studies that randomized treatment at the group level (i.e., site, community or neighborhood level) and reported on group level outcomes were excluded. This study focused exclusively on treatment outcomes among African Americans individuals who were randomized to treatment.

The search did not identify any cannabis studies with an 100% African American sample. Therefore, the threshold was lowered to 60% African American samples, as recommended by Wilson, Lipsey, and Soydan (2003), in cannabis studies to include a wider range of studies and provide preliminary information about the current state of cannabis treatment literature among African Americans. Because of the lowered threshold for cannabis, these studies did not fully include the population of interest (e.g., African Americans) and were therefore not included in a meta-analysis. A scoping review of findings in the small body of literature on cannabis studies with 60% or more African Americans was conducted instead.

As shown in Figure 1, 843 articles were identified through several scientific databases and a review of reference lists from selected articles. Two independent reviewers assessed the title and abstracts for all 843 articles to determine if they met inclusion criteria. A third reviewer

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was consulted in cases where the two initial reviewers disagreed over the inclusion of an article. A total of 814 articles were excluded at the first level of review because they did not meet the inclusion criteria listed previously (e.g., did not report cannabis or tobacco use outcomes). Seven additional studies were excluded after qualitative coding revealed that the studies had a nonrandomized design or did not report on the influence of treatment conditions on outcomes. A total of 22 studies were included in present review: seven studies in the scoping review for cannabis and 15 studies in the meta-analysis for tobacco. Data for articles included in the scoping review for cannabis and meta-analysis for tobacco studies are summarized in Table 1 (descriptive statistics for all articles) and Table 2 (summary of articles).

Coding

For tobacco studies, the codebook used by Webb (2008) and initially developed by Lipsey and Wilson (2001) was adapted to code characteristics of studies in the current review. The variables included demographic characteristics (e.g., age), study characteristics (e.g., recruitment strategy), smoking cessation outcomes (e.g., point prevalence abstinence [PPA]; no smoking one or more days prior to the follow-up), and methodological quality (as described later). Detailed procedures for coding and combining several outcomes for the purposes of this meta-analysis are described:

Smoking abstinence.—Several outcomes were included in each of the 15 studies. These outcomes included self-reported and biochemically verified (salivary cotinine or carbon monoxide) 7-day and 24-hr PPA, as well as self-reported 24-hr quit attempts (yes/no) and complete abstinence (yes/no) at follow-up. A single measure of smoking abstinence was created by averaging the smoking cessation outcome from each study. In studies with more than one smoking cessation outcome, the outcome that was biochemically verified was selected. In two studies, there were no biochemically verified outcomes. In one case, the complete abstinence outcome was selected over the 24-hr quit attempt because of the longer period of time covered by the abstinence variable. In the second study, the only outcome provided was used, which was a self-reported 24-hr quit attempt. It is also important to note that one study was a 2×2 design with two independent treatment groups and two independent control groups. Smoking cessation outcomes from each of the groups were treated as two unique studies in the meta-analysis.

Time.—Each study had one to four follow-up periods. Smoking cessation outcomes were recorded for each follow-up period. Data from each follow-up period were combined to examine short and long-term effects of treatment. Short-term follow-ups were defined as less than or equal to 4 months' posttreatment, and long-term follow-ups were defined as greater than 4 months' posttreatment.

Treatment type (pharmacological/culturally tailored).—In an effort to tease out the effects of the wide range of treatment and control conditions in this study, we identified the most homogeneous studies and created two subgroups (i.e., pharmacological studies and culturally tailored studies) to assess smoking abstinence outcomes. Pharmacological studies were defined as those that included a pharmacological treatment (e.g., bupropion) compared

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with a placebo drug. All the studies in this category also included a psychosocial component; however, both the treatment and control conditions had access to the psychosocial treatment. The studies sought to examine the effects of medications versus placebo and were therefore categorized as pharmacological studies in the current analysis. Studies that provided optional access to NRT or varenicline were excluded from the pharmacological cat egory, as these medications were offered to both the treatment and control conditions. Culturally tailored interventions were defined as those that were clearly labeled or described as culturally tailored or culturally specific by the authors (e.g., culturally specific CBT).

To assess the methodological quality of studies included in the meta-analysis, we adapted a three-item reliable and valid scoring system by Jadad and colleagues (1996). The system assessed the adequacy of randomization (the authors provided a brief description of the randomization process; 1 point), concealment of randomization (double-blinding is mentioned; 1 point) and completeness of follow up data (description of withdrawals and dropouts; 1 point). We added an additional item to assess the use of biochemically verified outcomes (e.g., salivary-cotinine specimens; 1 point) in studies. It is important to note that no quality scoring systems have been consistently associated with treatment outcomes, and the use of problem-specific items to supplement existing quality assessment measures is strongly recommended (Lau, Ioannidis, & Schmid, 1997).

For cannabis studies, a scoping review was conducted. Scoping reviews determine the size and nature of the evidence base for a particular topic area and are useful for identifying gaps in the literature and informing future research (Tacconelli, 2010). This scoping review approach was selected to identify literature on cannabis treatment for predominately African American samples and inform future systematic reviews and meta-analyses. Scoping reviews provide a map of the literature without quality assessment or extensive data synthesis (Armstrong, Hall, Doyle, & Waters, 2011).

To ensure data coding reliability, all studies were double coded by the authors. Interrater reliability was assessed for categorical variables using the kappa statistic and continuous variables using the intraclass correlation coefficient (ICC) statistic. The kappa statistic treats ordinal data as nominal and ranges from zero (chance agreement between coders) to one (perfect agreement; Landis & Koch, 1977). The ICC measure provides interrater reliability of numerical or continuous measurements and also ranges from zero to one (Koo & Li, 2016). Disagreements between coders were resolved by discussion and further examination of the articles and codebook. The final analyses were run on a data set with 100% agreement between coders.

Statistical Analyses

Analyses were conducted in SAS (SAS Institute Inc., Cary, NC) and comprehensive meta-analysis (CMA; Borenstein, Hedges, Higgins, & Rothstein, 2005). To determine the efficacy of smoking cessation treatments, differences in outcomes were calculated using random-effects procedures (Lipsey & Wilson, 2001). Odds ratios (*OR*s) and 95% confidence intervals (CIs) were calculated. *OR*s compared treatment and control groups on the relative odds of smoking cessation. Significant *OR*s greater than one suggests that individuals in the

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treatment condition had greater odds of abstinence than the control condition, while significant ORs less than one indicates the odds of cessation are greater in the control condition. To assess homogeneity, Q, I^2, and T^2 were calculated. Q indicates whether there is significant heterogeneity in the effect size (Hedges & Olkin, 1985), I^2 provides the proportion of variability in the effect size (Higgins & Thompson, 2002), and T^2 provides an estimate of the overall magnitude of between-study variance. *OR*s and 95% CIs were calculated for combined smoking abstinence outcomes (i.e., short-term and long-term follow-up outcomes) from the 15 studies. Separate analyses were conducted for short- and long-term follow-up periods and for pharmacological and culturally tailored treatments. Evidence of publication bias was assessed through a funnel plot using the standard error on the *y*-axis. Each circle on the plot represents a study, while the *y*-axis represents study precision and the *x*-axis shows the effect of treatment. The presence of publication bias may be indicated by a higher concentration of studies on one side of the mean (Borenstein, Hedges, Higgins, & Rothstein, 2009).

Results

Sample Description

A scoping review of cannabis studies and a meta-analysis of tobacco studies was conducted. Of the 22 articles reviewed, seven focused on cannabis and 15 focused on tobacco. As displayed in Table 1, all cannabis studies in the review examined the effectiveness of psychosocial approaches to treatment, especially CBT, MET, and CM. Most of the studies were published between 2006 and 2015 in the Northeast region of the United States. The studies focused on both adolescents and adults. On average, approximately 39% of each study sample was female. The average age of the 793 participants in the studies was 20. Each sample was 71% African American, on average.

