

Tobacco use and readiness to quit smoking in low-income HIV-infected persons

Jack E. Burkhalter, Carolyn M. Springer, Rosy Chhabra, Jamie S. Ostroff, Bruce D. Rapkin

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The study aim was to identify covariates of smoking status and readiness to quit that encompassed key sociodemographic and health status variables, health-related quality of life, drug use and unprotected sex, and tobacco use variables in a cohort of low-income persons living with HIV. We also examined the impact of HIV diagnosis on smoking cessation. The sample ($N=428$) was mostly male (59%) and Black (53%) or Hispanic (30%), and had a high school education or less (87%). Mean age was 40 years. Two-thirds of participants were current smokers, 19% former smokers, and 16% never smokers. Current smokers smoked a mean of 16 cigarettes/day for 22 years; 42% were in the precontemplation stage of readiness to quit smoking, 40% were contemplators, and 18% were in preparation. Most current smokers (81%) reported receiving medical advice to quit smoking. Multivariate logistic regression analyses indicated that current smokers, compared with former smokers, were more likely to use illicit drugs, perceive a lower health risk for continued smoking, and report less pain. Current smokers, compared with nonsmokers (former and never smokers), were more likely to report greater illicit drug use in their lifetime, current illicit drug use, and less pain. A multiple linear regression indicated that greater current illicit drug use, greater emotional distress, and a lower number of quit attempts were associated with lower stage of readiness to quit smoking. These findings confirm a high prevalence of smoking among HIV-infected persons and suggest a complex interplay among drug use, pain, and emotional distress that impact smoking status and, among smokers, readiness to quit. Tobacco control programs for HIV-infected persons should build motivation to quit smoking and address salient barriers to cessation—such as comorbid drug use, emotional distress, pain, and access to and coverage for treatment—and should educate smokers regarding the HIV-specific health benefits of cessation.

Introduction

Advances in medical treatment leading to greater life expectancy for persons infected with HIV (McNaghten, Hanson, Jones, Dworkin, & Ward, 1999) have increased interest in health protective behavior changes, such as smoking cessation (Collins et al., 2001; Gritz, Vidrine, Lazev, Amick, & Arduino, 2004; Niaura, Shadel, Morrow, Flanigan, & Abrams, 2000), which may reduce morbidity and mortality and improve quality of life in this population. The sociodemographic and risk profile for HIV

disease encompasses population characteristics related to higher likelihood of tobacco use, such as lower socioeconomic status (Droomers, Schrijvers, & Mackenbach, 2002; Escobedo, Zhu, Giovino, & Eriksen, 1995; Pierce, Fiore, Novotny, Hatziandreu, & Davis, 1989), illicit substance use or abuse (Hughes, 1993; Kopstein, Crum, Celentano, & Martin, 2001), and being a gay or bisexual male (Arday, Edlin, Giovino, & Nelson, 1993; Burns et al., 1991; Royce & Winkelstein, 1990; Stall, Greenwood, Acree, Paul, & Coates, 1999). Recent studies have shown higher rates of smoking among HIV-infected persons than in the general population, currently estimated at 23.3% (Centers for Disease Control and Prevention [CDC], 2002). In a study using a nationally representative sample of persons infected with HIV, 51% were current tobacco smokers (Collins et al., 2001). A multicenter study examining pulmonary complications of HIV infection found

Jack E. Burkhalter, Ph.D., Carolyn M. Springer, Ph.D., Rosy Chhabra, Psy.D., Jamie S. Ostroff, Ph.D., Bruce D. Rapkin, Ph.D., Department of Psychiatry & Behavioral Sciences, Memorial Sloan-Kettering Cancer Center, New York, NY.

Correspondence: Jack E. Burkhalter, Ph.D., Memorial Sloan-Kettering Cancer Center, Department of Psychiatry & Behavioral Sciences, 1275 York Avenue, New York, NY 10021, USA. Tel: +1 (212) 583-3013; Fax: +1 (212) 230-1953; E-mail: burkhalj@mskcc.org

that 45% were current smokers (J. Turner et al., 2001). The prevalence of smoking among HIV-infected patients seeking treatment in outpatient immunology clinics is high, ranging from 47% to 72% (Gritz et al., 2004; Mamary, Bahrs, & Martinez, 2002; Niaura et al., 1999). In aggregate, these findings indicate a substantially higher prevalence of smoking among those living with or at risk for HIV infection compared with the general population.

