Published in final edited form as:

AIDS Care. 2020 October ; 32(10): 1229–1237. doi:10.1080/09540121.2020.1778627.

The association of HIV and cocaine use to cigarette smoking in the context of depression and perceived stress.

JM Abbamonte, M.A.^a, M Sawhney, Ph.D.^b, ML Alcaide, M.D.^c, SM Weiss, Ph.D.^a, M. Kumar, Ph.D.^a, T Asfar, M.D.^d, DL. Jones, Ph.D.^a

^aDepartment of Psychiatry and Behavioral Sciences, University of Miami Miller School of Medicine, 1120 NW 14th St, Miami, FL 33136

^bLiffrig Family School of Education & Behavioral Sciences, University of Mary, 7500 University Drive Bismarck, ND 58504

^cDepartment of Medicine, University of Miami Miller School of Medicine, 1120 NW 14th St, Miami, FL 33136

^dDepartment of Public Health, University of Miami Miller School of Medicine, 1120 NW 14th St, Miami, FL 33136

Abstract

Mental well-being can contribute to cigarette smoking and negatively impact disease progression among people living with HIV (PLWH). This study examined potential associations between cocaine use (COC), depression, and HIV status in predicting cigarette smoking; hypothesizing that depression would be highest in cocaine users and predict cigarette smoking. An exploratory analysis including stress was also examined as a potential predictor of cigarette use. A series of generalized linear models (GLMs) were conducted examining potential differences in smoking behaviors among the different groups (composed of the different combinations of HIV status and cocaine use) from a community sample ($N = 512$). More than half of the sample (65%) endorsed smoking at some point in the past, and 52% endorsed being current smokers at the time of the study. Smokers were most likely to be cocaine users (87.1%), cocaine using PLWH (74.3%), or PLWH (36.6%). Neither HIV status ($\chi^2(1) = 1.5, p = .221$), perceived stress ($\chi^2(1) = 0.75, p = .386$), nor depressive symptomatology ($\chi^2(1) = 1.2, p = .274$) were related to smoking. Non-cocaine users were approximately 95.4% less likely to smoke than cocaine users, controlling for all other variables. Overall, cocaine use was the greatest predictor of cigarette smoking and quantity of cigarettes smoked. Perceived stress and depression were not associated with cigarette smoking in the sample. Future interventions targeting cigarette use should include a cocaine-related component to encourage smoking cessation among this high-risk group.

Keywords

HIV; Cocaine; Cigarette Smoking; Depression; Stress

INTRODUCTION

Despite the decline in cigarette smoking in the general population to 13.7% (Creamer et al., 2019), smoking prevalence among PLWH is still very high, ranging from 50 to 75% (Pacek & Cioe, 2015). It has been suggested that one reason PLWH smoke to help them deal with stress, anxiety, and depression (Shuter et al., 2012). PLWH who smoke are at increased risk of other illnesses and mortality (Shirley et al., 2013), reduced benefits from antiretroviral therapy (ART) (Hessol et al., 2014), lowered adherence to ARTs (King et al., 2012), are at increased risk of periodontal diseases (Mataftsi et al., 2011), oral lesions (Sroussi & Epstein, 2007), tuberculosis (Ramin et al., 2008), and malignant tumors, with lung cancer being the third most commonly diagnosed cancer in this population (Kirk et al., 2007; Lifson et al., 2010). The mortality rate in PLWH who smoke is double that of non-infected smokers (Helleberg et al., 2015; Weber et al., 2013), and among younger PLWH who smoke, life years lost is higher than the estimated total losses attributed to each condition alone, suggesting that HIV-infection and smoking act synergistically to increase mortality rates (Helleberg et al., 2013). To promote better health and reduce smoking rates among PLWH, it is important to understand factors experienced by PLWH that may be related to smoking (e.g. mental health, stress, and other substance use) and use this in developing targeted smoking interventions.

