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Cigarette Smoking Behaviors and Beliefs in Persons Living With HIV/AIDS

Jonathan Shuter, MD, Steven L. Bernstein, MD, and Alyson B. Moadel, PhD

Jonathan Shuter, AIDS Center and Division of Infectious Diseases, Montefiore Medical Center and the Albert Einstein College of Medicine, Bronx, NY. Steven L. Bernstein, Section of Emergency Medicine, Yale University School of Medicine, New Haven, CT. Alyson B. Moadel, Department of Epidemiology and Population Health, Albert Einstein College of Medicine, Albert Einstein Cancer Center, Bronx, NY

Abstract

Objective—To measure biopsychosocial domains related to tobacco use in persons living with HIV/AIDS (PLWHAs).

Methods—Cross-sectional interview study of 60 PLWHA smokers randomly selected from an HIV clinic.

Results—Participants averaged 14.4 cigarettes daily. Sixty-five percent were moderately or highly nicotine dependent, and most were motivated to quit. Substance use and depression were very common. Most reported that smoking helped them cope with depression, anxiety, and anger. Twenty-seven percent thought (mistakenly) that smoking raised their T-cell counts and/or helped fight infections. Referrals to quitlines or cessation programs were uncommon.

Conclusions—Smoking among PLWHAs is a challenging problem requiring targeted intervention strategies.

Keywords

HIV; cigarette; smoking; tobacco; behavior

Treatments for HIV have transformed a once life-threatening disease into a chronic one with greatly reduced risk of mortality, but health risk behaviors continue to pose a major threat to the growing population of persons living with HIV/AIDS (PLWHAs). More than half of PLWHAs in the United States are current smokers.^{1–5} Smoking increases the risk of a number of HIV-related complications, including oral candidiasis,³ hairy leukoplakia,⁵ and *Pneumocystis jirovecii* pneumonia.⁶ In recent years, there has been a worrisome rise in the incidence of cardiac events in PLWHAs, and cigarette smoking is an independent predictor of these outcomes.^{7,8} Increased incidences of tobacco-related cancers⁹ and increased overall mortality have also been noted in PLWHA smokers.^{10,11}

HIV infection disproportionately affects populations with high rates of tobacco use, such as substance users,¹² and gay and bisexual men.¹³ Other psychosocial characteristics that are associated with smoking such as anxiety disorder,¹⁴ depression,¹⁵ and social isolation¹⁶ are highly prevalent among PLWHAs.

Several recent studies have reported on smoking behaviors in samples of PLWHA smokers.^{17–20} They have largely focused on quantitative measures of tobacco usage, tobacco dependence, comorbid substance use and psychiatric illness, and readiness to quit. Vidrine et al additionally explored the domains of self-efficacy and social support in PLWHAs enrolled in a cessation program.²¹ A recent report by Stanton et al found that higher self-efficacy scores (particularly among Latinos) and more positive decisional balance (a measure of perceived pros and cons of smoking) were predictive of successful cessation in PLWHA smokers.²² There is a scarcity of information available on these and other behavioral determinants of cigarette smoking in PLWHAs, such as locus of control, motivation to quit, smoker and abstainer self-concept, and perceived benefits and risks of smoking. Greater understanding of these behavioral domains may inform the design of cessation interventions tailored to PLWHAs. The National Institutes of Health have recently identified PLWHA smokers as a high priority group for the development and study of tailored cessation strategies.²³ We, therefore, conducted an in-depth study of the social, psychological, and behavioral characteristics of a sample of smokers in an inner-city HIV-care clinic.

METHODS

Subjects were recruited for the study from the patient population of the Montefiore Medical Center, Center for Positive Living/Infectious Diseases Clinic (ID Clinic). Montefiore Medical Center's Moses Division is a 708-bed tertiary-care teaching hospital located in the Bronx, New York. The hospital's ID Clinic provides comprehensive outpatient care to over 2600 HIV-infected adults, primarily from the surrounding areas of the Bronx. The clinic population is 56% male, 54% Latino/a, 39% African American, and 4% white, non-Latino/a. Two thirds of patients have CDC-defined AIDS, and 80% have household incomes below the federal poverty line.

A target sample of 60 subjects was enrolled between May and August 2006. A computer-based randomization procedure selected 20 of approximately 50 scheduled patients during a given clinic session for potential enrollment. The primary care providers were furnished with a list of these names and were encouraged to refer those patients who were current smokers to the study. In order to avoid oversampling of patients with frequent clinic visits, the selection process excluded patients who had been randomly selected for eligibility within the previous 90 days, regardless of whether or not they enrolled in the study.

Subjects were considered current smokers if they affirmed smoking a cigarette within the past week.²⁴ Individuals who met this criterion and were willing to provide informed consent were administered standardized questionnaires and other surveys in a private room by one of 2 psychology graduate students with formal training in behavioral interviewing. All study data were collected by face-to-face interview with the participants, and responses were recorded in pencil-and-paper format by the interviewers. In the occasional instances where the subject did not understand a question, the interviewers explained the meanings of words, but avoided expressing opinions or judgments that could affect responses. Biochemical verification of smoking status was not performed. The interview lasted approximately 60 minutes and included questions about demographics; general, psychiatric, and HIV-related medical history; substance use; and CD4+ lymphocyte and HIV-1 viral load (VL) measurements that were abstracted from the electronic medical record. The investigators based the interview content upon the recommendations for assessment to inform smoking cessation treatment in *The Tobacco Dependence Treatment Handbook*.²⁵ This battery of scales is meant to guide the provider in developing an optimal management plan for his or her patients who smoke by measuring a number of key domains known to influence smoking and quitting behaviors based on social cognitive theory,²⁶ which views

human behavior as the end result of the interactions between internal cognitive, affective, biological, and behavioral factors and external social/environmental influences.