In addition to the well-documented health risks of smoking for the general population (U.S. Department of Health and Human Services [USDHHS], 1989, 1990), evidence that links smoking to HIV-specific health risks is growing. HIV-infected smokers, compared with HIV-infected nonsmokers, are at increased risk for bacterial pneumonia (Burns et al., 1996; Conley et al., 1996; Flanigan et al., 1999; Hirschtick et al., 1995); emphysema (P. T. Diaz et al., 2000; P. T. Diaz et al., 1999); spontaneous pneumothorax (Metersky, Colt, Olson, & Shanks, 1995); and bronchial hyperresponsiveness, an indicator of asthma (Poirier, Inhaber, Lalonde, & Ernst, 2001). HIV-infected smokers may be at higher risk for oral candidiasis (Burns et al., 1996; Conley et al., 1996; Galai et al., 1997; Greenspan et al., 2000; Palacio, Hilton, Canchola, & Greenspan, 1997; Swango, Kleinman, & Konzelman, 1991) and oral hairy leukoplakia (Conley et al., 1996; Shiboski, Neuhaus, Greenspan, & Greenspan, 1999). Another study suggests that current smoking doubles the risk of cryptococcosis in patients with HIV disease (Hajjeh et al., 1999). Persons with AIDS may be more likely to develop cancers also associated with smoking, such as lung and lip cancers (Frisch, Biggar, Engels, & Goedert, 2001), as well as precancerous anal disease (Palefsky, Shiboski, & Moss, 1994), in addition to the AIDS-defining cancers (Kaposi sarcoma, non-Hodgkin lymphoma, and invasive cervical cancer; CDC, 1992).

Conflicting reports exist about whether smoking increases maternal-child HIV transmission, with two reports finding this association (Burns et al., 1994; B. J. Turner, Hauck, Fanning, & Markson, 1997) and another not (Kalish et al., 1998). Although some researchers have found that smoking promotes HIV disease progression (Hessol et al., 2000; Nieman, Fleming, Coker, Harris, & Mitchell, 1993), most studies have not found such a relationship (Begtrup et al., 1997; Burns et al., 1996; Coates et al., 1990; Conley et al., 1996; Craib et al., 1992; Eskild & Petersen, 1994; Galai et al., 1997; Nieman, Coker, & Mitchell, 1993; Royce & Winkelstein, 1990). In addition to the direct effects of smoking on HIV disease is growing evidence that antiretroviral therapy increases the cardiovascular risks of those treated (Saves et al., 2003), adding another

HIV-specific risk factor for these smokers. The evidence is strong that smoking is associated with adverse health outcomes in HIV disease.

Serious illnesses such as cancer and myocardial infarctions, and hospitalization have been proposed as teachable moments that heighten smokers' perceived vulnerability to the adverse health impact of smoking and their receptivity to smoking cessation interventions (Emmons & Goldstein, 1992). For example, rates of smoking cessation have been reported to be in the range of 50%–70% after the diagnosis of lung cancer (Gritz, Nisenbaum, Elashoff, & Holmes, 1991; Johnston-Early et al., 1980), and up to 50% in smokers surviving a myocardial infarction (Schwartz, 1987). Although HIV infection is not related to tobacco use, HIV diagnosis may serve as a comparable teachable moment for persons concerned about reducing health risks through health behavior change. Collins and colleagues (2001) examined the impact of HIV diagnosis on smoking and found that, although 49% of their national sample reported cutting down or quitting smoking since HIV diagnosis, half of current smokers had not changed their smoking, and some 14% of current smokers had actually increased their smoking since diagnosis. Regarding readiness to quit smoking, Gritz and colleagues (2004) and Niaura et al. (1999) reported that about 38% and 58%, respectively, of HIV-infected patients treated in outpatient clinics were not even ready to consider taking steps to quit smoking (precontemplators).

Thus a picture is emerging within HIV disease of a high prevalence of smoking, low readiness to quit, and documented HIV-specific risks associated with continued smoking. HIV-infected persons may face several challenges that affect readiness to quit and quitting success, such as high rates of illicit drug use and comorbid psychiatric illness (Bing et al., 2001), lower socioeconomic status (T. Diaz et al., 1994; Karon et al., 2001), and impaired quality of life (Fang, Hsiung, Yu, Chen, & Wang, 2002)—all of which may limit the perceived benefits of quitting smoking. Little is known about the role of these variables and other medical, health behavior, and cessation-related perceptions as facilitators of or barriers to smoking cessation in this population. Such information will aid in the design of smoking cessation interventions for persons with HIV.

Our aims were to examine the extent to which HIV diagnosis was a teachable moment for smoking cessation and to identify covariates of smoking status and correlates of readiness to quit that encompassed key sociodemographic and health status variables, measures of health-related quality of life, drug use and unprotected sex, and tobacco use history in a cohort of low-income persons with HIV in New York state.