Physiological and immunological responses to stressful events arise from the individual's assessment of the event, its perceived stress, the actual event itself (Ellis, 2012) and adaptation to the stressor. Perceived stress, which is higher among PLWH (Williams et al., 2017) potentially due to the illness itself, as well as from legal, financial, work, poverty, homelessness, and others factors (Brown et al., 2019; Feng et al., 2015; Moskowitz et al., 2009), is related to many negative health outcomes (Cohen et al., 2007; Hand et al., 2006; Keiser et al., 2010; Lewis et al., 2015; Lopes et al., 2012; McIntosh & Rosselli, 2012; Owe-Larsson et al., 2009; Rubin et al., 2015; Weinstein & Li, 2016). Previous smoking cessation studies among PLWH suggest that specialized approaches may be needed to address tobacco cessation among PLWH who smoke (Hatleberg et al., 2017; Holloway & Boccara, 2017; van Zoest et al., 2017).

Adding to the complexity, smoking among PLWH has been associated with other addictive behaviors, e.g., cocaine and alcohol use (O'Cleirigh et al., 2015; Pacek et al., 2014), which increase risk of mortality (Hutton et al., 2017; Rubin et al., 2015), and the likelihood to successfully quit smoking may be inhibited by mental health issues (Pool et al., 2014). In addition among a general population, the rate of smoking when combined with other substances is significantly higher relative to smoking rates among nonsubstance users (Barrett et al., 2006) and depression is also often comorbid with substance use and may contribute to cardiovascular disease (CVD) risk (Avenevoli et al., 2015; Van Der Kooy et al., 2007). More specially, cocaine use is a particularly important substance to consider given its linkages with cardiovascular health (Kim & Park, 2019), as well as findings which suggest that cigarette smoking may be used by cocaine users in order to enhance the cocaine's effects (Brewer et al., 2013).

Previous studies have investigated the relationship between tobacco and perceived stress in the general population, with one large study of 2,376 finding that everyday discrimination was associated with indicators of nicotine dependence and another study of 592 finding that seven of the 11 stressor domains were associated with increased smoking likelihood (Kendzor et al., 2014; Slopen et al., 2012). Despite these more general studies related to stress and smoking, little information exists regarding the interrelationship between cigarette smoking, substance use, and mental well-being among PLWH.

This study examined HIV infection, cocaine use, depression, and perceived stress in predicting cigarette smoking. It was hypothesized that 1) depression would be highest among cocaine users 2) depression would be associated with cigarette smoking, and 3) smoking rates would differ among cocaine users and PLWH. Exploratory analyses were conducted including stress which was predicted to be positively associated with cigarette use.

METHODS

Participants and procedures

The study was approved by the University of Miami Miller School of Medicine Institutional Review Board (IRB number 20130988). Data was drawn from a larger study investigating cardiovascular disease, HIV, and cocaine use among adults in the Miami area (Jones et al., 2017). All study participants provided written informed consent before participation and were recruited from December 2014 to August 2017. All candidates enrolled were between 18 and 50 years of age. Candidates meeting the following criteria were *excluded*: Current diagnosis of CVD, hypertension, diabetes, myocardial infarction, bypass surgery or angioplasty, transient ischemic attacks, and currently taking lipid lowering drugs or statins. In the current study, participants were grouped based on their HIV status and cocaine use into four categories, cocaine using PLWH (HIV⁺COC⁺), non-cocaine using PLWH (HIV⁺COC⁻), HIV-uninfected cocaine users (HIV⁻COC⁺) and HIV-uninfected non-cocaine users (HIV⁻COC⁻). If participants had detectable arterial plaque at baseline, they were invited back for a one-year and two-year follow-up visits.

Measures

Demographics—Demographics characteristics assessed included education, age, sex, current employment status, monthly personal income, HIV status.

Cigarette Smoking—Smoking status was assessed by self-report, coded yes/no for smoking. It asked, “Do you smoke cigarettes?” Participants were also asked to provide the approximate number of cigarettes smoked every day. This question asked, “How many cigarettes do you smoke per day?”

Cocaine (COC) use—Cocaine use was assessed by using the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV), non-patient version (SCID-IV-NP) (First et al., 1997). This measure uses a series of

questions to assess a wide range of drug use behaviors. Current cocaine use was coded as yes or no, and based on use in the past three months.

Depression—The Center for Epidemiologic Scale for Depression (CES-D) (Radloff, 1977) was used to assess depression. The CES-D is a 20 item self-report questionnaire which assesses symptoms of depression in the previous week. Each item is scored from 0 (symptom present rarely or none of the time or less than 1 day in the past week) to 3 (most or all of the time or 5 to 7 days of the past week). The total scale score ranged from 0 to 60, and was used. At baseline, the CES-D demonstrated excellent internal consistency ($\alpha = .92$).

