Published in final edited form as:

Am J Health Behav. 2008 ; 32(1): 3–15. doi:10.5555/ajhb.2008.32.1.3.

HIV-positive Smokers Considering Quitting: Differences by Race/Ethnicity

Elizabeth E. Lloyd-Richardson, PhD, Cassandra A. Stanton, PhD, George D. Papandonatos, PhD, Renée M. Betancourt, BA, Michael Stein, MD, Karen Tashima, MD, Kathleen Morrow, PhD, and Raymond Niaura, PhD

Elizabeth E. Lloyd-Richardson, Assistant Professor, Brown Medical School, The Miriam Hospital, Weight Control and Diabetes Research Center, Providence, RI. Cassandra A. Stanton, Transdisciplinary Research Group, Providence, RI. George D. Papandonatos, Center for Statistical Sciences, Brown University, Providence, RI. Renée M. Betancourt, Institute for Health Policy, Massachusetts General Hospital/Partners HealthCare System, Boston, MA. Michael Stein, Rhode Island Hospital, Providence, RI. Karen Tashima, Fall River, MA. Kathleen Morrow, Centers for Behavioral and Preventive Medicine, Providence, RI. Raymond Niaura, Transdisciplinary Research Group, Providence, RI.

Abstract

Objective: To better characterize smoking in HIV-positive individuals and to identify critical components of a targeted smoking cessation intervention for multiethnic HIV-positive smokers.

Methods: Differences in baseline characteristics of 444 HIV-positive smokers were examined by race, and a multivariate linear regression model evaluated factors associated with nicotine dependence in an HIV-positive population, with a particular emphasis on race/ethnic differences.

Results: Low smoking self-efficacy and higher contemplation of quitting were predictive of greater nicotine dependence. An interaction between age and race was noted, with older Hispanic Americans less likely to be nicotine dependent.

Conclusions: Efforts should be made to tailor smoking cessation intervention content to HIV-positive racial/ethnic minority groups.

Keywords

nicotine dependence predictors; HIV; smoking

The human immunodeficiency virus (HIV) is estimated to have impacted 38.6 million individuals, as of 2005.¹ In the United States, rates of persons living with HIV/AIDS range from 1,039,000 to 1,185,000 persons.² Advances in the treatment of HIV in the United States have led to an increase in the number of people living with the virus,^{3,4} making HIV a more medically manageable chronic illness and thus allowing for increased efforts to improve health behaviors and quality of life.⁵ Smoking prevalence among HIV-positive populations is high, with estimates of 47%-70%,⁵⁻⁷ or more than 2 to 3 times the prevalence of the non-HIV general population.⁸ Smoking creates a well-known risk for conditions such as cancer, stroke, heart disease, and chronic obstructive pulmonary disease. However, evidence suggests that smoking poses an additional threat to individuals living with HIV/AIDS, including increased risk of developing AIDS-related infections, as well as non-AIDS-related illnesses, cancers, and cardiovascular disease.^{5,9,10} Although findings are inconsistent regarding the relationship

between smoking and the course of HIV/ AIDS, recent research suggests treatment with highly active antiretroviral therapy (HAART) is less effective for smokers.¹¹ Not only does smoking present an elevated health hazard to individuals with HIV, but research also suggests this population may experience more difficulty quitting, likely due to the complex inter-play among co-occurring behavioral risk factors, limited resources, and diminished access to health care.^{6,7}

Neither smoking behaviors nor the health consequences of smoking are spread evenly across various racial/ethnic groups. Asian Americans (11.3%) and Hispanic Americans (15.0%) have the lowest prevalence of current smoking; American Indians/Alaska Natives have the highest prevalence (33.4%), followed by European Americans (22.2%) and African Americans (20.2%).⁸ Among those ever-smokers who have quit, results are equivocal, with some studies finding European Americans (51%) more likely to have quit than African Americans (37%) or Hispanic Americans (43%)¹² whereas others find no differences in cessation rates by ethnicity status, particularly when taking into account population differences in smoking initiation age.¹³ Furthermore, compared with European Americans who smoke, racial/ethnic minority groups generally smoke fewer cigarettes per day and are more likely to smoke occasionally,^{12,14} observations having important implications for cessation strategies. Educational attainment accounts for only some of the differences in smoking behaviors between European Americans and racial/ethnic minority groups, with other biological, psychosocial, and cultural factors likely to further account for these differences.^{15,16}

Evidence suggests that racial/ethnic minority groups- in particular Hispanic American and African American populations- are also disproportionately affected by HIV,^{17,18} possibly due to some of the same factors contributing to poorer cessation outcomes: higher rates of poverty, lower educational attainment, limited access to and use of health care, and illicit substance use.^{12,19,20} Combined with differences noted in smoking behaviors, there is significant need for investigation of the smoking behaviors of HIV-positive individuals by race/ethnicity. Although a few investigations have investigated tobacco use, quality of life, and functional status in multiethnic HIV-positive populations,^{6,21} little is known of the potential differences between HIV-positive racial/ethnic minority groups on smoking and its mediators. Gritz and colleagues⁷ found that European American HIV-positive individuals were more likely to be current smokers than were Hispanic HIV-positive individuals, and that European Americans were more likely than Hispanics or African Americans to be heavier smokers. Moreover, a single-item proxy of nicotine dependence suggested that European Americans were more likely to smoke within 30 minutes of waking, compared with Hispanics or African Americans.⁷ Collins et al²² and Burkhalter et al⁶ both report that half to three quarters of their HIV-positive patients had either quit or reduced the amount that they smoked since diagnosis, with Hispanics most likely to report reduced smoking or quitting.²² Thus racial/ethnic differences in the extent to which people with HIV try to reduce or quit smoking to improve their health speak to the need to better understand variables associated with smoking cessation that allow for development of interventions targeted to subgroup needs, level of dependence, and cultural belief systems.

