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Cervical Cancer Screening Adherence among HIV-Positive Female Smokers from a Comprehensive HIV Clinic

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Abstract

HIV-positive women are at elevated risk for developing cervical cancer. While emerging research suggests that gynecologic health care is underutilized by HIV-positive women, factors associated with adherence to Pap testing, especially among HIV-positive female smokers are not well known. We utilized baseline data from a smoking cessation trial and electronic medical records to assess Pap smear screening prevalence and the associated characteristics among the HIV-positive female participants (n=138). Forty-six percent of the women had at least 1 Pap test in the year following study enrollment. Multiple logistic regression analysis indicated that younger age, African American race, hazardous drinking, increased number of cigarettes smoked per day, and smoking risk perception were associated with non-adherence to Pap smear screening. Cervical cancer screening was severely underutilized by women in this study. Findings underscore the importance of identifying predictors of non-adherence and addressing multiple risk factors and behavioral patterns among HIV-positive women who smoke.

Keywords

HIV-positive female smokers; cervical cancer screening; Pap smear screening; multiple risk behavior; smoking cessation program

INTRODUCTION

Compared to the general population of women, HIV-positive women are at elevated risk for developing invasive cervical cancer (1–3). Extensive evidence suggests that cervical cancer, which is primarily caused by human papillomavirus (HPV), is more pervasive among HIV-

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CONFLICT OF INTEREST

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infected women because: 1) HIV-infected women are more likely to have persistent HPV infections; and 2) persistent infection with oncogenic HPV subtypes is a requisite in the progression of cervical intraepithelial neoplasia (CIN) to invasive cervical cancer (2–5). Because of their increased risk, current guidelines recommend that HIV-positive women have biannual cervical cytology screening following their initial HIV diagnosis; if both tests are normal, annual screening can be resumed thereafter (6).

While emerging research suggests that gynecologic health care is underutilized by HIV-positive women in general (7–10), relatively few studies have elucidated risk and protective factors associated with adherence to Papanicolaou (Pap) smear testing among this population (7–16). A growing body of literature reveals that a history of abnormal Pap testing, recent pregnancy, and receiving gynecological care at the same location as HIV care might increase a woman's likelihood of utilizing Pap smear screening services (7, 11, 12). Factors that have been associated with suboptimal rates of cervical cancer screening utilization in previous studies include severe depressive symptoms, substance use, intravenous drug use, lower education, African American race, CD4 count <200 cells/mm³, younger or older age, obesity, lower body weight, tobacco use, and receiving primary care from a private infectious disease physician (7–10, 13).

Although it is well-established that cigarette smoking is highly prevalent among HIV-positive women (17–21) and that smoking increases the risk for the development and progression of cervical cancer (22–25) two- to-four fold, very little is known about Pap smear screening utilization as it relates to HIV-positive female smokers. To our knowledge, no studies to date have examined cervical cancer screening rates and the associated characteristics exclusively among HIV-positive women who smoke. To address this salient gap in the literature, we utilized electronic medical record data and secondary data from a smoking cessation randomized controlled trial (RCT) to achieve the following: 1) examine Pap smear screening adherence rates among a sample of high risk HIV-positive women who smoke and; 2) assess the factors associated with not adhering to the recommended cervical cancer screening schedule. In this exploratory analysis, we examined demographic, behavioral, clinical and psychosocial variables previously associated with cervical cancer screening adherence among HIV-positive women as well as variables known to be associated with both smoking status and HIV/AIDS outcomes (26–30).

RESEARCH DESIGN AND METHODS

Data for this secondary analysis are derived from a larger smoking cessation RCT for HIV-positive smokers (n=474). Our current analysis, however, focuses specifically on the female study participants (n=138). All participants enrolled in the parent study were recruited from Harris Health System's Thomas Street Health Center clinic in Houston, Texas from February 2007 through December 2009. The freestanding HIV clinic offers both primary and specialty services, including gynecologic care, to a predominantly low-income, patient population. Utilizing an audio computer-assisted self-interview (ACASI) program, study data were collected at the baseline assessment, prior to treatment randomization. Participants who completed the baseline assessment received a \$20 gift card as compensation. The research protocol was approved by Institutional Review Boards of The University of Texas

MD Anderson Cancer Center and The University of Texas Health Science Center at Houston. Further methodological detail about this trial has been published elsewhere (30).