Perceived Stress—The Perceived Stress Scale (PSS) (Cohen & Williamson, 1988) was used to measure global perception of stress during the previous month. The PSS is a 10 item instrument which assesses perceived general stress using a 5-point Likert scale quantifying how often the participant felt stressed or thought about a particular stressor over the past one month (0 = *never*; 1 = *almost never*; 2 = *sometimes*; 3 = *fairly often*; and 4 = *very often*). A total PSS score was computed by summing across all ten items and used for analyses. The PSS was added to the study after study onset as an additional assessment given to all participants at baseline and each subsequent visit; the first instance of the PSS administration was used in the analyses outlined below. The internal consistency of the first instance of each participant's PSS was good ($\alpha = .8$).

Analytic Plan

Descriptive statistics were used to describe the demographic variables collected in this study. Statistical analyses were conducted using SPSS and R version 3.6 with the “conover.test” package. Smoking behavior at baseline in the study was examined as both a dichotomous item and a continuous item for number of cigarettes smoked per day. If participants indicated smoking more than 0 cigarettes per day or indicated being current smokers, their current smoking status was coded as “Yes.” Models were run using HIV and cocaine status as main effects, and an interaction term between HIV status and cocaine use and total depression score on the CES-D as a covariate. To test the first hypothesis, an ANOVA with post-hoc tests was used to determine if groups significantly differed with respect to their levels of depression. Generalized linear models (GLMs) were used with robust standard errors, and a log link and negative binomial family (continuous outcome) or logit link and binomial family (dichotomous outcome) (Agresti, 2013) to examine depression (hypotheses 2), HIV status, and cocaine use (hypothesis 3) on cigarette smoking. Smoking was treated as the response category for logistic models.

For an exploratory analysis examining PSS, the first instance of the PSS being administered to participants was used in the analyses. Participants' responses for depression and smoking (status and number of cigarettes smoked) were matched to that first PSS timepoint for analysis. As the PSS was incorporated later into the study, observations were limited, and the interaction term had to be dropped due to sample size considerations. A non-parametric Kruskal-Wallis test was used to determine if the four groups differed on perceived stress (Kruskal & Wallis, 1952) with Conover-Iman tests for post-hoc comparisons (Conover & Iman, 1979). GLMs were then run on smoking status including PSS as well.

RESULTS

Table 1 and 2 provide demographic and key study variable information for the overall sample and by group.

Depression Among Study Groups

An ANOVA was conducted between study groups with depression as an outcome. The results revealed that there was a significant difference between the groups $F(3, 508) = 52.9$, $p < .001$. Using a Games-Howell post-hoc correction it was found that the HIV⁻COC⁻ group had significantly lower levels of depressive symptomatology compared to the HIV⁺COC⁻ ($p = .002$), HIV⁺COC⁺ ($p < .001$), and HIV⁻COC⁺ ($p < .001$) groups. Furthermore the HIV⁺COC⁻ group had significantly lower levels of depressive symptomatology compared to both the HIV⁺COC⁺ ($p < .001$) and HIV⁻COC⁺ ($p < .001$) groups. Finally, no significant difference was found between the HIV⁻COC⁺ and HIV⁺COC⁺ ($p = .809$) groups. Table 2 contains group means, and Table 3 displays all post-hoc comparisons.

Current Smoking

Within the overall model fit on 512 observations ($\chi^2(4) = 130.3$, $p < .001$), cocaine use ($\chi^2(1) = 77.16$, $p < .001$) and the interaction term between HIV status and cocaine use ($\chi^2(1) = 6.33$, $p = .012$) predicted smoking. It was found by examining the exponentiated coefficient that non-cocaine users were approximately 78.4% less likely to smoke compared to those who used cocaine on average ($b = -1.53$, $SE = 0.31$, $p < .001$), and compared to the HIV⁺ COC⁺ group the HIV⁻COC⁻ individuals were less likely to smoke ($b = -1.31$, $SE = 0.45$, $p = .012$). Full model results can be found in table 4.

Smoking Intensity Based on Number of Cigarettes Smoked Per Day

Within the overall model ($\chi^2(4) = 64.43$, $p < .001$), cocaine use predicted number of cigarettes smoked per day ($\chi^2(1) = 73.13$, $p < .001$). It was found that non-cocaine users smoked less cigarettes than cocaine users on average ($b = -1.06$, $SE = 0.21$, $p < .001$). Full model results can be found in table 4.