Method

Subjects

Subjects in this study were participants in a longitudinal cohort study of New York state Medicaid patients living with HIV or AIDS. The purpose of the longitudinal study was to examine how the implementation of special needs plans for Medicaid managed care affects access to care and quality of life for persons living with HIV/AIDS in New York state (Smith et al., 2000). Subjects were interviewed for the longitudinal study every 3 months, starting in 1996. Subjects eligible for assessment with the tobacco use questionnaire were those scheduled for regular follow-up assessment in the period from July 1999 to May 2000. Of the 465 subjects scheduled for follow-up, 428 (92%) completed the tobacco use questionnaire. Tobacco use data were not available for the remaining 37 subjects because of fatigue or illness ($n=15$) or lack of interest ($n=22$). Subjects participating in the tobacco assessment were recruited from multiple sites: 44% from New York state-designated AIDS centers (primarily medical centers), 28% from adult day health care programs that provided substance abuse treatment or mental health services, 19% from community-based organizations that provided HIV/AIDS services, and 9% from settings that combined adult day health care programs and community-based HIV/AIDS services.

Procedure

Subjects' tobacco use was assessed once with a tobacco use questionnaire that was added to a comprehensive assessment battery for the longitudinal study. Interviews were conducted in English and in Spanish. As part of recruitment, patients were offered US\$10 for each interview and an additional US\$10 for each supplemental module, such as the tobacco use assessment reported here. All data used for the present paper are self-reported. This study was approved by the institutional review board at Memorial Sloan-Kettering Cancer Center, and all participants provided informed consent prior to being interviewed.

Measures

Information on sex, age, ethnicity, education, sexual orientation, and marital/partner status was collected. Based on standard items from the literature, we devised a 16-item tobacco use questionnaire to assess lifetime and current tobacco use patterns, nicotine dependence, quit attempts and smoking cessation methods used, readiness to quit smoking, whether health care providers ever advised smoking cessation, level of intent to use a low-cost or free smoking

cessation program, and other variables consistently associated with tobacco use and cessation in the research literature. The questionnaire was also intended to gauge the impact of HIV diagnosis on tobacco use (see Appendix). Strength of beliefs regarding health risks of continued smoking and the benefits of cessation were assessed with two items. We assessed what smoking cessation treatments, if any, smokers had used. Smokers who answered yes to this question were asked to identify the specific treatments used.

To examine covariates of tobacco use status, we divided the sample into three groups. Never smokers were those who had not smoked at least 100 cigarettes in their lifetime. Former smokers were respondents who had smoked at least 100 cigarettes in their lifetime but who had not used tobacco within the past 3 months. Current smokers had smoked at least 100 cigarettes in their lifetime and had used tobacco products in the past 3 months.

Date of HIV-seropositive diagnosis was obtained from each subject by self-report at the time of entry into the longitudinal study. Subjects were asked their current HIV health status (asymptomatic, symptomatic, or AIDS), and the number of medical visits in the past 3 months. Drug use and sexual risk behavior were queried in a yes-no response format. The subjects were asked about use of heroin, crack, and other illicit drugs over their lifetime and within the past 3 months. Two indexes of the number of illicit drugs used (lifetime and current) were computed by adding the total number of illicit drug categories endorsed, with scores ranging from 0 to 3. Similarly, to produce two indexes of problematic alcohol use, we asked patients if they had had "too much alcohol" in the past 3 months and also in their lifetime. We asked patients if they had unprotected sex with a man or a woman in the past 3 months, to assess current sexual risk behavior.

The Brief Health and Functioning Questionnaire SF-21 Form is designed to assess health-related quality of life in HIV disease (Bozzette, Hays, Wu, Berry, & Kanouse, 1995; Huba et al., 1997). Five of eight subscales were of interest: Physical functioning (four items), bodily pain (two items), emotional distress (three items), cognitive functioning (three items), and current health perceptions (three items). Subjects were asked to answer all items for the time frame of the past 4 weeks. In the present sample, internal consistency reliabilities of these subscales (Cronbach's alpha) ranged from .68 to .81.

Data analyses

Data were analyzed using SPSS v. 11.5.1. Frequencies and descriptive statistics were used to summarize sociodemographic, health, and smoking-related

variables. Chi-square analyses, one-way analyses of variance, and *t* tests were used to examine differences on sociodemographic, health, and smoking-related variables by smoking status and by stage of readiness to quit smoking. Two multivariate logistic regression models were constructed to identify significant covariates of smoking status. The first model identified covariates of smoking cessation (current vs. former smokers), and the second identified covariates of current smokers versus nonsmokers (former and never smokers). To select potential covariates for entry into final multivariate models, we conducted univariate logistic regressions for each covariate in each model. Covariates examined are those listed in Table 1. Then we selected for inclusion in the final models those covariates that had an unadjusted odds ratio for which the *p* value was .25 or less, as recommended by Hosmer & Lemeshow (1989) in statistical model building. Thus each model was constructed statistically and comprised different types and numbers of covariates. In addition, for the logistic regression model comparing current and former smokers, two variables assessing strength of beliefs about the benefits of quitting smoking and

risks of continued smoking were included as continuous covariates.