Data Collection

Our outcome of interest was Pap smear screening non-adherence among HIV-positive female smokers in the 12 months following their enrollment in the parent study. The parameters for screening are based on national guidelines (6). To assess our outcome, we utilized Harris Health System's electronic medical record system to abstract information on participants' medical history and Pap smear screening visits. Pap smear screenings for study participants were conducted at an on-site gynecology specialty clinic. All appointments, including those for which the participant does not arrive, physician and hospital encounters, procedure orders and prescriptions are documented in the electronic medical records. Thus, the date of scheduled appointments for Pap screenings and actual screening visits were identified. A participant was classified as non-adherent to cervical cancer screening if there was no record of attending gynecologic appointments in the 12-month window. Finally, all study participants provided consent for their medical record data to be abstracted.

Measures

Socio-demographics—Participants provided information on socio-demographic characteristics including age, race, ethnicity, education level, marital status, employment status, and mode of HIV acquisition.

Behavioral variables

Illicit drug use—Participant drug use was assessed with a single item (yes/no) inquiring about any illicit drug use in the past thirty days.

Hazardous drinking

The Alcohol Use Disorders Identification Test (AUDIT) was employed to assess hazardous drinking. The AUDIT is a 10-item measure developed by a World Health Organization collaborative, and has been used with a variety of populations (31). A score of 8 or above indicates a strong likelihood of hazardous or harmful alcohol consumption.

Antiretroviral medication adherence

Antiretroviral medication adherence was assessed using the adherence questionnaire developed by the Adult AIDS Clinical Trials Group (AACTG). Our analysis was limited to participants' response to a single item, "During the past 4 days, on how many days have you missed taking all of your disease?" These responses were dichotomized into adherent (missed doses on 0 days) and non-adherent (missed doses on 1 or more days). This item has been used with a variety of HIV populations and is accepted as a valid clinical measure of antiretroviral adherence (32–36).

Psychosocial variables

Stress—Participants' level of general stress was measured using the 4-item Perceived Stress Scale (PSS) (37). The PSS provides a single composite score for each participant's

level of stress from 0 (indicating no stress) to 16 (indicating high levels of stress). This scale has well-established psychometric properties with an internal consistency of 0.74 (38).

Self-efficacy—The 9-item self-efficacy scale developed by Velicer and colleagues was used to evaluate participants' self-efficacy for quitting smoking (39). This widely used measure of smoking cessation self-efficacy is an effective predictor of smoking outcomes.

State/Trait Anxiety Inventory—Participants' level of anxiety was measured with the state portion of the Spielberger State/Trait Anxiety Inventory (STAI) (40). This 20-item scale provides information about an individual's current level or state of anxiety. Extensive normative data exists for this widely used anxiety scale (41).

Depression—Symptoms of depression and negative affect were assessed with the 20-item Center for Epidemiological Studies Depression Scale (CES-D Scale) (42). The CES-D has reliable psychometric properties and has been used with a variety of patient populations, including HIV-positive individuals (43).

Smoking risk perception—The smoking risk perception assessment items used in this study were developed based on recommendations by Weinstein and colleagues (44, 45). Four, single item risk perception measures were used to assess absolute risk, risk compared to other smokers, and risk given successful smoking cessation versus continued smoking. Participants were asked to respond to a series of questions: 1) If you don't quit smoking for good, what are your chances of ever developing a smoking-related health problem? 2) If you quit smoking for good, what are your chances of ever developing a smoking-related health problem? 3) Compared to other smokers, what are your chances of ever developing a smoking-related health problem if you continue smoking? 4) Compared to other smokers, what are your chances of ever developing a smoking-related health problem if you quit smoking for good? Participants respond using a seven-point, Likert scale ranging from *extremely unlikely* to *extremely likely*.