Exploratory Perceived Stress Analyses

A total of 75 participants completed perceived stress assessments at some timepoint in the study. Based on the first PSS recorded, 29 (38.7%) came from the baseline visit, 15 (20%) from the second visit, and 31 (41.3%) from the third visit. The overall mean of 18.96 ($Median = 20$; $SD = 7.35$) on the PSS indicated moderate perceived stress. Differences between individuals who completed and did not complete the PSS can be found in table 5.

Group Differences—First, non-parametric Mann-Whitney tests were used to examine potential differences in PSS between those with ($n = 56$) and without ($n = 19$) HIV ($U = 516$, $z = -0.2$, $p = .845$) and cocaine users ($n = 45$) and non-users ($n = 30$) ($U = 419.5$, $z = -2.77$, $p = .006$). The mean rank of the cocaine users was 43.68 and the mean rank of the non-cocaine users was 29.48. The median PSS for cocaine users was 22, and the median PSS for non-cocaine users was 17.

A non-parametric Kruskal-Wallis test was used to compare differences in perceived stress by the combination of HIV and cocaine groups. Results indicated differences between the groups ($\chi^2(3) = 8.92, p = .03$). Table 6 displays sample sizes, means, medians, and mean ranks for each group. Perceived stress was the highest among both cocaine using groups. Without adjustments for multiple comparisons, differences on perceived stress were found between the HIV⁺COC⁻ and HIV⁺COC⁺ groups ($t(71) = -2.16, p = .017$), the HIV⁺COC⁻ and HIV⁻COC⁺ groups ($t(71) = -2.4, p = .01$), and the HIV⁻COC⁻ and HIV⁻COC⁺ groups ($t(71) = -2.24, p = .014$). When correcting for multiple comparisons, differences on the post-hoc comparisons were no longer found.

Current Smoking—Within the model ($\chi^2(4) = 26.07, p < .001$), only the factor for cocaine use predicted likelihood of smoking ($\chi^2(1) = 17.12, p < .001$). It was found examining the exponentiated coefficient that non-cocaine users were approximately 95.4% less likely to smoke than cocaine users on average ($b = -3.07, SE = 0.74, p < .001$). Full model results can be found in table 7.

Number of Cigarettes Smoked Per Day—Within the model ($\chi^2(4) = 16.7, p = .002$), the factors for cocaine use ($\chi^2(1) = 23.02, p < .001$) and HIV status ($\chi^2(1) = 4.27, p = .039$) predicted number of cigarettes smoked per day. It was found that non-cocaine users smoked fewer cigarettes per day on average ($b = -1.56, SE = 0.33, p < .001$) and non-HIV infected individuals smoked more cigarettes per day on average ($b = 0.77, SE = 0.37, p = .039$). Full model results can be found in table 7.

DICUSSION

This study examined the association of HIV, cocaine use, depression, and stress on cigarette smoking. Overall, cocaine use was the greatest predictor of current cigarette smoking and smoking intensity, among PLWH and without. Contrary to hypotheses, perceived stress and depression did not predict cigarette smoking in this sample, although perceived stress was also highest among cocaine users. As anticipated, rates of smoking were high among PLWH ($n_{HIV} = 210$; $n_{HIV\&Smoking} = 118$; 56.2%) and extremely high among cocaine users, both PLWH and without (74.3% and 87.1%, respectively). Interestingly, smoking prevalence was similar among non-cocaine users regardless of HIV infection (29.9% HIV⁻, 36.6% HIV⁺), and smoking rates among PLWH were in line with previous research (Pacek & Cioe, 2015). This high rate of smoking prevalence found in some groups was more in line with estimates for homeless individuals (Connor et al., 2002), and may reflect unstable housing which was endorsed by some participants in this sample. This socio-economic influence may be one reason for why the smoking rate in the HIV⁻COC⁻ group's smoking rate of 29.9% was found to higher than the general population, as 8.5% ($n = 17$) of this group reported either living in a homeless shelter or on the street.