A multivariate linear regression model was constructed to identify correlates of readiness to quit smoking (an ordinal outcome variable), using the same statistical model-building approach. Potential correlates examined included those used above and tobacco history variables. This inclusive approach to model building was taken owing to the paucity of data on factors associated with smoking status and readiness to quit smoking in this population. In all multivariate models, independent variables were entered into each regression using a direct (simultaneous) entry method. Thus each independent variable's association with the outcome variable was adjusted for the presence of all other independent variables in the model.

Results

To test the representativeness of the analytic sample, we compared the demographic characteristics of the 37 subjects eligible for follow-up but not assessed with this tobacco questionnaire (noncompleters) with

Table 1. Subject characteristics.

Variable	Number of respondents ^a	Smoking status group			
		Never	Former	Current	Total
Number of respondents		67	80	281	428
Age (mean years, <i>SD</i>) [*]	418	37.7 (7.9)	40.8 (8.1)	40.2 (6.9)	39.9 (7.3)
Sex (percent)	428				
Male	253	55	58	60	59
Female	175	45	42	40	41
Ethnicity (percent)	394				
Black	208	48	55	54	53
Hispanic	118	36	29	29	30
White, non-Hispanic	68	16	16	18	17
Education (percent)	412				
Less than high school	130	32	32	31	32
High school	227	45	58	57	55
College or higher	55	23	10	12	13
Sexual orientation (percent)	415				
Gay/lesbian/bisexual	126	40	30	28	30
Heterosexual	289	60	70	72	70
Relationship status (percent)	418				
Single [*]	253	75	58	58	60
Married/partnered	66	14	19	15	16
Separated/divorced/widowed [*]	99	11	23	27	24
HIV disease status (percent)	418				
Asymptomatic	132	40	24	32	32
Symptomatic	128	25	35	31	31
CDC-defined AIDS	158	35	41	38	38
Years since diagnosis (mean, <i>SD</i>)	341	7.7 (3.2)	8.9 (3.7)	8.0 (3.4)	8.1 (3.4)
Number of doctor visits—past 3 months (mean, <i>SD</i>)	415	2.0 (2.2)	2.3 (2.9)	2.4 (3.1)	2.3 (2.9)
Used illicit drugs—lifetime (percent) ^{***}	428	57	88	89	84
Used illicit drugs—past 3 months ^{**} (percent)	428	16	16	31	26
Used too much alcohol—lifetime (percent) ^{***}	417	45	75	69	66
Used too much alcohol—past 3 months (percent)	414	8	16	16	14
Unprotected sex—past 3 months (percent yes)	428	16	15	17	17

^aThe number of respondents varies due to missing data.

^{*}*p* ≤ .05; ^{**}*p* ≤ .01; ^{***}*p* ≤ .001.

the 428 subjects in our sample. We found no significant differences between the two groups when compared by age, gender, income, sexual orientation, and HIV health status ($p > .05$). The noncompleters, however, were more likely to be White, as opposed to Black or Hispanic ($p < .01$), and were more likely to be married or partnered, as opposed to being single ($p < .01$). As shown in Table 1, the mean age of subjects was 40 years. The sample was mostly male (59%) and Black (53%) or Hispanic (30%), and had a high school education or less (87%).

A total of 281 respondents (66%) were current smokers, 80 (19%) were former smokers, and 67 (16%) were never smokers. The lifetime prevalence of using one or more illicit drugs was 84%. Never smokers reported using less illicit drugs over their lifetime than did former and current smokers ($p < .001$). Current smokers accounted for 68%–77% of those subjects having a history of using illicit drugs ($p < .001$). Two-thirds of the total sample reported ever having used too much alcohol. For the sample as a whole, current drug use in the past 3 months was 14% for heavy alcohol use, 7% for heroin, 9% for crack, 18% for other illicit drugs, and 4% for injection drug use. Current smokers accounted for 87%–96% of those using illicit drugs in the past 3 months ($p < .05$). The prevalence of engaging in unprotected sex in the past 3 months was 17%, which did not differ by smoking status.

Univariate comparisons by smoking status showed that never smokers were younger and more likely to be single than were current or former smokers. Further, current smokers reported greater current and lifetime use of illicit drugs than did never smokers. Current and former smokers were more likely to report using too much alcohol in their lifetime than were never smokers. The total sample was about equally divided by stage of HIV disease, and the smoking status groups did not differ on any health status variable.