Quality of life—The Medical Outcomes Study-HIV Health Survey (MOS-HIV) was used to measure aspects of functional status and well-being among study participants. This 35-item questionnaire consists of 10 sub-scales and assesses both general and HIV/AIDS specific physical health (pain, physical functioning, role functioning, social functioning, energy/fatigue) and mental health (health distress, cognitive functioning and overall quality of life) perceptions. The MOS-HIV is a widely used and well-validated quality of life measure for HIV/AIDS patients (46, 47).

Social Support—The Interpersonal Support Evaluation List (ISEL) was used to measure social support. This is a 12-item measure which assesses three constructs of social support including tangible, appraisal, and belonging (48).

Perceived discrimination—Williams and colleagues' 9-item discrimination scale was administered to assess participants' perception of discrimination. This psychometrically sound instrument assesses an individual's perception of interpersonal mistreatment in a variety of situations (49).

Body image perception—To assess participants' body image perceptions, the 9-item body image questionnaire developed by the Adult AIDS Clinical Trials Group (AACTG) was utilized. This questionnaire assesses the degree to which respondents are distressed by changes in appearance (e.g., weight gain/loss, and lipodystrophy) resulting from HIV/AIDS (50).

HIV immunosuppression—To assess advanced immunosuppression, HIV RNA viral load and CD4 cell count information was collected from participants' medical charts. Participants with an HIV RNA viral load >400 copies/mL were considered to have an unsuccessful response to therapy and were coded as detectable (51). Participants with CD4 cell count <350 cells/mm³ were coded as being in immunologic failure per the Department of Health and Human Services (DHHS) guidelines (6).

Tobacco-related variables

Tobacco use—Data were collected on participants' tobacco use, and included items assessing age of smoking initiation, number of years of tobacco use, and average number of cigarettes smoked daily. These items were adapted from the National Health Interview Survey and from our previous studies (18, 52–54).

Nicotine dependence—The modified 6-item Fagerström Test for Nicotine Dependence (FTND) was utilized to assess participants' levels of nicotine dependence. The FTND consists of six questions and creates a score indicating how dependent an individual is on nicotine (55). The FTND is a reliable measure and has been previously administered among various populations.

Other variables

Body mass index—Body mass index was calculated using height and weight data abstracted from participants' medical records.

Statistical Analysis—Statistical analyses were conducted using Stata, version 10.0 (College Station, TX). As an exploratory investigation of this population, we examined baseline variables (demographic characteristics, psychosocial, tobacco-related, alcohol and illicit drug use, and HIV disease status) by performing a standard descriptive analysis (e.g., means, frequencies and standard deviations). We subsequently performed unadjusted logistic regression to assess the relationships among the potential explanatory variables and non-adherence to recommended cervical cancer screening. After the unadjusted analysis was completed, adjusted logistic regression was performed. Variables found to have a p-value 0.10 in the unadjusted logistic regression analysis were included in the adjusted regression model. A backwards stepwise modeling approach was used to eliminate variables with p-values > 0.05. Potential confounding variables for non-adherence to cervical cancer screening were retained in the model in spite of statistical significance.

RESULTS

Demographic characteristics of study participants

The socio-demographic characteristics according to Pap screening adherence are shown in Table I. In summary, among study participants (n=138), majority of individuals self-identified as African-American (79%), reported heterosexual contact as the mode of HIV acquisition (68.8%), and reported not working due to health reasons (63.1%). The mean age (SD) of participants at baseline was 45.4 (8.6) years. Mean (SD) years of formal education was 10.7 (2.4). Only 21% of participants reported being married or living with a partner. Finally, 29.7% of the sample had a mean [SD] BMI >30 indicating obesity.

Pap smear screening

Related to our outcome of interest, 46% of the women (64/138) had at least 1 Pap test within a year following enrollment in the smoking cessation parent study.