The theory of reasoned action^{23,24} states that behaviors can be understood as the outcome of rational processes in which the individual weighs the costs and benefits of an action. Attitudes toward a particular behavior can be predicted from specific beliefs about the consequences of performing that behavior, intrinsic and extrinsic motivations for that behavior, and subsequent evaluation of those consequences. Research has shown that the smoking intentions of various subgroups of individuals are predicted by the perceived consequences particular to that group. Thus, identification of the salient consequences that predict intention to quit and actual quitting behavior can facilitate the development of targeted intervention paradigms. Individuals from

a particular race/ethnicity are important targets of intervention, as cultural differences and their influences on values and behavior can be profound.

In the literature on smoking and tobacco use, several constructs present as key mediators in smoking cessation, including nicotine dependence, depression, quality of life, substance use, and motivational readiness to make a quit attempt. Little is known about the role these constructs play among HIV-positive smokers. Given the disproportionately high number of HIV-positive individuals who smoke, it is not surprising that preliminary evidence suggests that nicotine dependence may also be high.⁷ Studies also show that HIV-positive individuals are more likely than non-HIV individuals to be affected by depression,^{7,25,26} by poor quality of life,^{21,27} and by alcohol and substance use and abuse.^{28,29} Despite these obstacles, nearly two thirds of a sample of HIV-positive smokers reported contemplating or preparing for quitting smoking.^{6,7}

This paper seeks to add to the relatively small literature on HIV and smoking by examining racial/ethnic differences in clinically relevant psychosocial correlates of smoking in a large multiethnic HIV-positive sample willing to speak with a counselor about their smoking. We examine various socio-demographic, psychosocial, and smoking variables by race to better characterize smoking in HIV-positive individuals. Based on previous evidence that HIV-positive European Americans smoke at greater frequency compared to other HIV-positive racial/ethnic groups, we hypothesize that Hispanic American and African American participants will smoke fewer cigarettes a day, be less dependent on nicotine, and score higher on measures of readiness and self-efficacy to quit compared to European Americans. Moreover, in multivariate models we examine the relative importance of smoking covariates, such as self-efficacy and readiness to quit, to nicotine dependence, as well as interactions with race/ethnicity, in order to identify critical components of a targeted smoking cessation intervention for low-income multiethnic HIV-positive smokers.

METHOD

Study Design

HIV-positive individuals were referred by study physicians for participation in a randomized controlled smoking cessation trial specifically designed for HIV-positive individuals. The study was performed at 6 outpatient HIV clinics and 2 primary care medical offices in southeastern New England. Each of these sites is a dedicated HIV/AIDS clinic within larger hospital and community health practices that provide comprehensive services to a diverse population of New England residents. Study physicians were trained to ask all patients about their smoking status. Those patients who smoked and were willing to speak with a health educator about their smoking were referred to the study. Participants were required to meet the following inclusion criteria, as assessed by their physician: (1) 18 years or older, (2) HIV seropositive, (3) not pregnant, (4) no uncontrolled hypertension or skin condition such as psoriasis or eczema that would contraindicate use of the nicotine patch, and (5) currently smoking at least one cigarette per day. Patients had to be willing to attend up to 4 intervention sessions, including baseline assessments, and were compensated for their time and effort. Patients were not required to make a quit attempt as a condition of study enrollment. All materials and interventions were available in English and Spanish. The study protocol was approved by the institutional review boards of participating hospitals. Baseline data were collected between February 2000 and June 2004.

Measures

Socio-demographic characteristics—Information was obtained from participants on age, sex, sexual orientation, marital status, race and ethnicity, language, employment, years of

education, and living situation. All participants that self-identified as Hispanic were treated as such, irrespective of race. Remaining participants were classified according to their racial origin, with participants of Asian, Native American, or mixed descent coded as “Other” due to small cell sizes.

Smoking characteristics—The Fagerstrom Test for Nicotine Dependence (FTND),³⁰ a reliable and well-validated 6-item measure of nicotine dependence, was used to classify dependence rated on a 10-point scale, with higher scores indicating greater levels of nicotine dependence. The FTND was used in analyses as the primary outcome of interest. It was also used to create a measure of daily cigarette consumption, as assessed by the item “How many cigarettes per day do you smoke?” Attitudes toward smoking behavior and motivation to quit smoking were assessed via several measures: the Contemplation Ladder, a continuum of 10 attitudes regarding quitting smoking,³¹ with higher scores suggesting a greater willingness to quit smoking; the 6-item Smoking Decisional Balance scale,³² used to assess the pros and cons of smoking, with higher scores indicating greater importance of pros/cons for the individual; the 9-item Smoking Self-efficacy scale,³³ used to assess the degree of temptation to smoke in various situations, with higher scores indicating lower self-confidence to resist smoking temptations; and the Perceived Vulnerability and Response Efficacy scale,³⁴ assessing perceptions of the probability of acquiring a smoking-related illness if continued smoking versus if quit smoking, with higher scores indicating greater perceived vulnerability and efficacy. Information on whether the participant had ever quit smoking for more than a year or ever used the nicotine patch/gum to quit smoking was also obtained.

Psychosocial characteristics—The 10-item version of the Center for Epidemiologic Studies Depression scale (CES-D)^{35,36} was used to assess depressive symptoms (scores 3 to 10 suggestive of elevated clinical depressive symptoms³⁷) and the 4-item Perceived Stress Scale (PSS)³⁸ was used to assess participant-perceived stress level, with higher scores indicating greater perceived stress. Participants completed the Multidimensional Quality of Life Questionnaire for HIV/AIDS (MQoL-HIV),³⁹ a 40-item measure of 10 dimensions of quality of life: mental health, physical health, physical functioning, social functioning, social support, cognitive functioning, finances, intimacy, sexual functioning, and medical care. Analyses presented here are based upon the MQoL total score, with higher scores indicating better perceived functioning. In addition to information on the number of smokers in the household, patients provided smoking information on the important people in their lives using a modified version of the Important People and Activities instrument (IPA),⁴⁰ designed to assess involvement in and support of the social network and activities in the person's smoking and abstinence. Two composite variables were calculated: (a) proportion of social network who smoke and (b) proportion of network who are supportive of quitting. Past 30-day alcohol and other substance use was assessed using a 30-day Timeline Follow-Back (TLFB),⁴¹⁻⁴⁴ a calendar-based form in which participants provide retrospective estimates of the number of days out of the past 30 in which alcohol was consumed or other drugs used.