In terms of the meta-analysis for the tobacco studies, the ICC was .89 for continuous variables and the kappa was .84 for categorical variables, both indicating excellent agreement between coders. As shown in Table 1, the tobacco studies examined a wide range of psychosocial and pharmacological treatments, with over half of the studies providing NRT for cessation. Most of the studies were published between 2008 and 2012 in the Midwest region of the United States. All of the studies focused on adults, with 65% female samples, on average. The average age of the 5,165 participants was 45 and the study samples were 100% African American. The inclusion criteria, treatment conditions, percentage of African Americans in the sample, treatment details (e.g., duration), number of follow-up phases, treatment outcomes, results, and methodological quality ratings (tobacco studies only) from each of the cannabis and tobacco studies are listed in Table 2.

Scoping Review of Cannabis Cessation RCTs in Predominately African American (60%+) Samples

Three of the RCTs focused on predominately African American adolescent samples. The first RCT (Liddle, Dakof, Turner, Henderson, & Greenbaum, 2008) focused on adolescents between 12 to 17.5 years of age in a community-based drug abuse clinic, with 88% meeting *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., *DSM–IV*) criteria for

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cannabis abuse or dependence. Participants either received CBT or Multidimensional Family Therapy (MDFT), an integrated, comprehensive, family-based treatment for substance use and behavioral problems among youth. Results revealed that both treatments produced significant decreases in past 30-day cannabis use. However, MDFT was more successful than CBT in decreasing cannabis use to zero or one occasion of use, and the effect was sustained over a 12-month follow-up period. Similarly, the second RCT for cannabis cessation among adolescents (Stanger, Ryan, Scherer, Norton, & Budney, 2015) incorporated family members into the treatment approaches. Participants who met criteria for cannabis abuse or dependence and were between the ages of 12–18 (if 18, had to be in high school) were recruited to participate in a RCT at an academic medical center. Adolescents were randomized to one of three conditions: (1) MET/CBT, (2) MET/CBT + abstinence-based CM at the clinic and home, or (3) MET/CBT/CM + Parent Training (PT). Findings revealed that adolescents who received clinic and home-based CM with or without PT were more likely to achieve 4 weeks of continuous abstinence than those who received MET/CBT alone. A recent RCT on cannabis cessation among urban adolescents (Mason, Sabo, & Zaharakis, 2017) examined the effectiveness of a computer-based Peer Network Counseling (PNC) intervention relative to standard care in a primary health care setting for heavy cannabis users. Adolescents who were assigned to PNC had a higher probability of being abstinent at 6 months and a lower probability of using cannabis 10 or more times per month relative to their counterparts in standard care.

Participants in a cannabis cessation RCT for a predominately African American adult sample (Carroll et al., 2006) were referred to a community clinic for cannabis dependence by the criminal justice system. Participants were randomized to receive either (1) MET/CBT + CM, (2) MET + CBT without CM, (3) Drug Counseling (DC) plus CM or (4) DC without CM over 8 weeks. Findings revealed a significant CM effect, with conditions including CM displaying longer durations of abstinence and higher rates of consecutive cannabis-free urine samples and total negative urine samples than conditions without CM. Furthermore, cannabis outcomes for participants in the MET/CBT + CM condition were better than other three conditions. However, a secondary analysis of this trial found racial differences in the effects of CM on treatment outcomes (Montgomery, Petry, & Carroll, 2012). Specifically, the authors found that conditions with CM were more effective in reducing the proportion of cannabis positive urine screens than conditions without CM among White young adults, but not among African Americans. Furthermore, African Americans were less likely to complete all phases of the clinical trial than their White counterparts.

The lack of positive CM effects relative to other treatment conditions was also displayed in another RCT with a predominately African American sample. Carroll et al. (2012) compared the effectiveness of (a) CBT alone versus (b) CBT + CM for treatment adherence versus (c) CM for cannabis abstinence versus (d) CBT + CM for cannabis abstinence among cannabis dependent adults in a community treatment clinic. The addition of CM did not significantly improve CBT outcomes. Furthermore, adding CBT to CM for abstinence resulted in a higher percentage of cannabis-positive urine specimens in the CBT + CM for cannabis abstinence condition (75.5%) relative to the CM for cannabis abstinence condition (57.1%). In a predominately African American sample of postpartum women in an urban obstetric hospital (Ondersma, Svikis, & Schuster, 2007), participants were randomized to receive

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either a computer based MI intervention plus CM for attendance or an assessment only at baseline. Findings revealed no significant differences between the two treatment conditions on changes in self-reported frequency of cannabis use from baseline to 4 months.

Meta-Analytic Results for Tobacco Cessation RCTs in African American Samples

Smoking abstinence (general effects).—Across all studies and follow-up periods, the meta-analysis produced a significant OR of 1.41 (95% CI = 1.11–1.78, $k = 16$, $p < .01$), which suggests that there was a significant difference in smoking abstinence among African Americans in the treatment condition relative to their counterparts in the control condition (Figure 2). The homogeneity test was significant, $p < .001$, $Q(15) = 54.36$, $I^2 = 72.41$, $T^2 = 0.14$, indicating a high level of heterogeneity in effect sizes. Significant heterogeneity suggests the need to look at subgroup analyses (e.g., time), which are described later.

The funnel plot in Figure 3 displays a scatterplot of the treatment effect against the standard error, a measure of study precision. Despite the small k, the plot appears relatively symmetrical, suggesting a low likelihood of publication bias.

Time.—As shown in Table 2, the assessment/follow-up phases for all studies ranged between the end of treatment and 12 months. For the short-term follow-up, the meta-analysis produced a significant OR of 1.39 (95% CI = 1.05–1.85, $k = 14$, $p < .05$), which suggests that there were significant differences in smoking abstinence among African Americans in the treatment condition compared with the control condition less than or equal to four months posttreatment. The effect size for the long-term follow up was $OR = 1.52$ (95% CI = .1.22–1.89, $k = 12$, $p = < .01$), indicating significant differences in smoking abstinence between treatment and control conditions greater than four months posttreatment.

Treatment type.—Regarding pharmacological treatments, the meta-analysis produced a significant OR of 1.69 (95% CI = 1.15–2.49, $k = 6$, $p < .01$), which suggest higher rates of smoking abstinence among African Americans in medication treatment conditions compared with placebo controls. There were no significant differences in smoking abstinence found between culturally tailored treatments and nonculturally tailored control conditions ($OR = 1.09$, 95% CI = 0.76–1.55, $k = 5$, $p = .65$).

Methodological quality ratings.—The studies were of good quality. As shown in Table 2, the most common weakness was the lack of a double-blind study design. The association between effect sizes and methodological quality was not significant.

Discussion

There have been several important advances in the psychosocial and pharmacological treatment of both cannabis and tobacco. It is unclear, however, whether racial/ethnic minorities benefit from these advances. The current study identified seven RCTs on cannabis and 15 on tobacco treatments with predominately (60%+) African American samples. Although the number of studies on cannabis and tobacco treatments among African American samples are limited, several trends on the effectiveness of treatments for cannabis and tobacco were found in the scoping review and meta-analysis. Furthermore, this study

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also provides several clinical and research implications to improve cannabis and tobacco treatments for African Americans.

Cannabis Cessation Treatment Among Predominately African American (60%+) Samples

The number of cannabis RCTs with predominately African American samples is very low. Despite the small body of literature on effective treatments for African Americans, the current review identified several issues that warrant additional attention. Findings from this scoping review suggest that CBT and MDFT were equally effective in reducing cannabis use among youth. This is a promising finding suggesting that CBT and MDFT might be two effective treatments that can be used to reduce cannabis use among African American youth. Other studies have especially supported the use of family based interventions, such as MDFT, in the treatment of substance use, especially among African American youth in the context of the criminal justice system (Dakof et al., 2015; Henderson, Dakof, Greenbaum, & Liddle, 2010). Given that African American youth are more likely than other racial/ethnic groups to enter the health care system through the legal system (Heflinger, Chatman, & Saunders, 2006; Sinha, Easton, & Kemp, 2003), it is important to identify effective treatments that are tailored for juvenile justice contexts. Mason and colleagues (2017) also demonstrated the effectiveness of another system-level intervention for African American adolescents that targets peer network characteristics (e.g., social support from peers) to treat heavy cannabis use. Future studies should continue to develop and examine the effectiveness of interventions that involve peers and family members in the treatment of cannabis use, especially among African American adolescents.