Table 2 presents data on tobacco use. Current smokers smoked a mean of 16 ± 7.3 cigarettes/day, and they had smoked an average of 23 ± 9.5 years. The mean time since their last cigarette was less than 2 days. Two-thirds of current smokers reported smoking a cigarette within 30 min of waking. Over one-third (35%) of smokers had made no quit attempt since HIV diagnosis. Most current smokers were either in the precontemplation (42%) or contemplation (40%) stage of readiness to quit smoking, and 18% were in the preparation stage. Nearly half (46%) of current smokers indicated that they “would definitely use” a free or low-cost smoking cessation program. Most current smokers (81%) reported receiving advice to quit from a medical provider. Former smokers reported smoking an average of 16 ± 9.2 years and had quit smoking a

mean of 6 years prior to this cross-sectional study; less than 8% of these smokers reported cessation in the 3–6 months before the interview. Three-quarters (77%) of former smokers had quit smoking after their HIV diagnosis, but only 8% reported quitting smoking within 6 months, and 14% within 1 year, after HIV diagnosis. Among both former and current smokers who reported having used a specific smoking cessation method, the most frequently reported methods used were nicotine patch and nicotine gum.

The first multivariate logistic regression model identified covariates of smoking cessation by comparing current and former smokers. The statistical selection process yielded six covariates that were entered into the multivariate model: time since diagnosis, bodily pain, current overuse of alcohol, number of illicit substances used currently, belief in benefits of quitting smoking, and belief in risks of continued smoking. Current smokers, compared with former smokers, were more likely to report lower perceived health risks for continued smoking ($OR = 0.62$, 95% $CI = 0.42$ – 0.90 , $p < .05$) and greater current use of illicit substances ($OR = 2.8$, 95% $CI = 1.24$ – 6.25 , $p < .05$), with a trend for current smokers to report lower bodily pain ($OR = 1.01$, 95% $CI = 0.999$ – 1.023 , $p < .10$).

In the second multivariate logistic regression model, we identified covariates of current smokers versus nonsmokers. The statistical selection process identified eight covariates entered into the multivariate model: age, education, sexual orientation, bodily pain, current overuse of alcohol, lifetime overuse of alcohol, number of illicit substances currently used, and number used over their lifetime. Current smokers, compared with nonsmokers, were more likely to report greater illicit drug use in their lifetime ($OR = 1.55$, 95% $CI = 1.22$ – 1.98 , $p < .001$), current illicit drug use ($OR = 1.84$, 95% $CI = 1.14$ – 2.96 , $p < .05$), and less bodily pain ($OR = 1.01$, $CI = 1.002$ – 1.018 , $p < .05$).

In the third multivariate analysis, we built a statistical model to identify correlates of stage of readiness to quit smoking among current smokers. A total of 13 variables met entry criteria for the multivariate model: relationship status, ethnicity, number of cigarettes smoked daily, level of nicotine dependence, number of quit attempts, having been advised (or not) to quit smoking by a health care provider, belief in benefits of quitting smoking, belief in risks of continued smoking, current illicit drug use, and four quality-of-life indicators (bodily pain, physical functioning, emotional distress, and current health perceptions). The model ($R^2 = .22$, $SE = .66$) yielded three significant correlates of readiness to quit smoking, with greater current illicit drug use ($\beta = -.14$, $SE = .069$, $p < .05$), greater emotional distress ($\beta = -.24$, $SE = .002$, $p = .001$), and lower number

Table 2. Tobacco use variables.

Variable	Smoking status			
	Number of respondents ^a	Current	Number of respondents ^a	Former
Number of cigarettes/day (mean, <i>SD</i>)	271	15.7 (10.7)	78	15.0 (21.2)
Number of years smoked (mean, <i>SD</i>) ^{***}	279	22.8 (9.5)	78	16.0 (9.2)
Number days since last cigarette (mean, <i>SD</i>) ^{***}	281	1.3 (7.4)	79	2197.6 (2221.4)
Smoked within 30 min of waking (percent)	272	67		
Stage of readiness to quit smoking (percent)	274			
Precontemplation	111	42		
Contemplation	108	40		
Preparation	48	18		
Number of smoking quit attempts since HIV diagnosis (mean, <i>SD</i>)	279	2.8 (6.1)	67	2.3 (2.1)
Tried specific smoking cessation treatments (percent yes) ^{**}	278	38	72	20
Methods used to quit smoking (percent)	278		72	
Nicotine gum	58	20.8	24	33.3
Nicotine patch	151	54.4	36	50.0
Bupropion	22	8.0	0	0
Other	47	16.8	12	16.7
Health care provider advised quitting smoking (percent yes) ^{***}	273	81	63	59
Belief in health risks of continued smoking (mean, <i>SD</i>) ^{b ***}	275	3.8 (1.2)	66	4.5 (1.1)
Belief in health benefits of quitting smoking (mean, <i>SD</i>) ^{b***}	268	3.8 (1.4)	69	4.5 (1.0)
Interest in using smoking cessation program (percent)	267			
Not likely to use the program	40	15		
Maybe would use the program	104	38		
Would definitely use the program	123	46		

^aThe number of respondents varies due to missing data.