Tobacco-related variables

The mean (SD) age of smoking initiation was 18.5 years (7.2). On average (SD), participants smoked approximately 18.1 (10.4) cigarettes per day and had been smoking for 19.5 (11.4) years. Participants had a moderately high level of nicotine addiction with a mean (SD) FTND score of 5.7 (2.1).

Alcohol and illicit drug use

A third, 34.8%, of participants reported illicit drug use in the past 30 days. Approximately 24% of participants were classified as having a harmful or hazardous level of alcohol use (AUDIT score = 8)

Clinical characteristics: HIV care

Of 138 participants who completed the baseline assessment, 64.5% of participants reported that they were currently on ART. Among the participants currently prescribed ART, 66.3% reported not missing a dose within the past four days and were considered adherent. Electronic medical record documentation indicated at baseline, 43.5 % of participants had a CD4 cell count <350 cells/mm³; 50.0 % of participants had an HIV RNA viral load >400, copies/mL).

Psychosocial Variables

More than half the sample (68.1%) had high levels of depressive symptoms at baseline (CES-D score = 16). Specifically, higher levels of depressive symptoms were reported among the non-adherent group (74.3%) compared to the adherent group (60.9%). Additionally, the study sample reported poor physical and mental health functional status as measured by the MOS-HIV Physical Health Summary (PHS) score and the Mental Health Summary (MHS) score. Summary scores for the non-adherent and adherent groups were below the population mean of 50, with participants reporting an average PHS score (SD) of 38.4 (18.3) and MHS score (SD) of 42.1 (10.6) at baseline. With the exception of the MOS-HIV MHS score and the smoking risk perception measure which assessed participants'

perceived susceptibility as it related to developing a smoking-related illness compared to other smokers even if they quit smoking, none of the other psychosocial variables were statistically significant ($p < 0.05$) in the bivariate analysis. Refer to Table I for a full description of psychosocial variables.

Unadjusted and Adjusted analyses

Younger age (OR: 0.97; 95% CI: 0.93, 1.00), African American race (OR: 2.51; 95% CI: 0.87, 7.28) education level (OR: 0.47; 0.21, 1.03), hazardous drinking (OR: 3.57; 95% CI: 1.48, 8.64), illicit drug use in the past 30 days (OR: 2.29; 95% CI: 1.10, 4.74), increased number of cigarettes smoked per day (OR: 1.05; 95% CI: 1.01, 1.09), nicotine dependence (OR: 1.17; 95% CI: 0.99, 1.38), viral load >400 copies/mL (OR: 2.20; 95% CI: 1.09, 4.42), depressive symptoms (OR: 1.86; 95% CI: 0.90, 3.83), physical health functional status (OR: 0.97; 95% CI: 0.94, 1.00), mental health functional status (OR: 0.97; 95% CI: 0.93, 1.00) and smoking risk perception (OR: 1.20; 95% CI: 1.03, 1.40) met the criteria ($p \leq 0.10$) for inclusion in the initial adjusted logistic regression model. Using the backwards stepwise approach outlined in the methods section, variables with p -values >0.05 were removed from the adjusted analysis. The final adjusted regression model indicated that younger age (OR=0.94; 95% CI=0.89, 0.99), African American race (OR=4.41; 95% CI=1.23, 15.80), hazardous drinking (OR=5.30; 95% CI=1.92, 14.67), increased number of cigarettes smoked per day (OR=1.07; 95% CI=1.03, 1.12) and smoking risk perception (OR=1.24; 95% CI=1.04, 1.47) were independently associated with non-adherence to Pap smear screening (See Table II).