The various domains of tobacco use behaviors, attitudes, and psychosocial factors explored include the following: the modified Fagerstrom Test for Nicotine Dependence, which has demonstrated high validity in very large samples;²⁷ Abrams and Biener Readiness to Quit Ladder (modified from their original Contemplation Ladder) with strong concurrent validity with reported intention to quit ($r=0.64$) and ability to discriminate smokers enrolled in a cessation program (mean=9.8) versus those who are not (mean=5.1);^{25,28} a 12-item Reasons for Quitting scale that measures intrinsic (concerns about health, desire for self-control) and extrinsic (immediate reinforcement, social influence) motivation for smoking cessation with Cronbach alpha ranging from 0.72 to 0.81;²⁹ a 20-item Self-Efficacy/Temptation scale assessing level of self-efficacy in one's ability to abstain from smoking in the face of 3 types of tempting situations: Positive Affect/ Social Situations ($\alpha=0.84$), Negative Affect Situations ($\alpha=0.92$), and Habit/Craving Situations ($\alpha=0.83$);²⁹ a 25-item locus-of-control measure that has shown consistency in identifying interpersonal, intrapersonal, and fate/luck dimensions in substance users;³⁰ a 9-item Smoker and Abstainer Self-Concept Scale³¹ to examine the extent to which smokers perceive themselves as more similar to smokers or abstainers (Cronbach alpha =0.74 for the Smoker Self-Concept subscale and 0.77 for the Abstainer Self-Concept subscale); and a 20-item partner interaction questionnaire (PIQ)³² that assesses level of perceived support received from a self-designated significant other around smoking cessation. High scores on the PIQ have been found to predict greater quitting success ($r=0.24$). Lastly, the Brief Symptom Inventory 18 (BSI-18) was included as a reliable measure of anxiety and depressive symptoms with internal consistency ratings ranging from 0.74 to 0.90 and test-retest ratings from 0.68–0.90. Convergent validity with major psychiatric assessment tools (eg, MMPI) approaches 0.60 or higher.³³ The authors also developed measures of perceived risks and benefits of smoking (including HIV-specific items), of interactions with their primary care providers concerning smoking, and of interest in various smoking-cessation interventions. All subjects received a \$20 stipend for participation.

Interview results were entered into a secure database and analyzed using SPSS 14.0 for Windows. Frequency distributions, means $\pm$ standard deviations (SD), and median values with interquartile ranges (IQR) are presented. Comparisons of proportions were accomplished using chisquared analysis or Fisher exact test. The study was reviewed and approved by the Montefiore Medical Center Institutional Review Board.

RESULTS

Over the course of 4 months, 60 of approximately 100 PLWHA smokers invited to participate in the study completed the interview. The overwhelming majority of those declining participation cited the need for a one-hour time commitment as their reason. The socio-demographic and clinical characteristics of the population are presented in Table 1.

Tobacco Use History and Behaviors

All study subjects, by definition, were cigarette smokers. Fifteen percent also smoked cigars, 6.7% smoked a pipe, and 3.3% used chewing tobacco. The mean number of cigarettes smoked per day was 14.4 ± 9.6 . Fifty percent of subjects smoked 0–14 cigarettes per day, 41.7% smoked 15–24 cigarettes per day, and 8.3% smoked 25 or more cigarettes per day. Mean age of first cigarette was 16.0 ± 5.0 years, and mean total number of years smoking was 29.0 ± 9.8 . Thirty percent of participants shared their home with a smoker. The distribution of number of prior lifetime quit attempts was none—18.3%, 1 to 5—53.3%, 6 to 10—16.7%, more than 10—11.7%. Nineteen subjects (31.7%) reported a history of quitting for a year or

more at some point in the past. Quitting strategies included cold turkey in 65%, nicotine replacement therapy in 40%, and acupuncture in 5%. Only one patient reported trying bupropion, group counseling, or individual counseling. Varenicline was released during the course of the study, so subjects were not routinely questioned about experience with this medication.

Nicotine Dependence

All subjects completed the modified Fagerstrom Test for Nicotine Dependence. Forty subjects (66.7%) reported smoking within 30 minutes of awakening. The median score was 5.0 (IQR: 2–6.8). Twenty-one subjects (35%) exhibited low dependence by this measure, 28.3% exhibited medium dependence, and 36.7% exhibited high dependence on nicotine.

Readiness to Quit

Responses to the Abrams and Biener Readiness to Quit scale are depicted in Table 2. The distribution of subjects in the Stages of Change Model³⁴ was as follows: Precontemplation (score=1–5)-28.3%, Contemplation-6.7% (score=6), Preparation (score=7–8)-53.3%, and Action (score=9–10)-13.3%. Despite the fact that all subjects reported having smoked a cigarette within the past week, 8 subjects (13.3%) claimed to have quit smoking at the time of the interview.