Our results suggest higher levels of depression and stress in this particularly socio-economically disadvantaged sample occur among cocaine users, irrespective of HIV status. Previous studies have found perceived stress and depression to be higher among PLWH (Keiser et al., 2010; Lopes et al., 2012; Owe-Larsson et al., 2009; Williams et al., 2017) and depression has previously been associated with anxiety. However, rates of perceived stress in

this study were similar among both non-cocaine users, irrespective of HIV status, suggesting that perceived stress levels were common to both populations.

Overall, study outcomes suggest significant challenges exist for smokers living with HIV who desire to quit smoking, and that cocaine use may be a significant deterrent to quitting due to the potential that cocaine may promote cigarette cravings and cigarettes may enhance the pleasure of cocaine (Brewer et al., 2013). PLWH may not be aware of the added health impact of smoking in combination with HIV (Helleberg et al., 2015; Hessol et al., 2014; Mataftsi et al., 2011; Ramin et al., 2008; Sroussi & Epstein, 2007; Weber et al., 2013), or this knowledge may be a necessary but not sufficient condition of quitting.

Tailored smoking cessation programs are needed for PLWH which include information on the unique challenges and consequences of smoking in this population. Ledgerwood and Yskes (2016) note in their review of the literature of smoking cessation programs for PLWH that there is little in the way of clinical trials, and more needs to be done to expand smoking cessation programs to different treatment settings. The syndemic of substance use and psychiatric disorders interacting with HIV (Pool et al., 2014) also highlights the need for specialized approaches to smoking cessation for PLWH (Hattleberg et al., 2017; Holloway & Boccara, 2017; van Zoest et al., 2017). Multiple health behavior change (MHBC) interventions that leverage the interconnectedness of many health behaviors to change more than one at a time (Noar et al., 2008; Prochaska et al., 2008), have shown promise in changing certain risk factors, such as by incorporating smoking cessation elements into addiction treatment programs (Prochaska & Prochaska, 2011), and may be more cost effective (Edington, 2001).

Results of this study are limited by the cross-sectional design, the use of self-report in the assessment of both smoking and cocaine use, and the small sample size and low statistical power in the exploratory analysis of perceived stress. Generalizability may also be limited by geographic and socio-economic factors reflected in our sample. Future studies should continue examining the relationship between perceived stress, depression, and cigarette smoking in the context of HIV infection and cocaine use, and explore interventions targeting multiple risk behaviors.

In conclusion, this study examined the association between perceived stress and depression and cigarette smoking in the context of HIV serostatus and cocaine use. Findings indicated perceived stress and depression did not predict cigarette smoking in this sample. Cocaine use was the primary predictor of both current smoking, and smoking intensity. Results of this study strongly support research on the development and testing of combination interventions targeting smoking cessation and cocaine use among this highly vulnerable population of PLWH.

Acknowledgments

Sources of Funding and Conflicts of Interest: This work was supported by NIDA/NIH under Grant R01DA034589, and with support from the Miami Center for AIDS Research, NIAID/NIH under Grant P30AI073061. The authors declare that there is no conflict of interest.