DISCUSSION

To our knowledge, this is one of the first studies to examine cervical cancer screening rates and the associated characteristics among an exclusive sample of HIV-positive females who smoke. Previous studies examining Pap smear screening adherence among HIV-positive women report rates of screening adherence ranging from approximately 53% to 81% (7, 8, 10–13). We found that more than half of women enrolled in the smoking cessation trial had not received the recommended cervical cancer screening in the year following study enrollment, demonstrating that cervical cancer screening services were severely underutilized by HIV-positive female smokers in this study. Results from the adjusted logistic regression analysis indicate that younger age, African American race, hazardous drinking, increased number of cigarettes smoked per day, and smoking risk perception were significantly associated with Pap smear screening non-adherence. Findings suggest that African American women were four times more likely than white women to be non-adherent to Pap screening. Although African American race has been associated with a lack of cervical cancer screening adherence in the general population, the relationship between race/ethnicity and screening non-adherence among the HIV-positive population is mixed (8, 12). However, it is well recognized that African American women are overrepresented in the HIV epidemic. For instance, the rate of new HIV infections among African American women is nearly 15 times higher than that of white women and nearly three times that of Hispanic women (56). In addition to disquieting rates of HIV-infection among African American women, literature suggests that health care services are traditionally underutilized

by this population, resulting in poorer health outcomes overall (57–59). Factors such as caregiving responsibilities, financial barriers, housing instability, stress, negative attitudes, limited transportation access, financial challenges, stigma, and nondisclosure (18, 60–64) have been identified as limiting women's capacity to adopt and maintain health-enhancing behaviors, such as adhering to recommended cancer preventive screening schedules. Thus, public health strategies which aim to improve cervical cancer screening adherence among HIV-positive, African American women must target multi-level behavioral and environmental change (65, 66) to adequately address the unique needs of this population.

Although there is a trend towards the association between older age and decreased likelihood to adhere to Pap smear screening in previous studies among HIV-positive women, in the current study, younger women were more likely to demonstrate non-adherence to cervical cancer screening (7, 10, 15). Detecting cervical cancer in its earlier stages is life-saving. For instance, cervical cancer diagnosed at an early stage has a 5-year survival rate of 92% (67). Given the increased cervical cancer risk among HIV-positive female smokers in particular, health care providers should give emphasis to the continuity of gynecologic care across women's life cycles. Likewise, Oster and colleagues note that attention should be given to ensure that women of all ages equally recognize the importance and benefits of Pap smear screening (7).

This study expands on existing literature by focusing specifically on Pap smear screening risk factors among HIV-positive women who smoke. While previous studies report that current smokers, former smokers, and those smokers who are more nicotine dependent are less likely to be compliant to Pap smear screening (68–71), the relationship between cigarette smoking and Pap screening as it relates to HIV-positive women is not well established. Results from the current study demonstrate that non-adherence to Pap testing among our sample increased 1.07 times for every additional cigarette smoked per day. Utilizing data from the Swiss HIV Cohort Study, Keiser and colleagues similarly identified current smoking status as a predictor of fewer gynecologic examinations and Pap smears among HIV-positive women (15). These investigators concluded that smokers are probably less health conscious in general, thus resulting in less frequent gynecologic examinations. Expanding on such work, our analysis, which focuses exclusively on HIV-positive women who smoke, underscores the significance of strengthening our current understanding of factors that might predict poor cervical cancer screening utilization among this particular population.

A growing body of literature indicates that HIV-positive smokers are more likely to engage in adverse health behaviors and less likely to adhere to recommended health regimens (72–75). Specifically, our earlier efforts documented that those smokers who demonstrated higher levels of nicotine dependence, alcohol use, and illicit drug use were less likely to adhere to their recommended ART regimen (75). Findings from our current analysis indicate a significant relationship between hazardous drinking and non-adherence to cervical cancer screening. Strikingly, women who engaged in hazardous or harmful alcohol consumption were five times more likely to demonstrate non-adherence to Pap smear screening. While hazardous drinking has not been linked to poor Pap screening adherence in other studies with HIV-positive women, elevated rates of alcohol consumption among HIV-positive

smokers have been observed among HIV-positive smokers (18). Although not statistically significant, it is important to note that a third of our sample reported illicit drug use in the past 30 days. The relationship between drug use and failure to receive a Pap smear has been reported in other studies with HIV-positive women (9, 10, 15, 16). Evidence suggests that multiple risk behavior engagement among the general population of smokers is normative (76–78). Since clustering or cooccurrence of poor health behaviors may be socially patterned, efforts to understand the underlying causes and to address multiple risk factors among high risk populations such as HIV-positive smokers are essential to sustained behavior change.