Intrinsic and Extrinsic Motivation to Quit

Subjects completed the 12-item Reasons for Quitting scale with items scored on a 5-point Likert scale: 1=Not at all true to 5=Extremely true. This measure separates motivation to quit into intrinsic (ie, seeking a reward internal to the person) and extrinsic (ie, seeking a reward external to the person) components. The mean intrinsic motivation score was 2.5 ± 1.0 , the mean extrinsic motivation score was 1.6 ± 0.9 , and the mean difference in scores was 0.9 ± 1.0 . Of the intrinsic motivations to quit, 63.3% of subjects rated the reason for quitting “Because I feel like smoking is hurting my health” as “Extremely true” (ie, the highest possible rating), and 61.7% of subjects rated “Because I am afraid that smoking will shorten my life” as “Extremely true.” Of the extrinsic motivations, only “To save money that I spend on cigarettes” was endorsed as “Extremely true” by the majority (60%) of respondents.

Self-efficacy and Temptations

Subjects completed a 20-item self-efficacy scale comprised of validated confidence and temptation inventories. Respondents rated their level of temptation to smoke in a variety of situational and emotional contexts on a 5-point Likert scale: 1=Not at all tempted to 5=Extremely tempted. The mean overall score for all subjects was 3.5 ± 0.9 . The measure’s subscales are primarily designed to assess change over time in individuals who are quitting and were therefore not analyzed.

Locus of Control

Subjects completed a 25-item locus-of-control scale modified by the investigators from a scale for measuring locus-of-control beliefs in alcohol users.³⁰ This measure includes intrapersonal, interpersonal, and fate subscales. Subjects responded to each locus-of-control item on a 6-point Likert scale: 1=Strongly disagree to 6=Strongly agree. Mean intrapersonal, interpersonal, and fate scores were 3.4 ± 1.3 , 3.9 ± 1.2 , and 3.8 ± 1.4 respectively.

Smoker and Abstainer Self-concept

Subjects completed a 9-item Smoker and Abstainer Self-Concept scale measuring agreement with statements expressing views of self as a smoker or nonsmoker. It was scored on a 10-

point Likert scale: 1=Strongly disagree to 10=Strongly agree. The mean score for abstainer self-concept (27.5 ± 18.0) exceeded that for the smoker self-concept (20.1 ± 13.3), $P=0.02$, indicating a greater degree of identification with the abstainer as compared to the smoker persona.

Social Support

Subjects completed a 20-item partner interaction questionnaire. This was prefaced by a request to identify the individual within the respondent's social circle most likely to encourage or help him or her to quit and to indicate whether that individual was a current smoker. All subjects were able to identify an individual. Twenty-six (43.3%) identified their spouse/partner/significant other as the person most likely to encourage or help in the quitting process. Six (10%) identified a parent, 8 (13.3%) identified one of their children, 13 (21.7%) identified a different relative, and 7 (11.7%) identified a friend. Of those identified, 28 (46.7%) were reported to be current smokers. Respondents rated the expected frequency that their social supporter would exhibit positive and negative behaviors relating to their attempt to quit smoking on a 5-point Likert scale: 0=Never to 4=Very often. The mean total positive behavior score (10 items) was 27.2 ± 9.7 , and the mean total negative behavior score (10 items) was 23.0 ± 8.6 . The mean positive/negative behavior ratio was 1.5 ± 1.7 .

Anxiety and Depression

Forty-four (73.3%) participants reported past or present depression, and 37 (61.7%) reported past or present anxiety disorder. Fifty-nine subjects completed the BSI-18 questionnaire. By this measure, clinically significant depression was present in 39.0%, and anxiety was present in 37.3%.

Perceived Risks and Benefits of Smoking

The investigators developed a 20-item measure exploring subjects' beliefs about the risks and benefits of smoking to their health. Responses are summarized in Table 3. Of note, 79.7% of respondents worried either "somewhat" or "a lot" about becoming seriously ill from smoking, and 89.8% were concerned about the monetary expense associated with smoking. A majority of respondents reported that smoking helped them to control anxiety, anger, and depression; and 74.5% stated that smoking helped them to relax. Remarkably, 26.7% thought that smoking helped to increase their T-cell count (13/60) or that it helped them to fight infection (11/60). The prevalence of these beliefs did not differ by age or gender, but was somewhat higher in Latino/a subjects (36.7%, $P=0.08$) and in males reporting MSM as their risk behavior (41.7%, $P=NS$).

Advice from Primary Care Providers About Smoking Cessation

Eighty-three percent of subjects stated that their primary care providers in the infectious diseases clinic had discussed smoking cessation with them, 72.9% reported that their providers recommended or prescribed pharmacotherapy to assist them to quit, 57.6% reported having received written materials about quitting from their providers, 32.8% reported having been referred to a quitline, and 5.3% reported having been referred to a smoking cessation program. Eleven percent of subjects expressed the belief that their providers smoked cigarettes.

Interest in Smoking Cessation Interventions

Asked which cessation strategies they would be interested in using, subjects reported interest in the following nonmutually exclusive categories: nicotine replacement therapy 64.4%, individual counseling 64.4%, group counseling 55.9%, quitline 52.5%, "buddy" system 49.2%, and oral medications 40.7%.