^bScale range: 1=not at all, 5=very much.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

of quit attempts since HIV diagnosis ($\beta = .27$, $SE = .007$, $p < .001$) associated with lower stage of readiness to quit smoking.

Discussion

The data presented here add new information about the smoking and cessation patterns, covariates of smoking status, and readiness to quit smoking of persons living with HIV. Two-thirds of the sample were current smokers, a rate at the high end of prevalence ranges reported in HIV but similar to rates reported for other HIV outpatient clinic samples (Gritz et al., 2004; Mamary et al., 2002; Niaura et al., 1999). Medicaid recipients overall have a greater smoking prevalence (36%) than does the general U.S. population (CDC, 2001). Because Medicaid serves 55% of all persons living with AIDS in the United States and is the single largest payer of direct medical services for AIDS (USDHHS, 2002), our findings have relevance to the larger population of persons living with HIV. Given the known adverse impact of smoking on morbidity and mortality in the general population and the growing amount of data documenting links between smoking and higher risk for HIV-specific illnesses, these data suggest an urgent need to devise effective strategies to reduce smoking prevalence among persons living with HIV. Our other findings help identify potential barriers to and facilitators of smoking cessation in this population.

The present study sheds some additional light on the impact of HIV diagnosis and chronic disease on smoking status. About one-third of current smokers reported making no quit attempt since their HIV diagnosis. Over three-quarters of former smokers had quit smoking sometime after their HIV diagnosis, but only 8% reported quitting within 6 months, and 14% within 1 year, after HIV diagnosis. This cumulative cessation during the year after HIV diagnosis suggests that HIV diagnosis in this patient sample represented a modest teachable moment for smoking cessation when compared with cessation rates observed in persons diagnosed with tobacco-related serious illnesses, such as cancer or myocardial infarctions. For another comparison, the estimated rate for unaided smoking cessation among those in the general population presenting at primary health care settings is 7.33% (Baillie, Mattick, & Hall, 1995). In a study examining health behavior changes following HIV diagnosis, nearly half of current smokers reported no change and some 14% increased their smoking (Collins et al., 2001; R. L. Collins, personal communication, September 24, 2002). Amplifying health concerns related to smoking and identifying HIV-specific health benefits in cessation also may enhance cessation readiness for these smokers, because greater health concerns of smokers are associated with higher intrinsic motivation to quit (Curry, Wagner, & Grothaus, 1990).

The observed association between current smoking and illicit drug use among the HIV-infected persons

in the present study is compatible with prior findings in which HIV-infected persons who recently used any illicit drug or were heavy alcohol drinkers were more likely to be current than former or never smokers (Burns et al., 1996; Gritz et al., 2004). In our sample overall, lifetime use of at least one illicit drug was high (84%), consistent with data showing that injection drug use is the second most common exposure category for HIV infection among Black and Hispanic males (CDC, 2001), who represent the majority of our sample. The present study did not collect data on routes of HIV transmission, preventing characterization of the sample by these categories. In a nationally representative sample of HIV-infected persons receiving medical care, about half reported using an illicit drug within the prior year (Bing et al., 2001), and in the Multicenter AIDS Cohort Study the prevalence of illicit drug use in the prior 6 months was as high as 92% (Sullivan et al., 1993). Current drug and alcohol use have been associated with greater smoking prevalence and less successful smoking cessation in other populations not known to be infected with HIV (Hughes, 1993; Humfleet, Munoz, Sees, Reus, & Hall, 1999; Hymowitz et al., 1997).

We also observed that current smokers perceived lower health risk for continued smoking compared with former smokers, a finding consistent with a phenomenon in which current smokers, compared with former smokers or nonsmokers, tend to minimize personal health risks of smoking (Boney-McCoy et al., 1992; Weinstein, 1998). In contrast to the report by J. Turner et al. (2001), current smoking status in our sample was associated with less bodily pain than was former smoker or nonsmoker (former and never smokers) status. The prevalence of pain in HIV-infected ambulatory persons is high (Breitbart et al., 1996; Singer et al., 1993), and evidence indicates that smoking, and in particular nicotine, has an analgesic effect in humans, demonstrated by the elevated tolerance or threshold, or both, to painful stimulation found among smokers (e.g., Fertig, Pomerleau, & Sanders, 1986; Jamner, Girdler, Shapiro, & Jarvik, 1998). Current smokers were also more likely to be current users of illicit drugs than were never and former smokers, suggesting a potentially complex interplay among drug use, smoking, and pain in HIV disease that warrants further investigation to determine the role of pain symptoms and pain control in the cessation of tobacco and illicit drug use.