This study suggests an association between smoking risk perception and Pap smear screening non-adherence. Among the four, single item risk perception measures administered to participants, findings reveal that women who perceived they were more susceptible to developing a smoking-related illness compared to other smokers even if they quit smoking were less adherent to Pap smear screening. Thus, women in this study appeared to minimize the benefits of smoking cessation, and it is quite possible that they similarly minimize the benefits of Pap smear screening. A decreased cognizance of the positive effects of health-enhancing behavioral practices may suggest fatalistic attitudes which are commonly observed among disadvantaged populations (79). Additionally, heightened susceptibility to smoking-related consequences in the absence of perceived benefits related to the health behavior change might lead to increased fear and fatalism and consequently less motivation to change behavior (80). Hence, to promote health behavior change among this population, it may be critical to balance a health communication emphasis on smoking cessation and Pap smear screening benefits while minimizing fear tactics. Moreover, deconstructing cancer fatalistic views (81) among HIV-positive female smokers may be relevant to understanding how this high risk population makes decisions as it relates to cancer preventive behaviors.

Integrating gynecologic specialty care into existing HIV care services in a single facility has been promoted as a strategy to improve the delivery of gynecologic care for HIV-positive women (12). Furthermore, in HIV previous studies, receiving gynecological care at the same location as HIV care increased the likelihood of HIV-positive women utilizing Pap smear screening services (7, 12). Of note, women in our study had access to gynecologic care and HIV care in the same facility. In light of poor utilization of Pap smear screening services among our study sample, important implications are raised for examining the integration of care merely beyond a physical context. To optimize and sustain effective delivery, services must be strategically and systematically integrated. Researchers contend that a lack of integrated screening and intervention approaches in primary care settings which aim to assist clinicians with efficiently addressing multiple risk factors is a salient barrier to the delivery of health behavior change (82, 83). HIV primary care providers may be optimally positioned to promote Pap smear screening among HIV-positive individuals who seek primary health care. Thus, a key area of exploration includes examining HIV primary health care providers' perceptions and current practices as it relates to recommending cervical cancer screening among HIV-positive women, especially among those women who smoke. Drawing on a community-engaged approach, health care providers should provide input on how to feasibly deliver an integrated and sustainable system of cancer preventive services.

The current study is not without limitations. First, we assessed Pap smear screening prevalence based on electronic medical records. Therefore, documentation of receipt of cervical cancer screening services outside the Harris Health System is not available through electronic medical charts. However, because the Harris Health System offers comprehensive medical and social services to low-income, HIV-positive individuals, it is unlikely that participants receiving primary HIV care from Thomas Street Health Center would seek gynecologic care at a facility outside of this system. Additionally, due to documentation issues in the medical charts, we were unable to consider information related to abnormal Pap smears and any other subsequent procedures. Hence, our reported Pap smear prevalence may be an underestimation based on guidelines stating that HIV-positive women with abnormal Pap smear results should follow up biannually (6). On a related note, we did not exclude women in our study who had undergone a hysterectomy (n=18) as we were unable to ascertain if the procedure was performed because of cervical dysplasia or cervical cancer. Because of increased risk of vaginal dysplasia, women who have undergone a hysterectomy due to cervical cancer or pre-cancer are still generally advised to have Pap smear screenings. Second, considering this was a secondary analysis, we were unable to examine potential predictors of Pap smear screening non-adherence, which include number of lifetime sexual partners reported by women in the study. Third, we relied on self-report data to conduct our secondary data analysis. Although ACASI enhances perceived privacy and confidentiality for sensitive issues, social desirability bias remains a study limitation. Fourth, our study design does not allow us to make causal inferences between explanatory variables and cervical cancer screening non-adherence. However, this exploratory study provides justification for designing longitudinal studies aimed to assess Pap smear prevalence among HIV-positive smokers. Fifth, the limited number of Hispanic smokers in our study sample limits our ability to generalize findings to Hispanic populations. However, national data suggests that smoking prevalence is significantly lower among Hispanic populations, compared to non-Hispanic white and non-Hispanic black adults (84). Sixth, the wide confidence intervals for the point estimates may suggest limited precision, which likely can be attributed to our limited sample size. Finally, our distinct target population and the fact that participants were drawn from a smoking cessation RCT limits our ability to generalize findings to other HIV-positive female smokers who are not seeking care in an HIV clinic setting and/or not enrolled in a smoking cessation study.