Data Analytic Plan

Results presented in this manuscript consist of analysis of baseline assessments. Frequencies and descriptive statistics summarize socio-demographic, psychosocial, and smoking-related characteristics. Univariate analyses were conducted in order to examine differences in these variables by race; significance levels were calculated using χ^2 tests for categorical variables and *F*-tests from a one-way ANOVA for continuous variables. Pearson residuals were investigated to examine differences in variables by race. Covariates examined as possible predictors of the FTND and daily cigarette consumption are listed in Tables 1-3. An inclusive approach to model building was implemented in order to expand knowledge of factors associated with nicotine dependence in an HIV+ population: all variables with significant

effects in univariate analyses were entered in multivariate linear regression models that assumed normal errors for the FTND and an overdispersed Poisson model for cigarette consumption. P values of less than 0.05 were considered significant. All continuous covariates were standardized using their baseline mean and standard deviation in the entire sample. The initial reference group for categorical covariates consisted of HIV-positive unemployed single European American heterosexual males with less than high school education who had never quit for more than a year, despite having used nicotine replacement in the past.

RESULTS

Table 1 summarizes the sample socio-demographic variables, both in the overall sample and separately by racial/ethnic groups. The racial/ethnic distribution of the sample (N=444) was diverse: 52% were European American, 19% were African American, 16% were Hispanic American, and 13% were Other designations. Although all groups were predominantly male (63.3% male), non-Hispanic participants of European descent (European Americans) were 25% more likely to be male (70% vs 56%, $P=0.0145$) than minority participants. Additionally, they were 30% more likely to have obtained at least a high school diploma (72% vs 55%, $P<0.001$) and more than twice as likely to be employed full-time (18% vs 8.4%, $P=0.07$). Statistically significant differences that arose with respect to marital status ($P<0.01$) appear to be driven by a percentage of married African Americans that is twice as large as the rest of the sample (19.5% vs 9.1%), and a divorce rate among Hispanic Americans two-thirds higher than in the other racial/ethnic groups (38% vs 23%). Among the 276 participants reporting their sexual orientation, European Americans were a third less likely to be heterosexual than minority participants (53% vs 82%, $P<0.001$). For 305 participants, we ascertained whether they were living in their own home or a group home. There were no differences by racial/ethnic group, with about a 10th of the sample coming from group homes.

Whereas socio-demographic characteristics differed widely by race/ethnicity, Table 2 shows that participants were quite similar in their psychosocial characteristics, such as current depression as measured by the CES-D ($P=0.34$), perceived stress on the PSS scale ($P=0.8096$), proportion of smokers in their social network ($P=0.38$), and proportion of social network supportive of quitting, as measured by the IPA ($P=0.20$). Fifty-eight percent of the sample had elevated CES-D scores and were thus considered to be at risk for depression. There were border-line significant differences with respect to measures of quality of life adapted to HIV/AIDS patients ($P=0.05$), with African Americans scoring about 0.43 standard units higher than Hispanic Americans, and very highly significant differences with respect to the number of other smokers in the household ($P<0.01$), with Hispanic American households having an average of 1.6 other smokers, versus 2.1 smokers in other ethnic/racial group households. In terms of alcohol, marijuana, and other substance uses in the past 30 days, as measured by the subsample of 390 participants that completed the TLFB survey, differences were observed only with respect to alcohol use ($P<0.01$), with European Americans drinking an average of 4.4 days in a 30-day period, more than double the average of the other 3 groups.

Table 3 focuses on nicotine dependence and other smoking-related variables. Despite the fact that European Americans had about a third higher daily cigarette consumption than the rest of the groups ($P<0.001$), they did not differ significantly in their degree of nicotine dependence as measured by the FTND ($P=0.31$), with an average score of 5.9, suggestive of a moderate level of nicotine dependence. Also, they showed border-line higher positive decisional balance ($P=0.04$), but did not differ on either negative decisional balance ($P=0.07$) or contemplation ladder score ($P=0.15$). However, there were significant differences in perceived vulnerability to cancer, CHD, and lung disease, with European Americans about 0.50 standard units lower than Hispanics in assessing the risks from continued smoking, ($P<0.01$) and about 0.30 standard units lower than Hispanic Americans in assessing the benefits from quitting ($P<0.05$).

Interestingly, African Americans were closer to European Americans in terms of assessing the risks of continued smoking, but closer to Hispanics when assessing the benefits from quitting. There were significant between-group differences in smoking self-efficacy ($P < 0.05$), but these were mainly driven by the low scores in the quite heterogeneous group classified as Other. In terms of past attempts at smoking cessation, European Americans showed higher past use of nicotine patch/gum ($P < 0.05$), but did not differ in terms of successful year-long quit attempts ($P < 0.05$).

In modeling nicotine dependence and daily cigarette consumption, the measures of sexual orientation, membership in a group home, and past alcohol and drug use had quite high missing data, and thus were not included in the models. The effect of all other variables appearing in Tables 1-3 was examined in univariate normal linear regression models, with nicotine dependence (FTND score) as the outcome. Predictors significant at the 5% level were then examined jointly in a multivariate regression model.