DISCUSSION

With the improved outlook for survival that has accompanied the introduction of highly active antiretroviral therapy (HAART) has come a growing recognition of the importance of the threat that cigarette smoking poses to the HIV-infected community. Smoking is associated with numerous morbidities as well as increased mortality in persons living with HIV/AIDS.^{3,5–11} It is an important contributing factor to the alarming rise in cardiovascular events and lung cancers in PLWHAs.^{7–9} Information about smoking behaviors in PLWHAs is scarce. The present study collected detailed psychological, social, and behavioral information relating to cigarette use from 60 inner-city PLWHAs.

The study sample was typical of an inner-city HIV-care clinic populations in the United States, ie, middle-aged, evenly balanced between genders, and predominantly belonging to ethnic minority groups. The majority of subjects had a history of CDC-defined AIDS, but their CD4+ lymphocyte and viral load measurements were indicative of reasonably good immunologic status and viral control as a result of antiretroviral therapy.

One of the most notable features of this PLWHA smoker cohort was the extremely high prevalence of substance use and psychiatric comorbidity. Both current cocaine and current marijuana use were reported by nearly half of the participants, and current heroin use was reported by one-third. These rates of illicit substance use are similar to rates reported by Gritz et al from an HIV/AIDS care facility in Texas.²⁰ Almost 80% of subjects reported a history of depression and/or anxiety. Current symptoms consistent with clinical depression were noted in 39% of respondents. This prevalence is higher than the 21–23% reported by Vidrine et al³⁵ from a group of PLWHA smokers in Texas and lower than the 58–62% reported recently from a European cohort of PLWHA smokers.³⁶ These findings are significant because both substance use and psychiatric illness are recognized obstacles to successful cessation.³⁷ They suggest the need to incorporate substance use counseling and mood disorder management into cessation interventions directed toward PLWHA smokers.

Measures of smoking behaviors and nicotine addiction approximated those described in studies of smokers in the general population. The distribution frequency of cigarettes smoked per day of 50%, 41.7%, and 8.3% for 0–14 cigarettes, 15–24 cigarettes, and 25 cigarettes, respectively, resembled the 47.8%, 36.6%, 15.6% distribution reported by the National Health and Nutrition Examination Survey (NHANES) 1999–2002.³⁸ The mean number of cigarettes smoked per day (14.4) and high level of nicotine dependence (65% with medium or high dependence) were very similar to those described in other HIV-infected cohorts.^{19–21}

The smokers in this study exhibited a high level of motivation to quit. A surprisingly large proportion, ie, two-thirds, of participants were in the preparation or action stages of quitting. This differs substantially from the 18% described by Burkhalter et al¹⁹ and the 34% by Gritz et al²⁰ in their PLWHA smoker cohorts. In contrast to their studies, the present study limited itself to subjects attending regularly scheduled clinic appointments with their primary care providers. It is possible that individuals who attend scheduled clinic appointments are more motivated to quit than other PLWHA populations. It is also possible that studying a group of individuals who were willing to volunteer for a lengthy, detailed interview about their smoking habits may have enriched for a study sample with high motivation to quit. Finally, the study of Gritz et al²⁰ collected data with pencil-and-paper questionnaires, and it is possible that social desirability bias contributed to the higher reported motivation during the face-to-face interviews that our subjects completed.

Intrinsic and extrinsic aspects of motivation are important predictors of successful cessation. Curry et al³⁹ demonstrated that higher scores on intrinsic motivation-to-quit items, reflecting

the desire to obtain a reward intrinsic to the quitter (eg, to be healthier), and larger differences between intrinsic and extrinsic motivation-to-quit scores, the latter reflecting the desire to obtain a reward extrinsic to the quitter (eg, to avoid burning holes in his or her clothing), were predictive of successful smoking cessation. Reasons for wanting to quit among PLWHA smokers have not been previously studied in a standardized fashion. In a modified version of the questionnaire²⁵ used by Curry et al,³⁹ our respondents' mean intrinsic motivation scores were similar to those found in their 2 general population cohorts, but our respondents' mean extrinsic motivation scores (1.6) exceeded the mean extrinsic motivation scores of their 2 cohorts (range 0.61–1.33). The higher mean extrinsic motivation score in our sample was driven by a desire to save the money spent on cigarettes. This finding suggests the need to highlight the importance of intrinsic benefits of smoking cessation as compared to extrinsic benefits in PLWHA smokers trying to quit.

Self-efficacy is an individual's level of confidence in him- or herself to perform a specific behavior. Although measures of self-efficacy are correlated with motivation to quit,⁴⁰ the 2 behavioral domains are distinct. For example, an individual may be very motivated to quit but feel little self-confidence to accomplish this goal. Higher levels of self-efficacy are predictive of successful cessation.⁴⁰ Despite the high rate of nicotine dependence and the burden of psychiatric and drug use comorbidities in our patient sample, their self-efficacy was comparable to that described in smokers from the general population.²⁹

Locus of control refers to an individual's perception of factors contributing to his or her involvement with a health behavior. The measure that we employed allows these factors to be categorized as intrapersonal (control resides within the individual respondent), interpersonal (control resides within other individuals), and fate (the behavior is outside of human control). Intrapersonal locus-of-control beliefs are believed to contribute to better health-related behavior outcomes.⁴¹ In our study sample, interpersonal and fate scores exceeded intrapersonal scores, indicating a belief that smoking behaviors are largely outside of the PLWHA smoker's control. Efforts to increase cessation rates in PLWHA smokers should strive to empower individuals to accept responsibility for and assert control over their smoking behavior, to teach strategies that maximize health-promoting interpersonal interactions and limit harmful social interactions, and to minimize the belief in fate as the ultimate determinant of smoking status.