Second, the other five studies in the review included CM alone or in combination with other psychosocial treatments, including MET and CBT. It appears that MET and CBT might be effective treatments for African Americans (Carroll et al., 2006), but additional research is needed to disentangle the effects of these treatments alone and in combination with each other and other treatment conditions (e.g., CM). For instance, secondary findings from studies in this review suggest that MET/CBT alone is just as effective as drug counseling (Carroll et al., 2006), MET/CBT plus CM and MET/CBT plus CM and parent training over time (Stanger et al., 2015). Although CM, especially in combination with other treatments, has been identified as an effective approach for treating cannabis in the general population (Gates, Sabioni, Copeland, Le Foll, & Gowing, 2016), findings from predominately African American samples suggest that CM might not have the same positive effect in the treatment of cannabis use. For instance, one study showed no statistical differences in the frequency of cannabis use at a 4-month follow-up among individuals in CM combined with MI compared with individuals in a non-CM based control condition (Ondersma et al., 2007). Although one study demonstrated the effectiveness of CM relative to other cannabis use treatments in a predominately African American sample (Carroll et al., 2006), secondary analyses of data from the trial revealed different treatment outcomes by race. Specifically, Montgomery et al. (2012) found that CM was effective in reducing the proportion of cannabis positive samples among White young adults, but not among African American adults. Combined results from the parent study (Carroll et al., 2006) and secondary analyses (Montgomery et al., 2012) highlight two important points.

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The findings suggest that CM might not be as effective for African Americans as it is for other racial/ethnic groups in the treatment of cannabis use. Given the poor effect of CM found among African Americans in this review, additional research is needed to examine the effectiveness of CM and additional factors that might influence African Americans' response to CM treatment. For example, baseline drug use has been shown to influence the relationship between race and CM treatment outcomes in a sample of adults who use cocaine (Montgomery, Carroll, & Petry, 2015). Among White cocaine users, adults who initiated treatment with a cocaine positive urine screen remained in treatment longer and submitted a higher proportion of negative urine samples when assigned to CM relative to standard care. However, among African American cocaine users, there were no significant treatment differences in retention or the frequency of cocaine use among adults who entered treatment with a positive urine screen. Second, the authors used a lower than recommended threshold (at least 60% African American vs. the recommended 75%; Huey & Polo, 2008) to include a wider range of studies with predominately African American samples. Only two of the cannabis studies in the current review had a sample that was comprised of at least 75% African Americans (Mason et al., 2017; Ondersma et al., 2007). However, findings from Carroll et al. (2006) and Montgomery et al. (2012) suggest that if a large treatment effect is observed in 40% of the sample (i.e., non-African Americans), it might mask an ineffective treatment among African Americans (60%) in the sample and vice versa. These findings suggest that a larger threshold (75%), as recommended by Huey and Polo (2008), might provide stronger evidence of a treatment effect among African Americans. Furthermore, these findings emphasize the importance of explicitly examining cannabis use treatment outcomes by race in future clinical trials.

Several other issues can be gleaned from existing studies on treatments for cannabis use among predominately African American samples. None of the studies examined the effectiveness of medications in the treatment of cannabis. Although no drug has been approved for the treatment of cannabis dependence, it is important to recruit predominately African American samples or examine potential racial differences in pharmacological outcomes for the treatment of cannabis use disorders, such as NAC. Second, the majority of studies focused on adolescents and young adults, with none focusing on older adults. Although cannabis use is highest among youth (Compton, Grant, Colliver, Glantz, & Stinson, 2004), it is also important to identify effective treatments for older adults, especially as some state policies become more lenient with cannabis use (e.g., legalization of medical and recreational cannabis use). Third, technology-based interventions represent an innovative method to reach cannabis users, especially among African Americans who are less likely than other racial/ethnic groups to enroll in and remained engaged in traditional substance abuse treatment (Becker, Stein, Curry, & Hersh, 2012). Only two studies in the current review utilized a computer-based intervention to treat cannabis use (Mason et al., 2017; Ondersma et al., 2007). Additional studies should examine the effectiveness of technology-based interventions for African American cannabis users. Lastly, future research should focus on examining the effectiveness of treatment interventions in diverse settings (e.g., noncriminal justice settings) among African Americans.

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Tobacco Cessation Treatment for Predominately African American (100%) Samples

The meta-analysis in the current study compared smoking cessation outcomes among African Americans participating in RCTs comparing psychosocial and pharmacological treatments to a control condition. Across all follow-up periods, the treatment condition was more effective than the control condition in improving smoking cessation outcomes. This finding is consistent with previous reviews and meta-analyses that display higher rates of smoking abstinence in psychosocial (e.g., written materials and counseling) and pharmacological (e.g., nicotine patch, nicotine nasal and bupropion) treatments among African Americans (Cox et al., 2011; Webb, 2008). This finding is especially significant given the focus on samples with 100% African Americans. Previous smoking cessation reviews and meta-analyses have included studies with a smaller percentage of African Americans (e.g., 10%+; Cox et al., 2011; 50%+; Webb, 2008). It is promising that the diverse treatment conditions (e.g., MI, culturally tailored smoking cessation videotapes) were superior to the standard care or active controls (i.e., behavioral counseling or health education with or without placebo drugs) included in the analysis. Subgroup analyses revealed that pharmacological treatments (i.e., bupropion and NRT) were more effective than their placebo control conditions. This finding is consistent with Robles and colleagues' (2008) review of smoking cessation-pharmacotherapies for African American and other racially/ethnically diverse populations. However, the significant pooled effect of pharmacological treatments on outcomes among 100% African American samples is promising, as several other reviews and studies have found nonsignificant effects of pharmacological treatments on smoking cessation outcomes among predominately African American samples (Cooper et al., 2005; Okuyemi et al., 2007; Webb, 2008). Future studies should replicate the promising findings on bupropion and NRT and assess the effectiveness of other pharmacological treatments, such as varenicline (Buchanan et al., 2012) and other forms of NRT (e.g., NRT spray; Mabry et al., 2007), among African American smokers.

To further assess the effect of treatment on outcomes, this meta-analysis also examined the effects of treatment over time. At the short- and long-term follow up periods, higher rates of smoking abstinence were found in the treatment conditions compared with control conditions. The positive short-term effects of smoking cessation treatments have been consistently noted across predominately African American samples (Cox et al., 2011) and in other populations (e.g., individuals in addiction treatment; Prochaska, Delucchi, & Hall, 2004). Many of the studies in this review included cultural components (e.g., smoking cessation health guide designed for African Americans, culturally tailored CBT) that might help to explain the positive outcomes in the treatment condition during the short-term follow-up phase. As noted by Webb (2008), culturally tailored interventions are likely effective in engaging African Americans and reducing attrition rates early on in treatment. However, subgroup analyses from the current study revealed a nonsignificant effect of culturally tailored smoking interventions on smoking abstinence. This finding is inconsistent with other studies (Matthews, Sanchez-Johnsen, & King, 2009; Webb, 2008) and is likely explained by the small number of studies and diverse culturally specific features represented in the five culturally tailored studies included in the review. For instance, some studies provided a culturally tailored version of an evidence-based treatment (i.e., culturally tailored CBT; Webb Hooper, An-toni, Okuyemi, Dietz, & Resnicow, 2017), while others provided

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culturally specific booklets (Webb, 2009). It is important to note that, although nonsignificant, there was a trend (i.e., *OR* greater than 1) in favor of culturally tailored treatments in the current meta-analysis. More studies are needed to provide clear and consistent descriptions of effective culturally tailored treatments to aid in the interpretation of findings from culturally tailored studies. For example, the effectiveness of surface structure (e.g., modify the presentation of treatment activities, such as meeting with participants in familiar places) relative to deep structure (e.g., modify the core curriculum, such as incorporating social values and experiences into treatment content) adaptations in smoking cessation interventions remains unknown (Resnicow, Baranowski, Ahluwalia, & Braithwaite, 1999). Future studies should assess the influence of culturally tailored smoking cessation interventions on both retention and abstinence rates in 100% African American samples during short and long-term follow-up periods.