Because of interest in racial differences, all possible interactions with race/ethnicity were explored one covariate at a time: only age showed a statistically significant interaction. This multivariate model is explored in detail in Table 4. The reference group for categorical covariates consists of unemployed European Americans with less than high school education. Because all continuous variables have been standardized to zero mean and unit variance, the regression coefficients of continuous predictors other than age correspond to partial correlations with the FTND score. To better understand the interaction of age with race/ethnicity, we note that the main effect of age corresponds to the partial correlation between age and FTND score among European Americans, whereas the interaction effects correspond to differences in this partial correlation between the reference group of European Americans and each of the other racial/ethnic groups. An inspection of these differences reveals that the direction of the association of age with nicotine dependence differs between Hispanic Americans and the remaining groups ($F(3,376) = 2.8513$, $P < .05$). Although the relevant correlation coefficients are weak and not statistically significant, older age is associated with higher nicotine dependence in European Americans ($P = 0.09$, 95% CI: $-0.03, 0.21$), African Americans ($P = 0.10$, 95% CI: $-0.14, 0.34$) and Others ($P = 0.07$, 95% CI: $-0.18, 0.32$). In contrast, older age is significantly associated with lower nicotine dependence among Hispanic Americans ($P = -0.21$, 95% CI: $-0.39, -0.03$). To the extent that nicotine dependence is related to quantity of smoking, we note a similar pattern for cigarettes per day consumption. Although all minority groups have lower average cigarette consumption than European Americans, the relationship between age and cigarette consumption differs between Hispanic Americans and the other race/ethnic groups, in that their consumption decreases with age.

Differences in educational level failed to attain significance ($F(2,376) = 2.0883$, $P = 0.13$). Descriptively, participants who failed to complete high school were less dependent than those with high school or GED diploma, although both groups scored higher than those with postsecondary education. In addition, none of the psychosocial variables retained their significance, when smoking-related variables were added to the model. Of the latter, the strongest in magnitude as well as in statistical significance is the partial correlation with smoking self-efficacy ($P = 0.50$, 95% CI: $0.40, 0.60$), which shows that low self-efficacy scores are strongly associated with a high degree of nicotine dependence. The only other significant partial correlation was that with the Contemplation Ladder ($P = 0.13$, 95% CI: $0.05, 0.21$), indicating that higher ladder scores are associated with a higher degree of dependence. More careful examination of the data showed that the association is indeed positive in the range of ladder scores corresponding to a precontemplation/contemplation stage, where most of our participants lay. The association turned negative in the preparation/action/maintenance stages, but there were too few participants in these to introduce statistically significant quadratic

effects. Parallel analysis of daily cigarette consumption produced almost identical conclusions and is not reproduced here.

DISCUSSION

The combination of AIDS as a treatable disease, antiviral therapy, lipodystrophy, and insulin resistance all point to a great concern about the possible prevalence of cardiovascular events within the next decade and underscore the need for intervention studies on traditional health behavior risk factors, in particular smoking.⁴⁵ Public health programs must effectively address the health needs of racial/ethnic minorities in order to reduce tobacco use in the United States and meet national health objectives.⁴⁶ Racial/ethnic minority groups are disproportionately affected by HIV,^{17,18} and it has been established that smoking presents even greater health hazards to individuals with HIV.¹⁰ This study describes the baseline characteristics of a group of multiethnic HIV-positive smokers. We examined salient racial/ethnic differences in smoking characteristics and psychosocial correlates of smoking to assess whether specific subgroups have different risk profiles for smoking cessation. Additionally, we identified key variables associated with nicotine dependence to be considered for inclusion in tailored smoking cessation interventions for HIV-positive individuals.

As hypothesized, smoking in this HIV-positive sample is a significant problem, with our sample smoking an average of 22.7 cigarettes per day, as compared to the reported national average of 15 cigarettes per day.⁴⁷ Moreover, participants were found to have higher levels of nicotine dependence as compared to demographically similar, non-HIV samples described in recent studies (Weinberger et al).⁴⁸ Furthermore, a large majority of participants were at elevated risk for depression, poor quality of life, and diminished social support, findings consistent with other investigations of this population.⁷ Higher levels of nicotine dependence, elevated depressive symptoms, and poor quality of life are all associated with greater difficulty quitting smoking and poorer response to cessation interventions.^{49,50} Based on the high prevalence of smoking and moderate degree of nicotine dependence in this sample, as well as concurrent psychosocial stresses, and with mounting data regarding the serious health consequences of smoking in HIV-positive populations,¹⁰ it is clear that smoking cessation interventions targeted to the specific risk profiles and needs of this population are warranted.

There are several notable differences by race/ethnicity among characteristics investigated. Interestingly, although European Americans smoked an average of a third more cigarettes per day than other racial/ethnic groups, a finding comparable to the results of Gritz and colleagues,⁷ there were no overall differences in the degree of nicotine dependence by ethnicity. Previous national data report that greater than 60% of African American and Hispanic American smokers report light smoking and smoking fewer cigarettes per day than European Americans smoke.¹² Furthermore, research documents racial/ethnic differences in serum cotinine,^{51,52} even when equal numbers of cigarettes are smoked, potentially helping to explain the inexact relationship between cigarettes smoked and level of nicotine dependence. Regardless, physician assessment of both patient smoking status and level of dependence is warranted in order to provide proper guidance and referral for appropriate treatment methods.

Interestingly, older Hispanic Americans were less likely to be nicotine dependent than same-aged constituents of other racial/ethnic groups. We are unable to locate national data with which to directly compare this finding, although there is support in the literature for differences in smoking attitudes across ethnicity by age. Perez-Stable and colleagues found that older Hispanic smokers, as compared to younger Hispanic smokers and non-Hispanic white smokers, were likely to report smoking in fewer antecedent situations (eg, when nervous or when drinking alcoholic beverages) and also less likely to consider some of the consequences of smoking (eg, effect of smoking on children's or other's health).⁵³ Thus, there is some evidence

suggesting ethnic-specific differences in attitudes towards smoking, which may also be influenced by such circumstances as language and acculturation, variables that may be closely related to age.