Smokers who identify more strongly with their potential abstainer persona than with their current smoker persona are more likely to be successful in their attempts to quit.³¹ Shadel et al collected smoker and abstainer self-concept scores prospectively in a group of general population smokers enrolled in a cessation program and found that individuals destined to succeed in their cessation attempts started with higher abstainer self-concept scores (28.1 vs 25.5) than did those who failed and that their smoker self-concept score fell progressively whereas the abstainer self-concept score rose progressively through the course of the intervention.³¹ It is encouraging that in our cohort, the smoker self-concept score was lower than that described by Shadel et al³¹ for eventual quitters at the time of enrollment in their program (20.1 vs 24.3) whereas their abstainer self-concept scores were similar (27.5 vs 28.1).

The level of social support that a smoker anticipates receiving from important others during attempted cessation is predictive of success in quitting.^{42,43} Higher levels of expected positive behaviors and higher expected positive behavior score/negative behavior score ratios are associated with higher rates of successful cessation.³² Early investigations into social support for smoking cessation focused on spouses or partners.^{42,43} The individuals identified as social supporters by our sample spanned the gamut of partners, multigenerational relatives, and friends. Fewer than half of the study participants identified a

spouse or partner, 45% identified another relative, and the remainder (11.7%) identified a close friend. Almost half of those identified were smokers. The mean expected positive behavior score of 27.2 was slightly lower than the 28.7 reported from a general population survey of smokers attempting to quit,³² and the mean expected negative behavior score of 23.0 from our sample was higher than the 17.4 reported in the general population survey. The expected positive behavior score/negative behavior score ratio of 1.5 in our sample was also lower than the 2.6 reported by Cohen and Lichtenstein.³² These findings suggest that efforts to recruit supporters from PLWHAs should be general enough to target persons who are not spouses or partners and should recognize the high rates of smoking that may prevail among these individuals. Additionally, the comparatively high rates of expected negative behaviors may indicate a need to teach and reinforce assertiveness techniques to PLWHA smokers attempting to quit and to consider strategies for engaging partners in the smoking cessation process.

In the pre-HAART era both patients and providers may have discounted the negative health effects of smoking in the setting of a terminal illness.⁴⁴ Among our patients, we found no evidence that these views remain prevalent. In the perceived-risks-and-benefits-of-smoking component of the interview, our study population expressed serious concerns about the health effects of smoking. Smoking on the basis of indifference to health outcomes and/or fatalism appears to be uncommon in the PLWHA population in the HAART era. Additionally, almost 90% were concerned with the financial cost of their smoking habits. However, many subjects reported perceived beneficial effects of smoking. Almost three-quarters stated that smoking helped them relax. Reynolds et al, in their descriptive study, emphasized the significant value ascribed to a few moments of cigarette-induced relaxation in the stressful life of a person living with HIV/AIDS.⁴⁵

Possibly our most remarkable finding was that more than one fourth of subjects believed that smoking conferred immunological benefit in the form of increased CD4+ lymphocyte counts (ie, "T-cells") and/or improved ability to fight infections. These mistaken beliefs were most prevalent in Latino/a subjects and in MSMs. Cigarette smoking has been associated with transient increases in CD4+ lymphocyte counts in PLWHA smokers although these rises have not been associated with any demonstrable health benefit.⁴⁶ Moreover, smokers initiating antiretroviral therapy experience lesser rises in CD4+ lymphocyte counts than do nonsmokers.¹⁰ The view that smoking helps to fight infections despite strong evidence to the contrary⁴⁷ is curious. The idea that cigarette smoke can ward off fever and contagion is well entrenched in the classic western cultural tradition,⁴⁸ and our patients may be the inheritors of this cultural legacy. Efforts to increase cessation rates in PLWHAs should strive to teach healthier ways of relaxing and of controlling depression, anxiety, and anger. They should also work to dispel myths about imagined health benefits of tobacco use.

Most participants in this study reported having received advice about smoking cessation from their health care providers, and most had been offered some form of pharmacotherapy. Referrals to quitlines or formal smoking cessation programs were much less common. It is possible that the lack of on-site programs for PLWHA smokers and the absence of programs tailored specifically to meet the needs and address the concerns of smokers living with HIV are impediments to referral to formal cessation programs. Individuals who provide care to PLWHAs should be educated regarding the availability of quitlines and of the range of safe and effective pharmacologic agents designed to assist patients who are trying to quit. On an encouraging note, there was a relatively high level of interest in referral to smoking cessation services, with over half of participants responding favorably to the idea of referral to quitlines, group counseling, and individual counseling.

This study had several limitations deserving mention. The sample size was small, limiting both the precision of calculated point estimates and our ability to detect less common findings. The study employed a cross-sectional, noncomparative design that did not allow either for the measurement of parameter changes over time or for comparison with a reference group. Notwithstanding these constraints, the structured interviews yielded a rich data set relating to the behavioral domains that underlie tobacco use in this population. Restricting eligibility to PLWHAs who attended scheduled appointments may have excluded less adherent subjects. The interview format of data collection may have introduced a social desirability bias leading to more favorable responses (eg, higher reported motivation to quit) in the various study measures. Even though the demographic profile of our clinic is typical of inner-city HIV-care clinics in the United States, all of our subjects were interviewed in a single borough of New York City, and their responses may not be generalizable to PLWHA smokers elsewhere in the country.