Unlike other studies (Cox et al., 2011), this meta-analysis also demonstrated significant effects on long term-abstinence in samples of African American smokers. This finding is very encouraging and may differ from previous studies because it focuses specifically on studies with 100% African American samples. It is also important to note that the current meta-analysis defined long term as 4 months posttreatment. There are varying definitions of long-term follow up in the smoking cessation literature. For instance, some smoking cessation meta-analyses define long-term follow-up periods as the first subsequent assessment following the end of treatment (Webb, 2008), while other reviews described long-term efficacy as 6 months or more (Cox et al., 2011). Additional studies are needed to provide a clearer and deeper understanding of long-term smoking cessation outcomes among African American.

Preliminary findings from this small meta-analysis suggest that current treatments are more effective than control conditions in improving smoking cessation among African Americans. While additional studies and meta-analyses are needed to support these findings, this study does highlight the urgent need for more tobacco studies that focus exclusively on African Americans. It is also important to assess potential moderators in future analyses, as several factors have been found to moderate treatment effects among African American smokers (e.g., treatment setting, type of control conditions; Webb, 2008). The urgent need to focus on potential moderators is also supported by the significant heterogeneity found in the effect sizes in the current meta-analysis.

Given that African Americans are the most studied racial/ethnic minority population in smoking cessation research (Cox et al., 2011; Liu et al., 2013; Webb, 2008), it was surprising to identify only 15 studies that exclusively focus on treatment effectiveness among African Americans (i.e., 100% African American samples). Additional smoking cessation studies are needed overall among African Americans, but especially for adolescents and young adults and individuals who have not expressed an interest in quitting smoking. Despite the small number of studies, findings from the small meta-analysis and scoping review have the potential to inform treatment for the dual use of cannabis and tobacco.

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Implications for Cannabis and Tobacco Co-Use RCTs Among African Americans

None of the studies in the current review examined the dual treatment of cannabis and tobacco. Cannabis and tobacco co-use research is relatively new and includes a small number of treatment studies (Lee et al., 2015). Given the high rates and negative health consequences of cannabis and tobacco co-use among African Americans (Meier & Hatsukami, 2016; Montgomery, 2015), it is important to target this population in the dual treatment of cannabis and tobacco. As suggested by Agrawal et al. (2012), a combination of effective approaches from both the cannabis and tobacco fields might work in the dual treatment of cannabis and tobacco. The current scoping review and meta-analysis provides several implications for future research in this area for African Americans.

Regarding cannabis, based on a small number of studies ($k = 7$), there appears to be preliminary evidence that MET/CBT is effec tive among African Americans and that CM is less effective. Based on findings in a meta-analysis of 15 tobacco studies, existing psychosocial (e.g., CBT, health education) and pharmacological (e.g., bupropion, NRT) treatments may have a positive short- and long-term effect on smoking cessation outcomes among African American smokers. An overall positive treatment effect was found, with several of the studies demonstrating significant promise for bupropion or NRT in conjunction with HE or MI and a trend toward culturally tailored CBT. One potential approach for treating the dual use of cannabis and tobacco among African Americans might include combining the options listed above. For instance, a study with a predominately White sample found that a computer-assisted version of MET/CBT/CM for cannabis use disorders was more effective than a control condition in reducing the number of cigarettes smoked per day (Lee et al., 2015). Another study (Hill et al., 2013) evaluated the effectiveness of a CBT manual plus NRT for adults with nicotine and cannabis dependence among a predominately White sample. Findings revealed a significant decrease in cigarette use, but not cannabis use. The authors in both studies did not find a compensatory increase in cannabis use following the reduction in cigarette use, suggesting that the two drugs can be treated simultaneously. Given the preliminary positive effects of MET, CBT, and NRT among African Americans, these approaches might be combined and perhaps culturally tailored to treat cannabis and tobacco co-use in this population.

Several other issues should be considered in the treatment of cannabis and tobacco co-use among African Americans. First, the identified areas for future research (e.g., technology-based interventions) described above in the sole use of cannabis should also be applied to the dual treatment of cannabis and tobacco. Technology-based interventions and group interventions might serve as effective methods to reach African Americans who are less likely to engage in traditional treatment (Becker et al., 2012) and more likely to cite support as a necessary and important component of treatment (Burgess et al., 2014). For example, in a predominately White sample of adult cannabis and tobacco co-users participating in a group cessation program (MI/CBT and self-control training) for co-users, participants reported significant decreases in tobacco and cannabis use over a 6-month period (Becker, Haug, Kraemer, & Schaub, 2015). A similar approach might also work well for African Americans who use cannabis and tobacco.

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There are also additional issues that clinicians and researchers should consider when working with African Americans who smoke cannabis and/or tobacco. First, African Americans are more likely than other racial/ethnic groups to report consuming cannabis through blunts (Ramo, Liu, & Prochaska, 2012; Schauer, Rosen-berry, & Peters, 2017). Blunts are hollowed out cigars or cigarillos that are filled with cannabis. Blunt use has been associated with negative several health consequences (e.g., increased risk for cardiovascular and pulmonary diseases; Cooper & Haney, 2009) and exposes users to cannabis as well as nicotine in the cigar wrapper used to make the product (Peters, Schauer, Rosenberry, & Pick-worth, 2016). The high rates of cannabis and tobacco co-use found among African Americans may be at least partially attributed to the use of blunts, especially among African American youth (Golub, Johnson, & Dunlap, 2005; Schauer et al., 2017). Therefore, future trials should examine the effectiveness of psychosocial and pharmacological treatments for blunt use in particular among African Americans. Second, African Americans are more likely than other racial/ethnic groups to smoke little cigars and cigarillos (LCC; Sterling, Fryer, Pagano, & Fagan, 2016; Sterling, Fryer, Pagano, Jones, & Fagan, 2016) and menthol cigarettes (Alexander et al., 2016). Therefore, common outcomes in RCTs for tobacco (e.g., number of cigarettes smoked per day, 7-day PPA of cigarette smoking) should be expanded to include the duration and frequency of LCC and menthol cigarette use and co-use among African Americans. Studies have demonstrated lower smoking cessation rates among African American menthol cigarette smokers relative to nonmenthol cigarette smokers in trials for psychosocial (Gandhi, Foulds, Steinberg, Lu, & Williams, 2009) and pharmacological (Okuyemi et al., 2003) treatments. Therefore, future clinical trials should specifically examine the influence of treatments (e.g., CBT) on menthol cigarettes and LCC use and co-use over time. Third, sociocultural correlates of cannabis and tobacco use among African Americans should be considered in the design and analysis of future psychosocial and pharmacological clinical trials for the sole and dual use of these substances. For example, low socioeconomic status, racial discrimination, and low acculturation have been linked to cigarette use among African American adults (Landrine & Corral, 2016). Moreover, other unique factors have been linked to smoking cessation outcomes among African American adults, such as type of cigarette smoked (e.g., menthol), baseline cotinine levels, and number of years smoked (Faseru et al., 2013). Several sociocultural factors are also associated with cannabis use among African Americans, such as racial discrimination (Steele, 2016) and stressors associated with living in high-risk urban environments (e.g., community violence exposure; Reboussin, Green, Milam, Furr-Holden, & Ialongo, 2014). These factors might influence how African American individuals engage with and respond to psychosocial and pharmacological treatments for cannabis and tobacco use and co-use. Last, future studies should include larger percentages (at least 75%) of African Americans and/or report treatment outcomes by race to determine whether findings from psychosocial and pharmacological RCTs on cannabis and tobacco use and co-use apply equally to African Americans.