Consistently, we noted additional differences by race/ethnicity on other smoking-related constructs relevant to smoking cessation treatment. European Americans were less likely to perceive the risks of continued smoking and the benefits of quitting than were Hispanic Americans, with African Americans falling between these 2 groups in their perceived vulnerability to smoking diseases. Similarly, self-efficacy to resist social and emotional triggers and temptations to smoke (ie, how tempted the individual is to smoke in situations such as when a spouse/friend is smoking, when at a party, when first wake up) was lowest among individuals of Other racial/ethnic backgrounds (Asian American, Native American, or mixed descent), which is consistent with the suggestion that racial/ethnic differences may exist with smoking self-efficacy⁵⁴ and has implications for the importance of addressing social temptations to smoke in culturally targeted interventions. These findings also suggest that vulnerability to smoking diseases may be an effective message for some race/ethnicities, but other messages, such as the social or economic consequences of continued smoking, may be more meaningful to other groups.

Low self-efficacy to resist tempting smoking situations was also indicated as the strongest predictor of nicotine dependence in regression models, a finding that is consistent with research identifying self-efficacy as an important independent predictor of smoking abstinence⁴⁹ and thus a critical intervention target. In this study, there was also a positive association between nicotine dependence (FTND) and progressing along stages of thinking about and planning to quit, with heavier smokers of all race/ethnicities more likely to be thinking about quitting. This speaks to the high motivation level of this HIV-positive patient sample to quit smoking, and results are consistent with previous studies of HIV-positive smokers that have reported a majority of patients are contemplating or preparing for quitting smoking.^{6,7} It is quite possible that the more dependent smokers (who are perhaps symptomatic) have been targeted by medical providers for regular discussions of the topic, and therefore the ladder is a real (or socially desirable) reflection of their thoughts.

These results should be considered within the context of several study limitations. First, although this study surveyed a large, ethnically diverse group of participants from multiple HIV clinics, all of these were located solely in the northeastern United States. Secondly, we enrolled participants willing to speak with a health educator about their smoking, and thus, presumably, more likely to be contemplating quitting smoking (although this was not a requirement for participation in the study). Nevertheless, stage of readiness to quit smoking was comparable to previous studies of HIV-positive current, former, and never smokers.⁶

Our results have implications for the type of clinical intervention messages that may be more efficacious for particular subgroups within patient populations and also serve a cautionary note for cessation treatment providers. It is clear that a high prevalence of tobacco use exists in HIV-infected patients, underscoring a need to identify these patients and provide them with an effective intervention. First, clinicians should pay particular attention to individuals from minority race/ethnic groups, who may present by smoking fewer cigarettes per day than their European American counterparts, but may in fact experience similar levels of nicotine dependence and thus warrant discussion of the use of nicotine replacement or other first-line pharmacotherapy for cessation treatment. Thus, it is worthwhile for providers to ask about cigarette consumption and also assess level of nicotine dependence. Second, clinical practice guidelines now assert that smoking cessation interventions should be tailored to the population^{12,55} and sensitive to culture-specific issues,^{56,57} reflecting the racial/ethnic group's cultural values, considering the group's psychosocial correlates of tobacco use, and

using strategies that are credible to members of that group. For instance, results from this study suggest that exploring the perceived risks of smoking and benefits of quitting—whether concerning the health, social, or economic consequences of smoking—and tailoring these for individuals from different racial/ethnic backgrounds are needed. Finally, self-efficacy to resist tempting smoking situations was a strong predictor of nicotine dependence. Use of counseling strategies to further bolster and reinforce the self-efficacy needed to quit is important in undermining nicotine dependence and maintaining smoking abstinence.

This is the first study to evaluate nicotine dependence in the context of socio-demographic, psychosocial, and smoking-related constructs in an ethnically diverse sample of HIV-positive smokers, allowing for investigation of race/ethnicity differences in order to tailor appropriate smoking cessation intervention content to individuals of various racial/ethnic backgrounds.

REFERENCES

1. United Nations AIDS Committee. HIV Data, Epidemiology: 2006 Report on the global AIDS epidemic, in UNAIDS Joint United Nations Programme on HIV/AIDS. Slides, UE., editor. 2006.
2. Centers for Disease Control. HIV/AIDS Surveillance Report, 2004. US Department of Health and Human Services, CDC; Atlanta: 2005.
3. Centers for Disease Control and Prevention. HIV/AIDS surveillance report: US HIV and AIDS cases reported through December 2000. Year end edition. 12. National center for HIV, STD, and TB Prevention; Atlanta, GA: 2000.
4. Institute of Medicine, Committee on HIV Prevention Strategies in the United States. No time to lose: Getting more from HIV prevention. National Academies Press; Washington, DC: 2001.
5. Niaura R, Shadel WG, Morrow K, et al. Human immunodeficiency virus infection, AIDS, and smoking cessation: the time is now. *Clin Infect Dis* 2000;31(3):808–812. [PubMed: 11017836]
6. Burkhalter JE, Springer CM, Chhabra R, et al. Tobacco use and readiness to quit smoking in low-income HIV-infected persons. *Nicotine Tob Res* 2005;7(4):511–522. [PubMed: 16085522]
7. Gritz ER, Vidrine DJ, Lazev AB, et al. Smoking Behavior in a low-income multi-ethnic HIV/AIDS population. *Nicotine Tob Res* 2004;6:71–77. [PubMed: 14982690]
8. Centers for Disease Control and Prevention. Cigarette Smoking Among Adults—United States, 2004. *MMWR Morb Mortal Wkly Rep* 2005;54(44):1121–1124. [PubMed: 16280969]
9. Engels EA, Broca MV, Chen J, et al. Elevated incidence of lung cancer among HIV-infected individuals. *J Clin Oncol* 2006;24(9):1383–1388. [PubMed: 16549832]
10. Patel NTA, Reichert VC, et al. Tobacco and HIV. *Clin Occup Environ Med* 2006;5(1):193–207. [PubMed: 16446262]
11. Feldman JG, Minkoff H, Schneider MF, et al. The association of cigarette smoking with HIV prognosis among women in the HAART era: a report from the Womens Interagency HIV study. *Am J Public Health* 2006;96(6):1060–1065. [PubMed: 16670229]
12. Centers for Disease Control and Prevention. Tobacco Use Among U.S. Racial/Ethnic Minority Groups, African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, Hispanics: A Report of the Surgeon General (Executive Summary). *MMWR Morb Mortal Wkly Rep* 1998;47(RR18):1–16. [PubMed: 9450721]
13. McGrady GA, Pederson LL. Do sex and ethnic differences in smoking initiation mask similarities in cessation behavior? *Am J Public Health* 2002;92:961–965. [PubMed: 12036790]
14. Perez-Stable EJ, Ramirez A, Villareal R, et al. Cigarette smoking behavior among US Latino men and women from different countries of origin. *Am J Public Health* 2001;91(9):1424–1430. [PubMed: 11527775]
15. Daza P, Cofta-Woerpel L, Mazas C, et al. Racial and ethnic differences in predictors of smoking cessation. *Subst Use Misuse* 2006;41(3):317–339. [PubMed: 16467009]
16. Winker MA. Measuring race and ethnicity: why and how? *JAMA* 2004;292(13):1612–1614. [PubMed: 15467065]