Cigarette smoking is one of the most significant threats to the health of the PLWHA community in the United States. Multiple factors that are highly prevalent among PLWHAs, such as psychiatric illness, substance use, poor social support, and health-related and financial stress, represent serious obstacles to effective cessation efforts. The National Institutes of Health, in their State-of-the-Science Statement on Tobacco Use, after identifying PLWHA smokers as a high-priority population stressed that “generic interventions may be less effective than interventions tailored to specific populations, so we need to understand how best to tailor interventions.”²³ Studies such as this one may provide valuable guidance for those seeking to develop interventions that address the unique concerns and needs of smokers living with HIV/AIDS.

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REFERENCES

1. Hessel NA, Anastos K, Levine AM, et al. Factors associated with incident self-reported AIDS among women enrolled in the Women's Interagency HIV Study (WIHS). *AIDS Res Hum Retroviruses*. 2000; 16:1105–1111. [PubMed: 10954885]
2. Galai N, Park LP, Wesch J, et al. Effect of smoking on the clinical progression of HIV-1 infection. *JAIDS*. 1997; 14:451–458. [PubMed: 9170420]
3. Burns DN, Hillman D, Neaton JD, et al. Cigarette smoking, bacterial pneumonia, and other clinical outcomes in HIV-1 infection. *JAIDS*. 1996; 13:374–383. [PubMed: 8948377]
4. Turner J, Page-Shafer K, Chin DP, et al. Adverse impact of cigarette smoking on dimensions of health-related quality of life in persons with HIV infection. *AIDS Patient Care and STDs*. 2001; 15:615–624. [PubMed: 11788076]
5. Moorman AC, Holmberg SD, Marlowe SI, et al. Changing conditions and treatments in a dynamic cohort of ambulatory HIV patients: the HIV Outpatient Study (HOPS). *Ann Epidemiol*. 1999; 9:349–357. [PubMed: 10475534]
6. Miguez-Burbano MJ, Burbano Z, Ashkin D, et al. Impact of tobacco use on the development of opportunistic respiratory infections in HIV seropositive patients on antiretroviral therapy. *Addiction Biology*. 2003; 8:39–43. [PubMed: 12745414]

7. The Data Collection on Adverse Events of Anti-HIV Drugs (DAD) Study Group. Combination antiretroviral therapy and the risk of myocardial infarction. *N Engl J Med*. 2003; 349:1993–2003. [PubMed: 14627784]
8. Barbaro G, DiLorenzo G, Cirelli A, et al. An open-label, prospective, observational study of the incidence of coronary artery disease in patients with HIV infection receiving highly active antiretroviral therapy. *Clin Ther*. 2003; 25:2405–2418. [PubMed: 14604740]
9. Herida M, Mary-Krause M, Kaphan R, et al. Incidence of non-AIDS defining cancers before and during the highly active antiretroviral therapy era in a cohort of human immunodeficiency virus-infected patients. *J Clin Oncol*. 2003; 18:3447–3453. [PubMed: 12972519]
10. Feldman JG, Minkoff H, Schneider MF, et al. Association of cigarette smoking with HIV prognosis among women in the HAART era: a report from the Women's Interagency HIV Study. *Am J Public Health*. 2006; 96:1060–1065. [PubMed: 16670229]
11. Crothers K, Griffith TA, McGinnis KA, et al. The impact of cigarette smoking on mortality, quality of life, and comorbid illness among HIV-positive veterans. *J Gen Intern Med*. 2005; 20:1142–1145. [PubMed: 16423106]
12. Richter KP, Arnsten JH. A rationale and model for addressing tobacco dependence in substance abuse treatment. *Substance Abuse Treatment, Prevention, and Policy*. 2006; 1:23. Available at: <http://www.substanceabusepolicy.com/content/pdf/1747-597X-1-23.pdf>.
13. Gruskin EP, Greenwood GL, Matevia M, et al. Disparities in smoking between the lesbian, gay, and bisexual population and the general population in California. *Am J Public Health*. 2007; 97:1496–502. [PubMed: 17600265]
14. Morissette SB, Tull MT, Gulliver SB, et al. Anxiety, anxiety disorders, tobacco use, and nicotine: a critical review of interrelationships. *Psychol Bull*. 2007; 133:245–272. [PubMed: 17338599]
15. Wilhelm K, Wedgwood L, Niven H, Kay-Lambkin F. Smoking cessation and depression: current knowledge and future directions. *Drug and Alcohol Review*. 2006; 25:97–107. [PubMed: 16492582]
16. Lauder W, Mummary K, Jones M, Capechione C. A comparison of health behaviours in lonely and non-lonely populations. *Psychology, Health, & Medicine*. 2006; 11:233–245.
17. Klinkenberg WD, Sacks S. the HIV/AIDS Treatment Adherence, Health Outcomes and Cost Study Group. Mental disorders and drug abuse in persons living with HIV/AIDS. *AIDS Care*. 2004; 16:S22–S42. [PubMed: 15736820]
18. Marmy EM, Bahrs D, Martinez S. Cigarette smoking and the desire to quit among individuals living with HIV. *AIDS Patient Care and STDs*. 2002; 16:39–42. [PubMed: 11839217]
19. Burkhalter JE, Springer CM, Chhabra R, et al. Tobacco use and readiness to quit in low-income HIV-infected persons. *Nicotine Tob Res*. 2005; 7:511–522. [PubMed: 16085522]
20. Gritz ER, Vidrine DJ, Lazev AB, et al. Smoking behavior in a low-income multiethnic HIV/AIDS population. *Nicotine Tob Res*. 2004; 6:71–77. [PubMed: 14982690]
21. Vidrine DJ, Arduino RC, Gritz ER. Impact of a cell phone intervention on mediating mechanisms of smoking cessation in individuals living with HIV/AIDS. *Nicotine & Tobacco Research*. 2006; 8:S103–S108. [PubMed: 17491177]
22. Stanton CA, Lloyd-Richardson EE, Papandonatos GD, et al. Mediators of the relationship between nicotine replacement therapy and smoking abstinence among people living with HIV/AIDS. *AIDS Educ Prev*. 2009; 21(Suppl A):63–78.
23. NIH State-of-the-Science Panel. National Institutes of Health State-of-the-Science Conference Statement: Tobacco Use: Prevention, Cessation, and Control. *Ann Intern Med*. 2006; 145:839–844. [PubMed: 16954353]
24. Centers for Disease Control and Prevention. [Accessed December 7, 2010] Teenage Attitudes and Practices Survey. 1993. Available at: http://wonder.cdc.gov/wonder/sci_data/surveys/nhis/type_txt/tapsii.asp
25. Niaura, R.; Shadel, WG. Assessment to inform smoking cessation treatment. In: Abrams, DB.; Niaura, R.; Brown, RA.; Emmons, KM.; Goldstein, M.; Monti, PM., editors. *Tobacco Dependence Treatment Handbook*. New York: Guilford Press; 2003. p. 61–63.
26. Bandura A. Social cognitive theory: an agentive perspective. *Annu Rev Psychol*. 2001; 52:1–26. [PubMed: 11148297]