References

- Agresti A. (2013). Categorical data analysis (3rd ed. ed.). Hoboken, New Jersey : Wiley-Interscience.
- Avenevoli S, Swendsen J, He J-P, Burstein M, & Merikangas KR (2015). Major Depression in the National Comorbidity Survey–Adolescent Supplement: Prevalence, Correlates, and Treatment. *Journal of the American Academy of Child & Adolescent Psychiatry*, 54(1), 37–44.e32. 10.1016/j.jaac.2014.10.010
- Barrett SP, Darredeau C, & Pihl RO (2006). Patterns of simultaneous polysubstance use in drug using university students. *Human Psychopharmacology: Clinical and Experimental*, 21(4), 255–263. 10.1002/hup.766 [PubMed: 16783813]
- Brewer AJ 3rd, Mahoney JJ 3rd, Nerumalla CS, Newton TF, & De La Garza R 2nd, (2013). The influence of smoking cigarettes on the high and desire for cocaine among active cocaine users. *Pharmacol Biochem Behav*, 106, 132–136. 10.1016/j.pbb.2013.03.008 [PubMed: 23541494]
- Brown MJ, Serovich JM, Laschober TC, Kimberly JA, & Lescano CM (2019). Ways of coping and HIV disclosure among people living with HIV: mediation of decision self-efficacy and moderation by sex. *AIDS Care*, 31(8), 1001–1010. 10.1080/09540121.2019.1605045 [PubMed: 30974958]
- Cohen S, Janicki-Deverts D, & Miller GE (2007). Psychological stress and disease. *JAMA*, 298(14), 1685–1687. 10.1001/jama.298.14.1685 [PubMed: 17925521]
- Cohen S, & Williamson GM (1988). Perceived stress in a probability sample of the United States In Oskamp SSS (Ed.), *The social psychology of health: Claremont Symposium on Applied Social Psycholog* (pp. 31–67). Thousand Oaks, California: Sage Publishing.
- Connor SE, Cook RL, Herbert MI, Neal SM, & Williams JT (2002). Smoking Cessation in a Homeless Population. *Journal of general internal medicine*, 17(5), 369–372. 10.1046/j.1525-1497.2002.10630.x [PubMed: 12047734]
- Conover WJ, & Iman RL (1979). On multiple-comparisons procedures (Vol. LA-7677-MS). Los Alamos Scientific Laboratory.
- Creamer M, Wang T, Babb S, Cullen K, Day H, Willis G, Jamal A, & Neff L. (2019). Tobacco Product Use and Cessation Indicators Among Adults - United States, 2018. *MMWR. Morbidity and Mortality Weekly Report*, 68(45), 1013–1019. 10.15585/mmwr.mm6845a2
- Edington DW (2001). Emerging Research: A View from One Research Center. *American Journal of Health Promotion*, 15(5), 341–349. 10.4278/0890-1171-15.5.341 [PubMed: 11502015]
- Ellis WL (2012). Perceived Stress Levels Among HIV/AIDS-Infected Mothers: The Role of Over-the-Counter Products. *Social Work in Health Care*, 51(9), 850–867. 10.1080/00981389.2012.699022 [PubMed: 23078015]
- Feng M-C, Feng J-Y, Yu C-T, Chen L-H, Yang P-H, Shih C-C, & Lu P-L (2015). Stress, needs, and quality of life of people living with human immunodeficiency virus/AIDS in Taiwan. *Kaohsiung Journal of Medical Sciences*, 31(9), 485–492. 10.1016/j.kjms.2015.07.003 [PubMed: 26362962]
- First MB, Spitzer RL, Gibbon M, & Williams JB (1997). User’s guide for the Structured clinical interview for DSM-IV axis I disorders SCID-I: clinician version. Washington, DC : American Psychiatric Association Publishing
- Hand GA, Phillips KD, & Dudgeon WD (2006). Perceived stress in HIV-infected individuals: Physiological and psychological correlates. *AIDS Care*, 18(8), 1011–1017. 10.1080/09540120600568376 [PubMed: 17012093]
- Hatleberg IC, Lundgren DJ, & Ryom DL (2017). Are we successfully managing cardiovascular disease in people living with HIV? *Current Opinion in HIV and AIDS*, 12(6), 594–603. 10.1097/COH.0000000000000417 [PubMed: 28832368]
- Helleberg MT, Afzal S, Kronborg G, Larsen CS, Pedersen G, Pedersen C, Gerstoft J, Nordestgaard BG, & Obel N. (2013). Mortality attributable to smoking among HIV-1 infected individuals: a nationwide, population-based cohort study. *Clinical Infectious Diseases*, 56(5), 727–734. 10.1093/cid/cis933 [PubMed: 23254417]
- Helleberg MT, May MM, Ingle SC, Dabis F, Reiss P, Fätkenheuer G, Costagliola D, D’arminio A, Cavassini M, Smith C, Justice A, Gill J, Sterne J, & Obel N. (2015). Smoking and life expectancy among HIV-infected individuals on antiretroviral therapy in Europe and North America. *AIDS*, 29(2), 221–229. 10.1097/QAD.0000000000000540 [PubMed: 25426809]