17. Dean HD, Steele CB, Satcher AJ, et al. HIV/AIDS among minority races and ethnicities in the United States, 1999-2003. *J Natl Med Assoc* 2005;97(7 Suppl):5S-12S. [PubMed: 16080451]
18. McDavid K, Li J, Lee LM. Racial and ethnic disparities in HIV diagnoses for women in the United States. *J Acquir Immune Defic Syndr* 2006;42(1):101-107. [PubMed: 16763498]
19. Larkey LK, Hecht ML, Miller K, et al. Hispanic cultural norms for health-seeking behaviors in the face of symptoms. *Health Educ Behav* 2001;28(1):65-80. [PubMed: 11213143]
20. Shapiro MF, Morton SC, McCaffrey DF, et al. Variations in the care of HIV-infected adults in the United States: results from the HIV Cost and Services Utilization Study. *JAMA* 1999;281(24):2305-2315. [PubMed: 10386555]
21. Vidrine DJ, Amick BC III, Gritz ER, et al. Functional Status and Overall Quality of Life in a Multiethnic HIV-Positive Population. *AIDS Patient Care STDs* 2003;17:187-198. [PubMed: 12737642]
22. Collins RL, Kanouse DE, Gifford AL, et al. Changes in health-promoting behavior following diagnosis with HIV: prevalence and correlates in a national probability sample. *Health Psychol* 2001;20(5):351-360. [PubMed: 11570649]
23. Ajzen, JFM. Understanding attitudes and predicting social behavior. Prentice-Hall, Inc.; Englewood Cliffs, NJ: 1980.
24. Fishbein, MA. Belief, attitude intention and behavior: An introduction to theory and research. Addison-Wesley. Addison-Wesley; Reading, MA: 1975.
25. Barroso J, Preisser JS, Leserman J, et al. Predicting fatigue and depression in HIV-positive gay men. *Psychosomatics* 2002;43(4):317-325. [PubMed: 12189258]
26. Penzak SR, Reddy YS, Grimsley SR. Depression in patients with HIV infection. *Am J Health Syst Pharm* 2000;57(4):376-386. [PubMed: 10714976]
27. Fleming CA, Christiansen D, Nunes D, et al. Health related quality of life of patients with HIV disease: impact of hepatitis C coinfection. *Clin Infect Dis* 2004;38(4):572-578. [PubMed: 14765352]
28. Tucker JS, Orlando M, Burnam MA, et al. Psychosocial Mediators of Antiretroviral Non-adherence in HIV-Positive Adults With Substance Use and Mental Health Problems. *Health Psychol* 2004;23:363-370. [PubMed: 15264972]
29. Turner BJ, Fleishman JA, Wenger N, et al. Effects of drug abuse and mental disorders on use and type of antiretroviral therapy in HIV-infected persons. *J Gen Intern Med* 2001;16(9):625-633. [PubMed: 11556944]
30. Heatherton TF, Kozlowski LT, Frecker RC, et al. The Fagerstrom Test for Nicotine Dependence: A revision of the Fagerstrom Tolerance Questionnaire. *British Journal of Addiction* 1991;86(9):1119-1127. [PubMed: 1932883]
31. Biener L, Abrams DB. The Contemplation Ladder: validation of a measure of readiness to consider smoking cessation. *Health Psychol* 1991;10(5):360-365. [PubMed: 1935872]
32. Velicer WF, DiClemente CC, Prochaska JO, et al. A decisional balance measure for assessing and predicting smoking status. *J Pers Soc Psychol* 1985;48:1279-1289. [PubMed: 3998990]
33. Velicer WF, DiClemente CC, Rossi JS, et al. Relapse situations and self-efficacy: An integrative model. *Addict Behav* 1990;15:271-283. [PubMed: 2378287]
34. Lee C. Perceptions of immunity to disease in adult smokers. *J Behav Med* 1989;12(3):267-277. [PubMed: 2634103]
35. Kohout FJ, Berkman LF, Evans DA, et al. Two shorter forms of the CES-D depression symptoms index. *J Aging Health* 1993;5:179-193. [PubMed: 10125443]
36. Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement* 1977;1:385-401.
37. Andresen EM, Malmgren JA, Carter WB, et al. Screening for depression in well older adults: evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale). *Am J Prev Med* 1994;10(2):77-84. [PubMed: 8037935]
38. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav* 1983;24:386-396.
39. Smith KW, Avis NE, Mayer KH, et al. Use of the MQoL-HIV with asymptomatic HIV-positive patients. *Qual Life Res* 1997;6:555-560. [PubMed: 9330554]