One limitation of this review is the wide variability in the methods (e.g., treatment conditions, inclusion/exclusion criteria, treatment outcomes) in each of the RCTs. Furthermore, this review of RCTs was limited by the exclusion of other types of treatment studies (e.g., quasi-experimental). However, it is important to note that RCTs were selected

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because they are considered the gold standard for clinical evidence. The meta-analysis also combined smoking cessation outcomes into one variable. However, outcomes were combined in an attempt to increase the number of studies that could be included in the analysis. Another limitation is the small number of studies identified in both the scoping review and meta-analysis. The small number of studies and high attrition rates limit the opportunity to draw strong conclusions and highlights a critical gap in the literature. Preliminary findings from the current study are presented in an effort to inform and encourage additional studies on African American cannabis and tobacco smokers. Several strengths of this review should also be noted. This is the first review of RCT treatment outcomes for cannabis use among predominately African Americans samples. Furthermore, this review extended tobacco literature by conducting a meta-analysis of existing RCTs with 100% African American samples. Overall, this scoping review and meta-analysis has revealed important clinical and research trends and implications for the psychosocial and pharmacological treatment of the sole and dual use of cannabis and tobacco among African Americans.

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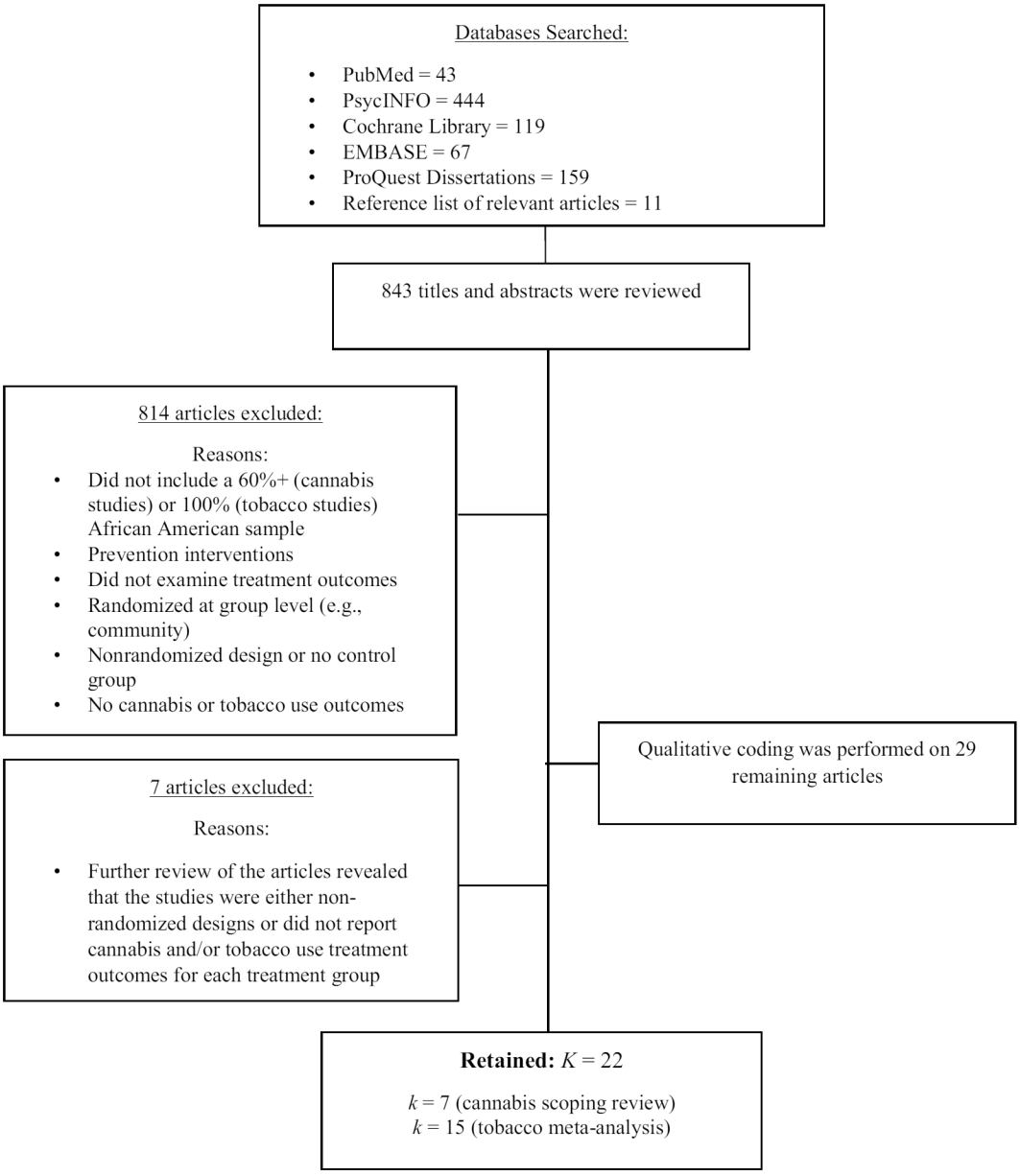

Figure 1.
Flow diagram for search strategy.

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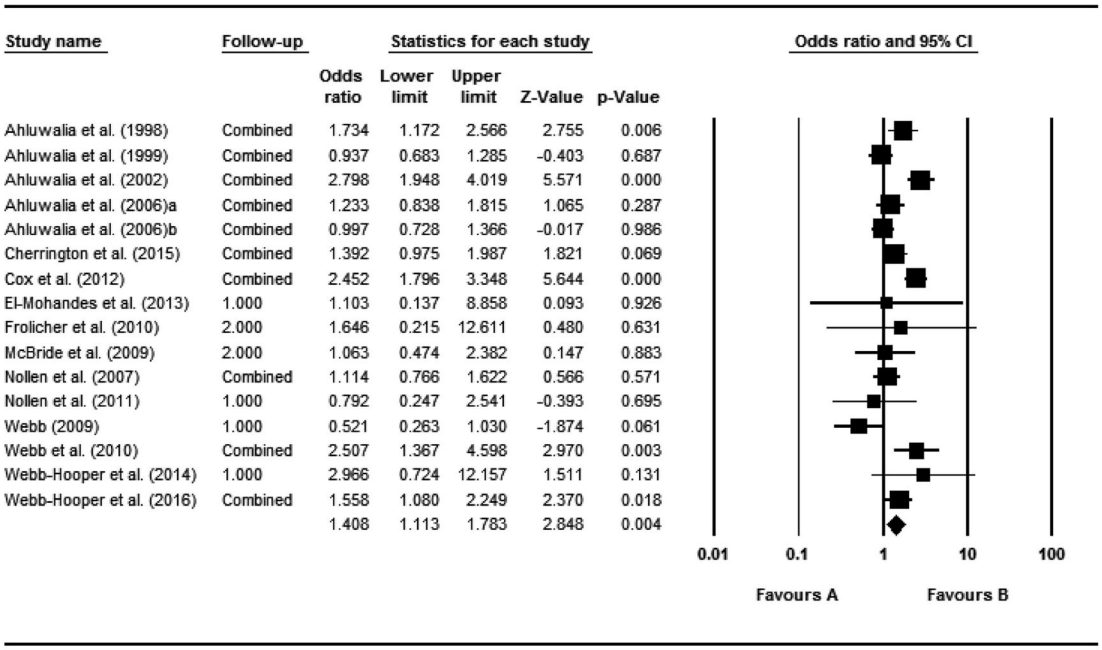

Note. Follow-up: 1 = less than or equal to 4 months, 2 = greater than 4 months, combined = effect sizes averaged across follow-up periods.

Figure 2.

Effect sizes and confidence intervals for tobacco treatment and control interventions for African Americans.