- Hessol NA, Weber KM, D'souza G, Burton D, Young M, Milam J, Murchison L, Gandhi M, & Cohen MH (2014). Smoking Cessation and Recidivism in the Women's Interagency Human Immunodeficiency Virus Study. *American Journal of Preventive Medicine*, 47(1), 53–69. 10.1016/j.amepre.2014.02.010 [PubMed: 24746376]
- Holloway JC, & Boccard JF (2017). HIV-related cardiovascular disease: closing the gap in mortality. *Current Opinion in HIV and AIDS*, 12(6), 509–512. 10.1097/COH.0000000000000420 [PubMed: 28984701]
- Hutton H, Lesko CR, Chander G, Lau B, Wand GS, & McCaul ME (2017). Differential effects of perceived stress on alcohol consumption in moderate versus heavy drinking HIV-infected women. *Drug and Alcohol Dependence*, 178, 380–385. 10.1016/j.drugalcdep.2017.05.021 [PubMed: 28704766]
- Jones DL, Rodriguez VJ, Alcaide ML, Barylski N, Cabral D, Rundek T, Weiss SM, & Kumar M. (2017). Subclinical Atherosclerosis Among Young and Middle-Aged Adults Using Carotid Intima-Media Thickness Measurements. *Southern Medical Journal*, 110(11), 733–737. 10.14423/SMJ.0000000000000728. [PubMed: 29100226]
- Keiser O, Spoerri A, Brinkhof MWG, Hasse B, Gayet-Ageron A, Tissot F, Christen A, Battegay M, Schmid P, Bernasconi E, & Egger M. (2010). Suicide in HIV-Infected Individuals and the General Population in Switzerland, 1988–2008. *American Journal of Psychiatry*, 167(2), 143–150. 10.1176/appi.ajp.2009.09050651 [PubMed: 20008942]
- Kendzor DE, Businelle MS, Reitzel LR, Rios DM, Scheuermann TS, Pulvers K, & Ahluwalia JS (2014). Everyday Discrimination Is Associated With Nicotine Dependence Among African American, Latino, and White Smokers. *Nicotine & Tobacco Research*, 16(6), 633–640. 10.1093/ntr/ntt198 [PubMed: 24302634]
- Kim ST, & Park T. (2019). Acute and Chronic Effects of Cocaine on Cardiovascular Health. *Int J Mol Sci*, 20(3), 584. 10.3390/ijms20030584
- King RM, Vidrine DJ, Danysh HE, Fletcher FE, McCurdy S, Arduino RC, & Gritz ER (2012). Factors associated with nonadherence to antiretroviral therapy in HIV-positive smokers. *AIDS patient care and STDs*, 26(8), 479–485. 10.1089/apc.2012.0070 [PubMed: 22612468]
- Kirk GD, Merlo C, O' Driscoll P, Mehta SH, Galai N, Vlahov D, Samet J, & Engels EA (2007). HIV infection is associated with an increased risk for lung cancer, independent of smoking. *Clin Infect Dis*, 45(1), 103–110. 10.1086/518606 [PubMed: 17554710]
- Kruskal WH, & Wallis WA (1952). Use of Ranks in One-Criterion Variance Analysis. *Journal of the American Statistical Association*, 47(260), 583–621. 10.1080/01621459.1952.10483441
- Ledgerwood DM, & Ysken R. (2016). Smoking Cessation for People Living With HIV/AIDS: A Literature Review and Synthesis. *Nicotine Tob Res*, 18(12), 2177–2184. 10.1093/ntr/ntw126 [PubMed: 27245237]
- Lewis J, Abramowitz S, Koenig LJ, Chandwani S, & Orban L. (2015). Negative life events and depression in adolescents with HIV: a stress and coping analysis. *AIDS Care*, 27(10), 1265–1274. 10.1080/09540121.2015.1050984 [PubMed: 26313848]
- Lifson AR, Neuhaus J, Arribas JR, van den Berg-Wolf M, Labriola AM, & Read TRH (2010). Smoking-related health risks among persons with HIV in the strategies for management of antiretroviral therapy clinical trial. *The American Journal of Public Health*, 100(10), 1896–1903. 10.2105/AJPH.2009.188664 [PubMed: 20724677]
- Lopes M, Olfson M, Rabkin J, Hasin DS, Alegría AA, Lin K-H, Grant BF, & Blanco C. (2012). Gender, HIV status, and psychiatric disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *The Journal of clinical psychiatry*, 73(3), 384–391. 10.4088/JCP.10m06304 [PubMed: 22053858]
- Mataftsi M, Skoura L, & Sakellari D. (2011). HIV infection and periodontal diseases: an overview of the post-HAART era. *Oral diseases*, 17(1), 13–25. 10.1111/j.1601-0825.2010.01727.x [PubMed: 21029260]
- McIntosh R, & Rosselli M. (2012). Stress and Coping in Women Living with HIV: A Meta-Analytic Review. *AIDS and Behavior*, 16(8), 2144–2159. 10.1007/s10461-012-0166-5 [PubMed: 22434282]