27. John U, Meyer C, Schumann A, et al. A short form of the Fagerstrom Test for Nicotine Dependence and the Heaviness of Smoking Index in two adult population samples. *Addict Behav.* 2004; 29:1207–1212. [PubMed: 15236824]
28. Biener L, Abrams DB. Contemplation ladder: validation of a measure of readiness to consider smoking cessation. *Health Psychol.* 1991; 10:360–365. [PubMed: 1935872]
29. Velicer WF, DiClemente CC, Rossi JS, Prochaska JO. Relapse situations and self-efficacy: an integrative model. *Addict Behav.* 1990; 15:271–283. [PubMed: 2378287]
30. Hartmann DJ. Replication and extension analyzing the factor structure of locus of control scales for substance abusing behaviors. *Psychol Rep.* 1999; 84:277–287. [PubMed: 10203962]
31. Shadel WG, Mermelstein R, Borrelli B. Self-concept changes over time in cognitive-behavioral treatment for smoking cessation. *Addict Behav.* 1996; 21:659–663. [PubMed: 8876764]
32. Cohen S, Lichtenstein E. Partner behaviors that support quitting smoking. *J Consult Clin Psychol.* 1990; 58:304–309. [PubMed: 2365893]
33. Derogatis LR, Melisaratos N. The Brief Symptom Inventory: An Introductory Report. *Psychol Med.* 1983; 13(3):595–605. [PubMed: 6622612]
34. Prochaska JO, DiClemente CC, Norcross JS. In search of how people change: applications to addictive behaviors. *Am Psychol.* 1992; 47:1102–1114. [PubMed: 1329589]
35. Vidrine DJ, Arduino RC, Lazev AB, Gritz ER. A randomized trial of a proactive cellular telephone intervention for smokers living with HIV/AIDS. *AIDS.* 2006; 20:253–260. [PubMed: 16511419]
36. Benard A, Bonnet F, Tessier JF, et al. Tobacco addiction and HIV infection: toward the implementation of cessation programs: ANRS CO3 Aquitaine Cohort. *AIDS Patient Care and STDs.* 2007; 21:458–468. [PubMed: 17651027]
37. Fiore, MC.; Bailey, WC.; Cohen, SJ., et al. Clinical Practice Guideline. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service; 2000 Jun. Treating Tobacco Use and Dependence; p. 99-101.
38. O'Connor RJ, Giovino GA, Kozlowski LT, et al. Changes in nicotine intake and cigarette use over time in two nationally representative cross-sectional samples of smokers. *Am J Epidemiol.* 2006; 164:750–759. [PubMed: 16887891]
39. Curry C, Wagner EH, Grothaus LC. Intrinsic and extrinsic motivation for smoking cessation. *J Consult Clin Psychol.* 1990; 58:310–316. [PubMed: 2195084]
40. Borrelli B, Mermelstein RM. Goal setting and behavior change in a smoking cessation program. *Cognitive Therapy and Research.* 1994; 18:69–83.
41. Wallston BD, Wallston KA. Locus of control and health: a review of the literature. *Health Education Monographs.* 1978; 6:107–117. [PubMed: 357347]
42. Mermelstein R, Cohen S, Lichtenstein E, et al. Social support and smoking cessation and maintenance. *J Consult Clin Psychol.* 1986; 54:447–453. [PubMed: 3745596]
43. Coppotelli H, Orleans CT. Partner support and other determinants of smoking cessation maintenance among women. *J Consult Clin Psychol.* 1985; 53:455–460. [PubMed: 4031200]
44. Chaisson RE. Smoking cessation in patients with HIV. *JAMA.* 1994; 272:564. [PubMed: 8046815]
45. Reynolds NR, Neidig JL, Wewers ME. Illness representation and smoking behavior: a focus group study of HIV-positive men. *J Assoc Nurses AIDS Care.* 2004; 15:37–47. [PubMed: 15296657]
46. Park LP, Margolick JB, Giorgi JV, et al. Influence of HIV-1 infection and cigarette smoking on leukocyte profiles in homosexual men. The Multicenter AIDS Cohort Study. *JAIDS.* 1992; 5:1124–1130.
47. Arcavi L, Benowitz NL. Cigarette smoking and infection. *Arch Intern Med.* 2004; 164:2206–2216. [PubMed: 15534156]
48. Dickens, C. [Accessed December 7, 2010] The Old Curiosity Shop. Available at: <http://dickens.thefreelibrary.com/The-Old-Curiosity-Shop/1-11>