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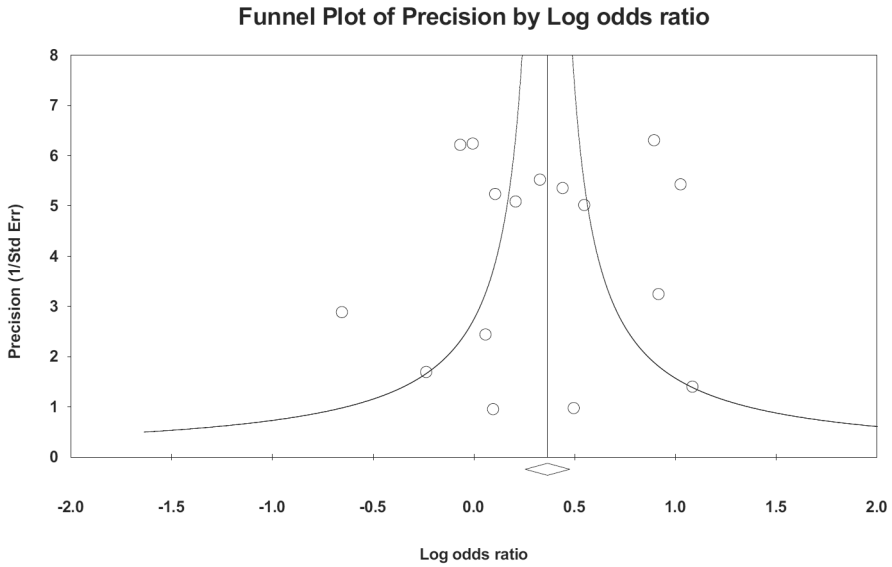

Figure 3.
Funnel plot of precision to detect publication bias.

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Table 1

Descriptive Statistics of Randomized Clinical Trials for Cannabis and Tobacco Use Among Predominately African American Samples (K = 22)

Variable	Number of Studies	%
Cannabis studies (k = 7)		
Publication year		
2006–2010	3	42.9
2011–2015	3	42.9
2016–2017	1	14.3
Location of study		
Midwest United States	1	14.3
Southeastern United States	1	14.3
Northeastern United States	5	71.4
Target group		
Adolescents	3	42.9
Adults	4	57.1
Treatment type		
Motivational enhancement therapy	4	57.1
Cognitive behavioral therapy	5	71.4
Contingency management	4	57.1
Drug counseling	2	28.6
Multidimensional family therapy	1	14.3
Behavioral parent training	1	14.3
Average number of women in studies[a]	6	38.4
Average age of participants (M, SD)[a]	20	3.5
Total number of participants (N, % African American)[a]	793	71.0
Tobacco studies (k = 15)		
Publication year		
1998–2002	4	26.7
2003–2007	2	13.3
2008–2012	6	40.0
2013–2017	3	20.0
Quality score		
0–1	1	6.6
2–3	9	60.0
4	5	33.3
Location of study[b]		
Midwest United States	8	53.3
Southern United States	6	40.0
Western United States	1	6.6

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Variable	Number of Studies	%
Target group		
Adolescents	0	0.0
Adults	15	100.0
Treatment type		
Motivational interviewing	2	13.3
Cognitive behavioral therapy[c]	3	20.0
Videotapes/DVDs[c]	3	20.0
Smoking cessation messages[c]	1	6.6
Biomarker feedback	1	6.6
Smoking cessation guides	4	26.7
Health Education	4	26.7
Bupropion SR	2	13.3
Nicotine replacement therapy	7	41.2
Average number of women in studies[a]	9	65.0
Average age of participants (*M, SD*)[d]	45	8.0
Total number of participants (*N*, % African American)	5,165	100

[a]The Montgomery, Carroll and Petry article was not included in the average age or total number of participants because it is a secondary analysis of the Carroll et al. 2006 article.

[b]If the location was not explicitly listed in the manuscript, the authors recorded the location listed in the author's affiliation information.

[c]Includes culturally tailored and nonculturally tailored interventions.

[d]The *SD* was reported in four of the studies.

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Table 2

of Randomized Clinical Trials for Cannabis and Tobacco Use Among Predominately African American Samples

Inclusion criteria	Treatment and control conditions	Total number of participants	% African Americans	% Women	Age (*M*, *SD*)	Delivery/duration/frequency	Follow-up phases	Outcomes	Results	QR1	QR2	QR3	QR4
Cannabis studies included in scoping review ($k = 7$)													
18–25 years of age, referred to treatment for cannabis dependence by probation office, met criteria for current cannabis dependence	Motivational enhancement therapy (MET)/ cognitive–behavioral therapy (CBT) plus contingency management (CM), MET/CBT without CM, drug counseling (DC) plus CM, DC without CM	136	60.0	10.0	21, 2.1	8-week trial; weekly individual sessions of MET/CBT and DC; CM based on attendance at treatment sessions	Weekly during treatment, 8-week termination point and 3-and 6-month follow-up	Likelihood of submitting a cannabis-positive urine specimen across time; longest period of continuous abstinence during treatment (LCA); percentage of cannabis-free urine specimens)	(1) Conditions with CM had significantly longer durations of abstinence than those not assigned to CM conditions; no statistical differences between MET/CBT vs. DC; (2) CM conditions submitted significantly more consecutive cannabis-free urine samples and more total negative urine samples than non-CM conditions; no significant effects of MET/CBT vs. DC; (3) MET/CBT plus CM had significantly more consecutive cannabis-free urine specimens and a lower percentage of				

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Inclusion criteria	Treatment and control conditions	Total number of participants	% African Americans	% Women	Age (*M*, *SD*)	Delivery/duration/frequency	Follow-up phases	Outcomes	Results	QR1	QR2	QR3	QR4
									cannabis-positive urine specimens during treatment than MET/CBT without CM or DC without CM; (4) MET/CBT decreased their frequency of cannabis use over time at a higher rate than DC; no other significant differences found at follow-up				
18 years of age or older, self-referred or referred to treatment by probation office, met criteria for current cannabis dependence	CBT, CBT plus CM for adherence [CM_{adhere}], CM_{adhere}, CBT plus CM for abstinence [$CM_{abstinence}$]	127	63.8	15.7	25.7, 7.1	12-week trial; individual CBT on a weekly basis; CM on a weekly basis	Weekly during treatment, 12-week postassessment and 3-month intervals during the 1-year follow-up	Percentage of cannabis-free urine specimens; longest period of continuous abstinence during treatment	(1) No statistical differences in outcomes in CBT + CM_{adhere} vs. CBT_{alone};(2) No statistical differences in conditions with CM vs. CBT_{alone}; (3) Higher proportion of positive urine specimens in the CBT + $CM_{abstinence}$ vs. $CM_{abstinence}$ alone; (4) Greater reduction of cannabis use in CBT alone compared to the				

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Inclusion criteria	Treatment and control conditions	Total number of participants	% African Americans	% Women	Age (*M*, *SD*)	Delivery/duration/frequency	Follow-up phases	Outcomes	Results	QR1	QR2	QR3	QR4
Between the ages of 12 and 17.5 years, living with at least one parent or parent figure who could participate in the family therapy if assigned to that condition, have no history of organic dysfunction, not current in need of inpatient detoxification, not actively suicidal	CBT, multidimensional family therapy (MDFT)	224	72.0	19.0	15	60- to 90-min weekly sessions of CBT and MDFT; individual CBT; family MDFT	End of treatment, and 6 and 12 months' posttreatment	30-day frequency of cannabis use	(1) Both treatments showed statistically significant decreases in 30-day frequency of cannabis use; (2) No treatment differences in reducing frequency of cannabis use				
Enrolled at an adolescent medicine outpatient clinic, report using heavy cannabis use (≥10 times in the past month)	Peer network counseling (PNC), control	46	91.5	74.6	16.65, 1.36	20-min individual sessions	1, 3, and 6 months	Number of times used cannabis within the last month	(1) PNC participants had a higher probability of being abstinent at 6 months, (2) PNC participants had a lower probability of using cannabis 10 or more times per month				
18–25 years of age, referred to treatment for cannabis dependence by probation office, met criteria for current cannabis dependence	MET/CBT plus CM, MET/CBT without CM, drug counseling (DC) plus CM, DC without CM	112	72.3	10.0	21.6, 2.2	8-week trial; weekly individual sessions of MET/CBT and DC; CM based on attendance at treatment sessions	Weekly during treatment, 8-week termination point and 3-and 6-month follow-up	Percentage of cannabis-negative urine specimens during active treatment; maximum number of days of continuous cannabis abstinence during active treatment based on urine test results	(1) No significant interaction between race and treatment type when comparing MET/CBT vs. DC on both outcomes; (2) Statistically significant interaction between race and				