The present study is among the first to identify factors associated with stage of readiness to quit for HIV-positive smokers. Quitting readiness in this sample was nearly identical to the "40-40-20" percentage distribution across the earliest stages of readiness in smoking cessation—precontemplation,

contemplation, and preparation, respectively—reported for the general population of smokers (Velicer et al., 1995), and this sample's profile confirms the overall low readiness observed in two other studies of HIV-infected smokers (Gritz et al., 2004; Niaura et al., 1999). In multivariate analyses, greater illicit drug use was a salient marker for concurrent tobacco smoking, and we also found that greater current illicit drug use was associated with lower readiness to quit smoking. Thus, consistent with prior work (Gritz et al., 2004), substance or alcohol abuse is a likely barrier to preparedness for tobacco use cessation in HIV disease. Compounding the challenge for smokers with HIV/AIDS is the finding that illicit drug use, drug dependence, and heavy alcohol use are among the factors associated with screening positive for a psychiatric disorder, such as major depression (Bing et al., 2001). Although we did not assess psychiatric disorders, greater emotional distress was associated with lower readiness to quit smoking. Other reports have identified higher levels of emotional distress, depressive symptoms in particular, as increasing the difficulty of smoking cessation in the general population of smokers (Anda et al., 1990; Glassman et al., 1988). Smokers who were less ready to quit also reported a lower number of quit attempts since HIV infection, consistent with the existence of chronic barriers (illicit drug use, emotional distress, pain) or the absence of positive support for smoking cessation.

With regard to the present study's limitations, our findings are based on low-income persons living with HIV disease and treated at medical centers and by community-based service providers in New York state. Thus caution should be used in generalizing to the larger population of HIV-infected persons. Sociodemographic differences between the participants in the longitudinal study who declined tobacco use assessment and those who agreed to participate suggest some caution in generalizing to the larger study sample. We did not verify smoking status either biochemically or through collateral reports from family or partners for those who reported being nonsmokers. Our cross-sectional analyses do not permit determination of causal pathways between covariates and outcome variables. We did not find sociodemographic associations with smoking status that Gritz and colleagues (2004) and population-based surveys (Escobedo et al., 1995; Pierce et al., 1989) reported. This may be explained by differences in sample characteristics. For example, our sample was less educated and had higher minority representation than did the Gritz study, and the socioeconomic status of our sample was relatively homogeneous compared with the general population.

A number of cross-sectional studies have found more depressive symptoms in smokers compared

with nonsmokers (Brown, Madden, Palenchar, & Cooper-Patrick, 2000; Frederick, Frerichs, & Clark, 1988; Pérez-Stable, Marin, Marin, & Katz, 1990). In our study, emotional distress did not emerge as a significant covariate of smoking status, consistent with a similar study using a different measure of distress (Gritz et al., 2004). We used a general distress measure, as opposed to a specific measure of depressive symptoms that is typically used when associations are found.

Of interest, we found no association between smoking status and engaging in unprotected sex, although as others observed (Wolf et al., 2003), unprotected sex was associated with current illicit drug use ($r_s = .15$, $p < .01$). We are unaware of published reports linking tobacco use and unprotected sex in those already HIV infected, but youth who use tobacco have a greater likelihood of engaging in illicit drug use and unprotected sex (USDHHS, 1994). J. Turner et al. (2001) compared persons with HIV disease who smoked with those who did not and observed that smoking was associated with poorer self-reported physical well-being (more physical symptoms and less energy) and poorer mental and social well-being. However, Gritz and colleagues (2004) did not find differences in health-related quality of life by smoking status, but we observed differences in bodily pain, suggesting fertile ground for future studies.

Among the challenges of addressing tobacco dependence with comorbid substance abuse and psychiatric disorders in HIV disease are determining the priority of treatment needs and the patient's readiness to manage each problem as well as identifying feasible, effective care models—an area under active investigation (e.g., Andersen et al., 2003). The 5A's recommended by the Public Health Service clinical practice guideline for treating tobacco use and dependence (Fiore et al., 2000) provides an evidence-based approach to assess tobacco use, intervene, support abstinence, and monitor progress. Application of the 5A's in HIV disease care settings can serve to identify problems in progress toward cessation—such as drug or alcohol problems, impaired mental health, or pain—and facilitate the treatment of these problems by broadening the treatment plan or referring the patient to specialists.