40. Longabaugh, R. Manual for the administration of the Important People Instrument adapted for use for BST Decision Tress. Center for Alcohol and Addiction Studies, Brown University; Providence, RI: 2001.
41. Sobell, LC.; Sobell, MB. Alcohol consumption measures. In: Allen, JP.; Columbus, M., editors. *Assessing Alcohol Problems: A Guide for Clinicians and Researchers*. National Institute on Alcohol Abuse and Alcoholism; Bethesda, MD: 1995. p. 55-73.
42. Sobell, LC.; Sobell, MB. *Handbook of Psychiatric Measures*. American Psychiatric Association; Washington, D.C: 2000. Alcohol Timeline Followback (TLFB); p. 477-479.
43. Sobell, LC.; Sobell, MB. Alcohol Consumption Measures. In: Allen, JP.; Wilson, VB., editors. *Assessing Alcohol Problems: A Guide for Clinicians and Researchers*. 2nd ed.. National Institute on Alcohol Abuse and Alcoholism; Bethesda, MD: 2003. p. 75-99.
44. Sobell LC, Toneatto T, Sobell MB. Behavioral assessment and treatment planning for alcohol, tobacco and other drug problems: Current status with an emphasis on clinical applications. *Behavioral Therapies* 1994;25:533–580.
45. Hoffmann C, Jaeger H. Cardiology and AIDS-HAART and the consequences. *Ann NY Acad Sci* 2001;946:130–144. [PubMed: 11762982]
46. Centers for Disease Control and Prevention. Receipt of Advice to Quit Smoking in Medicare Managed Care – United States 1998. *MMWR Morb Mortal Wkly Rep* 2000;49(35):797–801.
47. U.S. Department of Health and Human Services. Results from the 2004 National Survey on Drug Use and Health: National Findings (online). Available at: <http://www.oas.samhsa.gov/>. Accessed August 28, 2006
48. Weinberger AH, Reutenauer EL, Allen TM, et al. Reliability of the Fagerstrom Test for Nicotine Dependence, Minnesota Nicotine Withdrawal Scale, and Tiffany Questionnaire for Smoking Urges in Smokers with and without Schizophrenia. *Drug Alcohol Depend*. Jul 28;2006 Epub ahead of print
49. Amodi N, Lamb RJ. Predictors of initial abstinence in smokers enrolled in a smoking cessation program. *Subst Use Misuse* 2005;40:141–149. [PubMed: 15770881]
50. Foulds J, Gandhi KK, Steinberg MB, et al. Factors associated with quitting smoking at a tobacco dependence treatment clinic. *Am J Health Behav* 2006;30(4):400–412. [PubMed: 16787130]
51. Caraballo RS, Giovino GA, Pechacek TF, et al. Racial and ethnic differences in serum cotinine levels of cigarette smokers: Third National Health and Nutrition Examination Survey, 1988-1991. *JAMA* 1998;280(2):135–139. [PubMed: 9669785]
52. Perez-Stable EJ, Herrera MS, Jacob P III, et al. Nicotine metabolism and intake in black and white smokers. *JAMA* 1998;280(2):152–156. [PubMed: 9669788]
53. Perez-Stable EJ, Marin G, Posner SF. Ethnic comparison of attitudes and beliefs about cigarette smoking. *J Gen Intern Med* 1998;13:167–174. [PubMed: 9541373]
54. Piper ME, Fox BJ, Welsch SK, et al. Gender and racial/ethnic differences in tobacco-dependence treatment: a commentary and research recommendations. *Nicotine Tob Res* 2001;3:291–297. [PubMed: 11767718]
55. Fiore, MC.; Bailey, WC.; Cohen, SJ., et al. Treating tobacco use and dependence: clinical practice guideline. US Department of Health and Human Services, Public Health Service; Rockville MD: 2000.
56. King TK, Borrelli B, Black C, et al. Minority women and tobacco: implications for smoking cessation interventions. *Ann Behav Med* 1997;19:301–313. [PubMed: 9603705]
57. Levinson AH, Borrayo EA, Espinoza P, et al. An exploration of Latino smokers and the use of pharmaceutical aids. *Am J Prev Med* 2006;31(2):167–171. [PubMed: 16829334]

Table 1

Participant Socio-demographic Characteristics: % (n)

	All Smokers N = 444	European American N = 230	African American N = 82	Hispanic American N = 72	Other N = 60
Gender^b					
Male	63.3 (281)	70.0 (162)	55.0 (45)	56.0 (40)	57.0 (34)
Female	36.7 (163)	30.0 (68) ^e	45.0 (37)	44.0 (32)	43.0(26)
Sexual Orientation (n = 276^a)^d					
Heterosexual	67.0 (185)	53.0 (74) ^e	90.0 (45)	80.0 (37)	72.0 (29)
Homosexual	25.7 (71)	39.0 (55)	4.0 (2)	15.0 (7)	18.0 (7)
Bisexual	4.7 (13)	5.7 (8) ^e	4.0 (2)	0.0 (0) ^e	7.5 (3)
Other	1.8 (5)	1.4 (2)	2.0 (1)	2.2 (1)	2.5 (1)
Refuse	0.7 (2)	0.7 (1)	0.0 (0)	2.2 (1)	0.0 (0)
Marital Status^b					
Single	46.4 (206)	48.0 (110)	48.0 (39)	35.0 (25)	53.0 (32)
Married	11.0 (49)	9.0 (21)	19.5 (16)	11.0 (8)	6.7 (4)
Divorced	25.5 (113)	23.0(54)	16.0 (13)	38.0(27) ^e	32.0 (19)
Widowed	5.4 (24)	6.0 (13)	8.5 (7) ^e	3.0 (2)	3.3 (2)
Other	11.7 (52)	14.0(32)	8.5 (7)	14.0 (10)	5.0 (3)
Living in Group Home (n=305^a)^d					
Yes	9.5 (29)	9.6 (15)	11.0 (11)	9.6 (5)	7.1 (3)
Education Level^d					
11 th grade or less	36.0 (161)	28.0 (65) ^e	38.0 (31) ^e	56.0 (40)	42.0 (25)
High School or GED	33.0 (147)	34.0 (78)	33.0 (27)	29.0 (21)	35.0 (21)
Beyond High School	31.0 (136)	38.0 (87) ^e	29.0 (24) ^e	15.0 (11)	23.0 (14)
Employment (n = 443^a)^d					
Full time	13.5 (60)	18.0 (42) ^e	9.8 (8)	9.7 (7)	5.0 (3) ^e
Part time	7.7 (34)	8.7 (20)	6.1 (5)	6.9 (5)	7.0 (4)
Unemployed	78.8 (349)	73.0 (167)	84.0 (69)	83.0 (60)	88.0 (53)
Age Mean, (SD)	42.1 (7.7)	41.5 (7.5)	43.4 (7.2)	41.9 (9.1)	42.7 (7.0)

Note.