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Inclusion criteria	Treatment and control conditions	Total number of participants	% African Americans	% Women	Age (*M*, *SD*)	Delivery/duration/frequency	Follow-up phases	Outcomes	Results	QR1	QR2	QR3	QR4
									conditions with CM versus those without CM; CM was effective in reducing proportion of cannabis positive samples among White young adults, but not African Americans				
Self-report of any illicit drug use in the month prior to pregnancy, 18 years of age or older	Treatment: intake assessment plus computer-based brief motivational intervention (based on motivational interviewing methods) combined two nontailored mailings and voucher-based reinforcement of attendance at an initial intake/ treatment session; (2) Control: intake assessment only	107	97.2	100.0	25.1, 5.6	1 day; 20-min brief intervention; 45-min assessment	4-month follow-up	Self-reported frequency of cannabis use; point prevalence abstinence based on urine test results	(1) No statistical differences in frequency of cannabis use between treatment and control conditions; (2) Point-prevalence analysis at follow-up did not show any significant differences between the two conditions				
12–18 years of age (if 18, must be in high school), reported use of cannabis during the prior 30 days or a cannabis-positive urine test, met criteria for cannabis abuse or dependence, living with a parent/guardian	MET/CBT) MET/CBT plus CM, MET/CBT plus CM plus behavioral parent training (PT)	153	62.0	11.0	15.8, 1.3	14-week trial; individual MET/CBT treatment on a weekly basis; CM on a biweekly basis during weeks 3–14 (weeks 1–2 considered a washout period)	End of treatment and 3, 6, 9, and 12 months' posttreatment	Longest period of continuous cannabis abstinence (LCA); posttreatment cannabis abstinence rates based on urine test results, self-report of	(1) No statistical differences in LCA among the three treatment conditions, however; among participants with one or more negative				

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Inclusion criteria	Treatment and control conditions	Total number of participants	% African Americans	% Women	Age (*M*, *SD*)	Delivery/duration/frequency	Follow-up phases	Outcomes	Results	QR1	QR2	QR3	QR4
who agreed to participate								cannabis use frequency	urine tests, MET/CBT plus CM had significantly greater LCA than MET/CBT and MET/CBT plus CM plus PT; (2) MET/CBT plus CM had a higher likelihood of a negative test at the end of treatment than MET/CBT, similar abstinence rates found among all three conditions at each of the follow-up assessments; (3) No statistical differences in cannabis use frequency among the three conditions at the end of treatment or posttreatment				
Tobacco studies included in meta-analysis (k = 15)													
Self-identify as African American or Black, were at least 18 years of age, smoked at least 10 cigarettes per day, were interested in quitting in the next 30 days,	Treatment: 150 mg bupropion SR plus brief motivational counseling, Control: 150 mg placebo plus brief motivational counseling	600	100%	70%	44	7-week trial, pills twice daily for 7 weeks, counseling at baseline, quit day, Weeks 1 and 3, end of treatment (Week 6), telephone sessions at Day 3 and Weeks 5 and 7	Weeks 1, 3, 6, 26	7-day point prevalence smoking cessation at Week 26, 7-day point prevalence at Week 6, continuous abstinence at	(1) Confirmed abstinence rates were higher in the bupropion SR group than the placebo group at	1	1	1	1

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Inclusion criteria	Treatment and control conditions	Total number of participants	% African Americans	% Women	Age (*M*, *SD*)	Delivery/duration/frequency	Follow-up phases	Outcomes	Results	QR1	QR2	QR3	QR4
spoke English and had a permanent home address with a working telephone								Weeks 6 and 26 and change in the number of cigarettes smoked at Weeks 6 and 26	Weeks 7 and 26				
Self-identified as African American, smoke a minimum of 10 cigarettes a day continuously for at least the past year, at least one previous attempt to quit, a home address, a telephone number at which the patient could be reached, weigh more than 100 pounds, self-motivated to quit smoking	Treatment: transdermal nicotine patches plus health education and Pathways to Freedom (PTF) guide, Control: placebo patches plus health education and PTF guide	410	100	6	48	10-week trial, 10 weeks of patches, 1 health education session	1, 2, 6, and 10 weeks and 6 months after the quit day	Self-reported continuous abstinence from the end of patch treatment to the 6-month follow-up, 30-day abstinence at 10 weeks	(1) Higher self-reported abstinence rates among patients with nicotine patches relative to those with placebo patches at 10 weeks and 6 months	1	1	1	0
Self-identified as African American or Black, at least 18 years of age, smoked 10 or fewer cigarettes a day for at least 6 months prior to enrollment, smoked at least 25 of the last 30 days, were interested in quitting in the next 2 weeks, spoke English and had a permanent home address and working telephone	Treatments: 2 mg nicotine gum plus health education (HE), 2 mg nicotine gum plus motivational interviewing (MI), Control: placebo gum plus HE, placebo gum plus MI	755	100	66	45	26-week study, 8-week supply of nicotine gum, 6 individual counseling sessions	Weeks 1, 3, 6, 8, 16, 26	Cotinine-verified 7-day abstinence at Week 26, 7-day abstinence at Week 8	(1) Seven-day quit rates for nicotine gum were no better than the placebo group, (2) Higher quit rates were found for HE conditions relative to MI conditions at Weeks 1, 8 and 26	1	1	1	1
Not reported	Treatment: culturally tailored videotape and guide plus	500	100	Not reported	Not reported	Booster phone calls Weeks 1 and 3, booster postcards at Months 3 and 5, 8 weeks	Weeks 4, 6 months	Self-reported continuous abstinence at 4 weeks and 30-day	(1) No significant differences in self-reported	0	0	0	0

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Inclusion criteria	Treatment and control conditions	Total number of participants	% African Americans	% Women	Age (*M*, *SD*)	Delivery/duration/frequency	Follow-up phases	Outcomes	Results	QR1	QR2	QR3	QR4
	nicotine patches, booster phone calls at Weeks 1 and 3, and booster postcards at Months 3 and 5, Control: nonculturally tailored videotape and guide plus nicotine patches, booster phone calls at Weeks 1 and 3, and booster postcards at Months 3 and 5							abstinence at 6 months, change in the number of cigarettes smoked per day	continuous abstinence, (2) Both interventions led to a significant reduction in number of cigarettes smoked at 4 weeks and 6 months				
19 and older, self-identified African American, current smoker, excluded patients with primary diagnosis of other substance use disorder or mental illness, incarcerated, unable to participate in phone call following discharge	Treatment DVD: Current/former smokers discussed cessation, Control DVD: Non-tobacco health videos. All participants received brief tobacco cessation counseling and had access to nicotine replacement therapy	300	100.0%	52.0%	50	1 session of viewing the DVDs in the Hospital; Optional use of DVDs after initial viewing	2 weeks after viewing DVD, 6 months after viewing DVD	7 day point prevalence biochemically verified cessation at 2 weeks and 4 months	No statistical differences in cessation outcome at 2 weeks or 6 months.	1	1	1	1
Self-identified as African American, men and women aged 18 years or older, interested in quitting smoking, smoked 10 or fewer CPD for 2 or less years, smoked on 25 or more days in the past month, smoked for at least 3 years, had a home address and functioning	Treatment: Bupropion SR plus health education (HE) counseling, Control: Placebo plus HE counseling	540	100.0%	Not reported	Not reported	At baseline, participants received 7 week supply of bupropion SR (150 mg daily for 3 days and then 150 mg twice daily for the remaining 46 days; All participants received six sessions of health education counseling (culturally sensitive Kick it at Swope, Stop Smoking guide) in person at baseline and weeks 1, 3, and 7 and via telephone at weeks 5 and 16; sessions lasted	Weeks 1, 3, 5, 7 16 and 26	, Salivary cotinine-verified 7 day point prevalence smoking abstinence at weeks 7 and 26	(1) No statistically significant differences in long-term smoking abstinence rates at week 26 between bupropion SR and placebo groups, (2) Cotinine-verified smoking abstinence	1	1	1	1