Despite a reported high rate of medical advice to quit, 40% of the present sample was not thinking about quitting smoking. This finding suggests that building motivation to change prior to cessation would be a critical element in any tobacco control program for smokers with HIV. Motivational interviewing (Miller & Rollnick, 1991), a technique applicable to any drug abuse or dependence, could be used by trained health care providers to deliver brief interventions across clinic visits to help move

precontemplators, contemplators, and those in preparation to more advanced stages of readiness, or action. Because persons with HIV under treatment may have frequent contacts with medical providers (Panel on Clinical Practices, 2002), the potential for sustained intervention is substantial. Given that nearly half of the smokers in the present study reported interest in using a free or low-cost smoking cessation program, it is important to allay HIV-positive smokers' concerns about cost by informing them about Medicaid coverage of treatments for tobacco dependence, although coverage varies widely among states (CDC, 2001). Two major barriers to smoking cessation for low-income smokers are the lack of access to care and treatment cost (Schauffler & Parkinson, 1993). Thus systemic as well as individual barriers to smoking cessation exist that can affect motivation to pursue and success in achieving important personal—and public—goals in optimizing health for HIV-infected persons. Finally, two-thirds of the present sample reported smoking within 30 min of waking, a behavioral marker for nicotine dependence (Heatherton et al., 1989). Of the 38% of current smokers who reported using a specific method in prior quit attempts, half reported using nicotine replacement, suggesting that awareness of this treatment is moderately high. HIV-positive smokers should be educated about and encouraged to use, with medical approval, nicotine replacement for cessation (Fiore et al., 2000).

In conclusion, the present study surveyed a large, ethnically diverse sample of low-income persons with HIV disease, identified covariates of smoking status that build on prior findings, and contributed new data on readiness to quit that can inform smoking cessation interventions for this population.

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Appendix: Smoking Questionnaire

Now we would like to ask you some questions about your tobacco use. If you have recently quit smoking, answer the questions for the time just before you quit. In this survey, unless otherwise specified, "cigarettes" refer to all forms of tobacco (cigars, pipes, etc.).

1. During your lifetime, have you smoked at least 100 cigarettes (5 packs) or regularly used other tobacco products (cigars, pipe, chewing tobacco, or snuff)?
 NO. If NO, Please skip to the next questionnaire.
 YES. If YES: When did you last use tobacco? ___/___/___ (date).
2. During your lifetime, what tobacco products have you used (check all that apply)?
 cigarettes
 cigars
 pipe
 chewing tobacco/snuff
3. For how many years have (had) you smoked cigarettes regularly? _____ years.
(Allow the person to answer either in number of

years or age when started. Probe with "When did you start smoking?" Deduct from total # years any periods of time that they quit. Ex: If quit for 6 months over 10 years of smoking, enter 9.5 years)

4. During the 12 months before your HIV+ diagnosis, did you smoke a cigarette or use another tobacco product, even a single puff?
 NO
 YES
5. Before your HIV+ diagnosis, how many times did you try to quit smoking?
 None. Go to question #6.
 =Number of times person tried to quit smoking
 - a. The longest time that you went without smoking: _____ days.
 - b. How many times have you quit for 24 hours or more?: _____times.
6. Since your HIV+ diagnosis, how many times have you tried to quit smoking?
 None. Go to question #7.
 =Number of times person tried to quit smoking
 - a. The longest time that you went without smoking: _____ days.
 - b. How many times have you quit for 24 hours or more?: _____times.
7. Since your HIV+ diagnosis, have you smoked a cigarette or used any other tobacco product, even a single puff?
 NO
 YES
8. Since your HIV+ diagnosis, have you tried treatments like nicotine gum or the patch, had individual counseling for smoking, or attended Smoke Enders or any other program to help you quit smoking?
 YES Which ones? _____.
 NO
9. Since your HIV+ diagnosis, has any health care provider ever advised you to quit smoking?
 YES
 NO
 Don't know/not sure/don't remember
10. During the past 3 months, how much you have smoked or used tobacco products per day on average:
 cigarettes/day
 cigars/day
 pipe bowls/day
 pinches or chews of chewing tobacco/day
 dips of snuff/day

11. How soon after you wake up do you smoke your first cigarette?
 Within 5 minutes 31–60 minutes
 6–30 minutes After 60 minutes
12. Which of the following best describes your actions about quitting smoking (check one)?
 I quit more than 6 months ago
 I quit within the last 6 months
 I plan to quit in the next 30 days
 I plan to quit in the next 6 months
 I do not plan to quit in the next 6 months
13. Since your HIV+ diagnosis, how much do you believe that there are health risks associated with continued smoking?
 1 2 3 4 5
 Not at all A little bit Somewhat Quite a bit Very much
14. Since your HIV+ diagnosis, how much do you believe that there are health benefits associated with quitting smoking?
 1 2 3 4 5
 Not at all A little bit Somewhat Quite a bit Very much
If the person has quit smoking, DO NOT ask this question.
15. If there were a free or low-cost smoking cessation program to help you quit, how likely would you be to use it?
 Not at all likely to use the program
 Maybe would use the program
 Would definitely use the program
 Comments: _____.