CONCLUSIONS

This study represents an attempt to provide documentation of Pap smear screening rates and the associated characteristics among HIV-positive women who smoke, a population at elevated risk for developing cervical cancer (22–25). Results from this study reveal an underutilization of cervical cancer screening services at a comprehensive HIV clinic, which offers both primary and specialty services, including gynecologic care. Hence, identifying predictors of non-adherence and developing innovative strategies that address multiple risk factors and behavioral patterns among HIV-positive women who smoke could potentially improve women's Pap smear screening adherence rates. Given the disproportionate rates of cigarette smoking among the HIV-positive population, expanding routine screening for tobacco use and the provision of cessation services into HIV clinic-based settings has

emerged as a public health priority (85, 86). Findings similarly shed light on the importance of incorporating cervical cancer screening services as a routine part of HIV care to address the various health and social needs of HIV-positive women. Our future research consists of employing a qualitative approach to gain a deeper contextual understanding of the environmental and systemic –level factors that influence the utilization of existing gynecological care services among HIV-positive female smokers. Given the paucity of public health approaches to address cervical cancer screening disparities among HIV-positive women, resultant findings will be used to generate larger scale cervical cancer screening utilization studies and to inform programs and interventions which aim to improve cervical cancer screening adherence rates among HIV-positive women who smoke.

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Socio-Demographic Characteristics of Study Sample (n=138)

Table 1

Characteristic	Pap Smear Adherent (n=64)	Pap Smear Non- Adherent (n=74)	Total n=138 (100.0%)
Demographic variables			
Age in years, mean (SD) *	44.3 (8.5)	46.7 (8.5)	45.4 (8.6)
Race/ethnicity, no. (%)			
White	11.0 (17.2)	6.0 (8.1)	17.0 (12.3)
Black/African American *	46.0 (71.9)	63.0 (85.1)	109.0 (79.0)
Latino/Hispanic	4.0 (6.3)	4.0 (5.4)	8.0 (5.8)
Other	3.0 (4.7)	1.0 (1.4)	4.0 (2.9)
Years of formal education, mean (SD)	11.2 (2.3)	10.2 (2.4)	10.7 (2.4)
Education level, no. (%)			
Less than high school	23.0 (35.9)	39.0 (52.7)	62.0 (44.9)
High school or equivalent *	24.0 (37.5)	19.0 (25.7)	43.0 (31.1)
More than high school	17.0 (26.6)	16.0 (21.6)	33.0 (23.9)
Current employment status, no. (%)			
Working full or part time	11.0 (17.2)	12.0 (16.2)	23.0 (16.7)
Not working due to health	38.0 (59.37)	49.0 (66.2)	87.0 (63.1)
Unable to find work	5.0 (7.8)	2.0 (2.7)	7.0 (5.1)
Not working for other reasons	10.0 (15.6)	11.0 (14.9)	21.0 (15.2)
Married/living with partner, no. (%)	11.0 (17.2)	18.0 (24.3)	29.0 (21.0)
HIV transmission, no. (%)			
Heterosexual contact	44.0 (68.8)	51.0 (68.9)	95.0 (68.8)
Injection drug use	7.0 (10.9)	13.0 (17.6)	20.0 (14.5)
Other	13.0 (20.3)	10.0 (13.5)	23.0 (16.7)
BMI >30 (obese), no. (%)	19.0 (29.7)	22.0 (29.7)	41.0 (29.7)
Alcohol and illicit drug use			
AUDIT score 8, no. (%) ***	8.0 (12.5)	25.0 (33.78)	33.0 (23.91)
Illicit drug use in the past 30 days, no. (%) **	16.0 (25)	32.0 (43.24)	48.0 (34.78)