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Inclusion criteria	Treatment and control conditions	Total number of participants	% African Americans	% Women	Age (*M*, *SD*)	Delivery/duration/frequency	Follow-up phases	Outcomes	Results	QR1	QR2	QR3	QR4
telephone number, were willing to attend scheduled study visits and provide biological samples for genetic analyses related to nicotine and bupropion metabolism									rate at end of medication week 7 was higher in the bupropion SR vs. placebo group				
English speaking, Washington DC metro area, self-identified ethnic minority, <30 weeks pregnant, smoker with desire to quit, 18 years of age or older	Treatment: Trans dermal nicotine patches plus CBT, Control: CBT (no patches)	52	100.0	100.0	27.5, 5.4	5 CBT sessions, 10 weeks of nicotine replacement therapy (intervention group only)	3, 4, 5, 6 weeks	Biochemically confirmed cessation at 3, 4, 5, 6 weeks	(1) No significant differences between the transdermal nicotine patch and CBT only group overall; higher quit rates found in the CBT plus patch group	1	0	1	1
Self-identify as African American, age ≥21 years, tobacco use during the past month, willingness to quit smoking, agreement to be available by telephone for follow-up interviews at 6 and 12 months after the intervention and to provide salivary cotinine samples	Treatment: Smoking cessation program plus tobacco industry and media (IAM) messages, Control: Smoking cessation program only–nicotine patches or lozenges were offered to both groups	60	100.0	72.0	46.6, 10.3	1-hr preclass orientation and a 5-week group smoking cessation intervention (treatment group had 2 5-hr group sessions with IAM components)	6 months, 12 months	7-day point prevalence abstinence biochemically verified at 6 and 12 months	(1) No significant differences between the CG and IAM groups on 7-day point prevalence	1	0	1	1
Self-identified as African American, smoked at least	Treatment: biomarker feedback (BF, feedback about genetic	557	100.0%	60.0%	44.5, 12.3	1 preintervention assessment telephone survey, nicotine replacement therapy as appropriate, pathways guide, treatment: 4 counseling calls	6 months, 12 months	Self-reported 7-day point prevalence abstinence	(1) Smoking cessation was greater for the BF arm than the	1	0	1	0

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Inclusion criteria	Treatment and control conditions	Total number of participants	% African Americans	% Women	Age (*M*, *SD*)	Delivery/duration/frequency	Follow-up phases	Outcomes	Results	QR1	QR2	QR3	QR4
one cigarette/day in the prior 7 days	susceptibility to lung cancer), Control: enhanced usual care								Enhanced Usual Care arm at 6 months but not at 12 months				
Self-identify as African American, 18 years of age or older, ready to quit smoking in the next 6 months or the next 30 days, smoking more than 10 cigarettes per day, weigh more than 100 lbs, have home address and access to a telephone and VCR	Treatment: Culturally targeted videotape and print guide, Control: Standard care videotape and print guide	500	100.0	Not reported	Not reported	8 weeks of nicotine patches, reminder telephone calls at Weeks 1 and 3	Week 4, Month 6	7-day abstinence at Week 4 and Month 6, change from baseline in the number of cigarettes smoked	(1) No significant differences in smoking cessation between the two groups	1	0	1	1
Self-identify as Black, 18 years of age or older, smoked more than 10 cigarettes per day, ready to quit, willing to take varenicline	Treatment: Adherence support; Control: Standard care	72	100.0	Not reported	46.8, 11.3	3 months of varenicline, 1 individual counseling session, 5 additional counseling sessions (Treatment group)	Months 1, 2, 3	Salivary cotinine and carbon monoxide verified smoking abstinence, reductions in self-reported cigarettes per day	(1) No treatment differences were found between the Adherence Support and Standard Care groups	1	0	1	1
18 to 65 years of age, smoked 5 or more cigarettes per day, had a permanent mailing address, could read English, wanted to quit smoking within the next year	Treatment: Culturally specific booklet, Control: Standard booklet	183	100.0	Not reported	Not reported	1 mailing, reminder letters at 1 and 2 months	3 months	Self-reports of quit attempts in ≥24 hr and past 3 months, smoking reduction, 24-hr point prevalence abstinence and 7-day point prevalence abstinence	(1) No significant differences in reduction in smoking or abstinence measures between the two groups	1	0	1	0
Self-identification as African American,	Treatment: culturally specific CBT	342	100.0	36.0	49.5	12 weeks individual CBT; 8 sessions group-based culturally specific CBT; 8	End of therapy, 3, 6, and 12-month follow-up	12-month 7-day ppa, 6 month 7-day	(1) 7-day ppa was two times greater	1	0	1	1

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currently smoked five or more cigarettes per day or an expired carbon monoxide level of ≥8 parts per million, ages 18–65 years, able to read fifth-and sixth-grade English, permanent contact information, ability to attend group sessions, motivated to quit smoking (6 on a 1–10 scale)	plus trans dermal nicotine patches, Control: standard CBT plus trans dermal nicotine patches					weeks trans dermal nicotine patch (4 weeks at 21 mg, 2 weeks at 14 mg, and 2 weeks at 7 mg)		point prevalence abstinence (ppa); smoking abstinence verified biochemically using saliva cotinine (follow-up) and carbon monoxide (end of treatment)	following culturally specific CBT versus standard CBT across all timepoints, (2) Analysis by timepoint found no significant differences at 6 or 12 months, yet culturally specific-CBT was efficacious at the end of treatment and the 3-month follow-up				
Self-identification as African American, currently smoked five or more cigarettes per day, aged 18–65, read fifth-grade English and had permanent contact information	Treatment: Pathways to Freedom [PTF] DVD, Control: Standard control DVD	140	100.0	Not reported	Not reported	60-min DVDs	Immediately post-DVD viewing, 1-month follow-up	Self-reported 24-hr quit attempt; limiting smoking to certain places/ situations; setting a quit date; quitting smoking completely (yes/no)	(1) 24-hr quit attempts were greater in the PTF DVD condition vs. the standard DVD, (2) PTF DVD participants reported a greater likelihood of limiting smoking to certain situations/ places, setting a quit date and reporting complete cessation during the past 4 weeks than the standard	1	0	1	0

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									DVD participants				
Self-identify as African American, 18–65 years of age, current smokers (5 or more cigarettes per day and a breath carbon monoxide reading of >8 ppm), able to read English, interested in quitting smoking	Treatment: CBT, Control: general health education	154	100.0	65.0	44	8 group sessions, 8 weeks of trans dermal nicotine patches	3 month, 6 month	7-day point prevalence abstinence at the 3-and 6-month follow-ups, 24-hr point prevalence abstinence and 28-day continuous abstinence at 3 and 6 months	(1) 7-day point prevalence abstinence was significantly greater in the CBT than the GHE condition at the end of counseling, at 3 months and at 6 months	1	0	1	1

lity rating (applicable to tobacco studies only). Studies received a QR score of 0 (*not present*) or 1 (*present*). Quality ratings were adapted from a scale created by Jadad and colleagues (1996). hors provided a brief description of the randomization process. QR2 _ Double-blinding is mentioned in the study. QR3 _ Description of withdrawals and dropouts is provided. QR4 _ The hemicallyverified outcomes.

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