^aNumber of respondents varies due to missing data.

^b<.05

^cP<.01

^dP<.001

^eBased upon Pearson residuals, these cells with large residuals contribute the most to rejecting the null hypothesis of no association between the factors define the rows and columns of this table.

Table 2

Participant Psychosocial Characteristics: Mean (SD)

	All Smokers N = 444	European American N = 230	African American N = 82	Hispanic American N = 72	Other N = 60
Depression ^a	12.0 (6.6)	11.8 (6.9)	11.2 (6.0)	13.0 (6.3)	12.4 (6.8)
Quality of Life ^b	51.7 (11.5)	51.5 (11.6)	53.7 (11.5)	48.7 (11.2)	53.0 (10.9)
Perceived Stress	6.7 (3.4)	6.6 (3.3)	6.5 (3.4)	6.9 (3.1)	7.0 (3.6)
# of Smokers in Home (n=441) ^{a, d}	2.0 (2.9)	2.0 (2.9)	2.3 (3.8)	1.6 (0.9)	2.3 (3.2)
% Smokers in Social Network	46.8 (25.3)	47.7 (25.3)	46.7 (28.3)	42.0 (21.7) ^e	49.2 (25.4)
% People in Network Supportive of Quitting	81.6 (24.3)	80.0 (24.6)	82.2(27.0)	87.1(18.5)	80.0 (25.5)
Past 30-day Alcohol Use (n=390) ^{a, c}	3.2 (7.0)	4.4 (8.6)	2.1 (5.5)	1.6 (3.1)	1.7 (4.5)
Past 30-day Marijuana use (n=390) ^{a, c}	2.6 (7.4)	3.3 (8.0)	1.1 (4.5)	2.1 (7.2)	2.6 (7.9)
Past 30-day Other Substance Use (n=390) ^{a, c}	0.9 (3.7)	1.1 (4.5)	0.4 (1.5)	0.9 (3.7)	0.4 (1.4)

Note.

^a Number of respondents varies due to missing data.

^b P<.05

^c P<.01

^d P<.001

^e Based upon Pearson residuals, these cells with large residuals contribute the most to rejecting the null hypothesis of no association between the factors define the rows and columns of this table.

Table 3
Nicotine Dependence and Other Smoking Characteristics: Mean (SD)

	All Smokers N = 444	European American N = 230	African American N = 82	Hispanic American N = 72	Other N = 60
FTND					
Number of Cigarettes per day ^d	5.9 (2.3)	6.1 (2.4)	5.6 (2.5)	5.9 (2.4)	5.8 (1.9)
Contemplation Ladder Smoking Decisional Balance	22.7 (11.2) 4.5 (1.5)	25.1 (10.6) 4.6 (1.4)	19.7 (10.0) ^e 4.6 (1.7)	19.9 (11.5) ^e 4.4 (1.4)	21.0 (12.9) ^e 4.2 (1.5)
Positive ^b	2.5 (0.8)	2.4 (0.7)	2.6 (0.8)	2.5 (0.7)	2.7 (0.9) ^e
Negative	2.4 (0.8)	2.4 (0.7)	2.5 (0.8)	2.2 (0.7)	2.5 (0.8)
Self-efficacy ^b	3.8 (0.7)	3.8 (0.6)	3.7 (0.8)	3.9 (0.7)	3.6 (0.7) ^e
Perceived Vulnerability to Cancer, CHD, Lung Disease					
If continues to smoke ^c	77.7 (23.4)	74.8 (23.8)	76.7 (24.6)	86.7 (19.5) ^e	79.1 (22.3)
If quits smoking ^b	36.7 (24.4)	39.5 (23.6)	31.5 (24.5) ^e	32.2 (26.6) ^e	38.5 (23.5)
% Ever quit for more than one year (n=442 ^a)	20.0 (89)	21.0 (47)	13.0 (12)	25.0 (18)	20.0 (12)
% Ever used nicotine patch/gum (n=442 ^a) ^b	38.0 (170)	45.0 (102)	30.0 (24)	28.0 (20)	40.0 (24)

Note.

^aNumber of respondents varies due to missing data.

^bP<.05

^cP<.01

^dP<.001

^eBased upon Pearson residuals, these cells with large residuals contribute the most to rejecting the null hypothesis of no association between the factors define the rows and columns of this table.

Table 4

Multiple Linear Regression Model of Fagerstrom Test of Nicotine Dependence (FTND) Score Among HIV-positive Smokers

Coefficient	Value	LCL	UCL
(Intercept)	0.08	−0.10	0.26
Race			
African American	−0.12	0.36	0.12
Hispanic American	−0.16	−0.41	0.09
Other	0.04	−0.23	0.31
Age	0.09	−0.03	0.21
Age*Race			
African American	0.01	−0.26	0.28
Hispanic American	−0.30	−0.52	−0.08
Other	−0.02	−0.29	0.25
Education			
High School or GED	0.08	−0.14	0.30
Above High School	−0.14	−0.36	0.08
CES-D Score	−0.02	−0.16	0.12
MQoL-HIV Total Score	−0.06	−0.18	0.06
Cohen Perceived Stress Score	−0.05	−0.17	0.07
Number of Smokers at Home	0.03	−0.05	0.11
% Smokers in Network	−0.05	−0.15	0.05
% Supportive of Quitting	0.04	−0.06	0.14
Perceived Vulnerability (cont. smoke)	0.05	−0.03	0.13
Contemplation Ladder	0.13	0.05	0.21
Self-efficacy	0.50	0.40	0.60

Note.

Those confidence limits excluding zero are marked in bold.

LCL = 95% Lower Confidence Limit; UCL = 95% Upper Confidence Limit.