Characteristic	Pap Smear Adherent (n=64)	Pap Smear Non- Adherent (n=74)	Total n=138 (100.0%)
Tobacco-related variables			
Age of smoking initiation, mean (SD)	18.7 (7.8)	18.4 (6.8)	18.5 (7.2)
Cigarettes smoked per day, mean (SD) **	15.6 (8.6)	20.3 (11.3)	18.1 (10.4)
Years of smoking, mean (SD)	20.2 (12.3)	18.8 (10.7)	19.5 (11.4)
Nicotine dependence (FTND score), mean (SD) *	5.3 (2)	6.0 (2.1)	5.7 (2.1)
HIV disease status			
HIV RNA viral load >400, no. (%) **	25.0 (39.1)	44.0 (59.5)	69.0 (50.0)
CD4+ cell count <350, no. (%)	23.0 (36.0)	37.0 (50.0)	60.0 (43.5)
Currently on ART, no. (%)	41.0 (64.1)	48.0 (64.9)	89.0 (64.5)
100% adherent to ART, no. (%)	27.0 (42.2)	32.0 (43.2)	59.0 (66.3)
Psychosocial variables			
Stress (Perceived Stress Scale score), mean (SD)	43.5 (17.5)	47.6 (19.5)	45.7 (18.6)
Self-efficacy, mean (SD)	27.0 (8.8)	26.0 (9.1)	26.4 (8.9)
Anxiety (STAI state score), mean (SD)	40.5 (13)	43.0 (13.4)	41.9 (13.2)
Depression (CES-D score), mean (SD)	20.1 (11.8)	23.8 (10.9)	22.1 (11.4)
CES-D score 16, no. (%) *	39.0 (60.9)	55.0 (74.3)	94.0 (68.1)
Perceived discrimination, mean (SD)	8.8 (5.1)	10.1 (5.9)	9.5 (5.6)
Physical health summary (MOS-HIV PHS Score), mean (SD) *	40.0 (11.8)	37.0 (9.8)	38.4 (18.3)
Mental health summary (MOS-HIV MHS Score), mean (SD) **	44.2 (10.6)	40.4 (10.4)	42.1 (10.6)
Social functioning (MOS-HIV), mean (SD)	66.3 (35.3)	59.2 (28.8)	62.5 (32.0)
Social support (ISEL), mean (SD)	35.6 (7.0)	35.0 (7.4)	35.3 (7.2)
Smoking Risk perception variables			
Smoking risk perception, mean (SD)	5.8 (1.9)	6.0 (1.7)	5.9 (1.8)
Smoking risk perception, mean (SD)	4.0 (2.2)	4.1 (2.3)	4.1 (2.2)
Smoking risk perception, mean (SD)	5.8 (1.5)	5.7 (1.6)	5.7 (1.6)
Smoking risk perception, mean (SD) **	3.2 (2.1)	4.1 (2.3)	3.7 (2.3)

Note:

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SD = standard deviation; AUDIT = Alcohol Use Disorders Identification Test; FTND = Fagerström Test for Nicotine Dependence; CES-D = Centers for Epidemiologic Studies – Depression scale; MOS-HIV = Medical Outcomes Study – HIV Health Survey; PHS = Physical Health Survey; MHS = Mental Health Survey

Table II

Adjusted Analysis: Risk Factors Associated with Non-adherence to Pap Smear Screening

Variable	OR	95% CI	p-value
Age	0.94	(0.89, 0.99)	0.011
Race/ethnicity			
White	Reference		
Black	4.41	(1.23,15.80)	0.022
Hispanic	3.74	(0.52,26.94)	0.190
Other	0.53	(0.03, 8.43)	0.654
Hazardous drinking	5.30	(1.92,14.67)	0.001
Cigarettes smoked per day	1.07	(1.03, 1.12)	0.002
Smoking risk perception	1.24	(1.04, 1.47)	0.018