Table 1

Socio-demographic and Clinical Characteristics of Study Participants

Socio-demographic or Clinical Characteristic	N=60
Age in years (mean±SD)	46.8±7.2
Gender	
Male	32 (53.3%)
Female	28 (46.7%)
Race/Ethnicity	
Latino/a	30 (50.0%)
African American	22 (36.7%)
White	2 (3.3%)
Other ^a	6 ^a (10.0%)
Marital Status	
Single	33 (55.0%)
Married/Living with partner	11 (18.3%)
Widowed	7 (11.7%)
Separated	5 (8.3%)
Divorced	4 (6.7%)
Risk Behavior	
Injection drug use	13 (21.7%)
Male-male sexual contact	12 (20.0%)
Heterosexual contact	27 (45.0%)
Unknown	8 (13.3%)
Current Illicit Substance Use	
Cocaine	29 (48.3%)
Heroin	20 (33.3%)
Marijuana	28 (46.7%)
Years since HIV diagnosis (mean±SD)	13.0±5.5
CDC-defined AIDS	
Yes	37 (61.7%)
No	23 (38.3%)
Lowest documented CD4+ lymphocyte count (cells/ul, mean±SD)	215±187
Most recent CD4+lymphocyte count (cells/ul, mean±SD)	520±404
Most recent HIV-1 viral load (copies/ml, median (IQR))	<75 (<75—7850)

Note. SD = standard deviation, IQR=interquartile range

^a“Other” included 2 individuals who identified themselves as African American/Latino, 2 Caribbeans, 1 white/ Latino, and 1 African American/ Native American.

Table 2Responses to the Abrams—Biener Readiness to Quit Scale (Biener and Abrams, 1991)²⁸

Stage of Change	Contemplation Ladder	N(%)
Precontemplation	1. I enjoy smoking and have decided not to quit smoking for my lifetime. I have no interest in quitting.	3 (5%)
	2. I never think about quitting smoking, and I have no plans to quit.	0 (0%)
	3. I rarely think about quitting smoking, and I have no plans to quit.	0 (0%)
	4. I sometimes think about quitting smoking, but I have no plans to quit.	4 (6.7%)
	5. I often think about quitting smoking, but I have no plans to quit.	9 (15%)
Contemplation	6. I definitely plan to quit smoking in the next 6 months.	4 (6.7%)
Preparation	7. I definitely plan to quit smoking in the next 30 days.	7 (11.7%)
	8. I still smoke, but I have begun to change, like cutting back on the number of cigarettes I smoke. I am ready to set a quit date.	25 (41.7%)
Action	9. I have quit smoking, but I still worry about slipping back, so I need to keep working on living smoke free.	7 (11.7%)
	10. I have quit smoking and will never smoke again.	1 (1.7%)

Table 3

Perceived Risks and Benefits of Smoking

	Not at all	N=59 ^a Somewhat	A lot
Perceived risks (“For you, how much do these things bother you about smoking?”)			
Worrying about getting seriously ill	20.3%	25.4%	54.2%
Smelling like smoke	22.0%	22.0%	55.9%
Exposing others to secondary smoke	23.7%	18.6%	57.6%
Expense of smoking	10.2%	16.9%	72.9%
Stigma (ie, rejection from others)	44.1%	23.7%	32.2%
Inconvenience (eg, smoke-free laws)	47.5%	22.0%	30.5%
Looking older	42.4%	18.6%	39.0%
Feeling tired and/or out of breath	20.3%	23.7%	55.9%
Perceived benefits (“How much do you think smoking helps you with..?”)			
Weight control	55.9%	22.0%	22.0%
Moving your bowels	61.0%	23.7%	15.3%
Enhanced narcotic response (ie, increases the “high” from other drugs)	64.4%	18.6%	16.9%
Fighting infection	81.4%	6.8%	11.9%
Increasing your T-cell count	78.0%	10.2%	11.9%
Decreasing your pain	74.6%	8.5%	15.3%
Controlling anxiety	40.7%	40.7%	18.6%
Controlling anger	32.2%	40.7%	27.1%
Controlling depression	40.7%	40.7%	18.6%
Relaxing	25.4%	54.2%	20.3%
Being accepted by other smokers	57.6%	28.8%	13.6%
Increasing social contact	61.0%	28.8%	10.2%

Note.

^aOne participant elected not to answer this set of questions, resulting in a sample size of 59.