- Moskowitz JT, Hult JR, Bussolari C, & Acree M. (2009). What Works in Coping With HIV? A Meta-Analysis With Implications for Coping With Serious Illness. *Psychological Bulletin*, 135(1), 121–141. 10.1037/a0014210 [PubMed: 19210056]
- Noar SM, Chabot M, & Zimmerman RS (2008). Applying health behavior theory to multiple behavior change: Considerations and approaches. *Preventive Medicine*, 46(3), 275–280. 10.1016/j.ypmed.2007.08.001 [PubMed: 17825898]
- O’Cleirigh C, Valentine SE, Pinkston M, Herman D, Bedoya CA, Gordon JR, & Safren SA (2015). The unique challenges facing HIV-positive patients who smoke cigarettes: HIV viremia, ART adherence, engagement in HIV care, and concurrent substance use. *AIDS Behav*, 19(1), 178–185. 10.1007/s10461-014-0762-7 [PubMed: 24770984]
- Owe-Larsson B, Säll L, Salamon E, & Allgulander C. (2009). HIV infection and psychiatric illness. *African journal of psychiatry*, 12(2), 115–128. 10.4314/ajpsy.v12i2.43729 [PubMed: 19582313]
- Pacek LR, & Cioe PA (2015). Tobacco Use, Use Disorders, and Smoking Cessation Interventions in Persons Living With HIV. *Current HIV/AIDS Reports*, 12(4), 413–420. 10.1007/s11904-015-0281-9 [PubMed: 26391516]
- Pacek LR, Harrell PT, & Martins SS (2014). Cigarette smoking and drug use among a nationally representative sample of HIV-positive individuals. *Am J Addict*, 23(6), 582–590. 10.1111/j.1521-0391.2014.12145.x [PubMed: 25065609]
- Pool ERM, Dogar O, & Siddiqi K. (2014). Interventions for tobacco use cessation in people living with HIV and AIDS. *Cochrane Database of Systematic Reviews*, 2014(5). 10.1002/14651858.CD011120
- Prochaska JJ, & Prochaska JO (2011). A Review of Multiple Health Behavior Change Interventions for Primary Prevention. *American Journal of Lifestyle Medicine*, 5(3), 208–221. 10.1177/1559827610391883
- Prochaska JJ, Spring B, & Nigg CR (2008). Multiple health behavior change research: An introduction and overview. *Preventive Medicine*, 46(3), 181–188. 10.1016/j.ypmed.2008.02.001 [PubMed: 18319098]
- Radloff LS (1977). The CES-D Scale: A Self-Report Depression Scale for Research in the General Population. *Applied Psychological Measurement*, 1(3), 385–401. 10.1177/014662167700100306
- Ramin B, Kam D, Feleke B, Jacob B, & Jha P. (2008). Smoking, HIV and non-fatal tuberculosis in an urban African population. *Int J Tuberc Lung Dis*, 12(6), 695–697. [PubMed: 18492341]
- Rubin L, Cook J, Weber K, Cohen M, Martin E, Valcour V, Milam J, Anastos K, Young M, Alden C, Gustafson D, & Maki P. (2015). The association of perceived stress and verbal memory is greater in HIV-infected versus HIV-uninfected women. *Journal of NeuroVirology*, 21(4), 422–432. 10.1007/s13365-015-0331-5 [PubMed: 25791344]
- Shirley DK, Kaner RJ, & Glesby MJ (2013). Effects of smoking on non-AIDS-related morbidity in HIV-infected patients. *Clin Infect Dis*, 57(2), 275–282. 10.1093/cid/cit207 [PubMed: 23572487]
- Shuter J, Bernstein SL, & Moadel AB (2012). Cigarette smoking behaviors and beliefs in persons living with HIV/AIDS. *American journal of health behavior*, 36(1), 75–85. 10.5993/AJHB.36.1.8 [PubMed: 22251785]
- Slopen N, Dutra LM, Williams DR, Mujahid MS, Lewis TT, Bennett GG, Ryff CD, & Albert MA (2012). Psychosocial Stressors and Cigarette Smoking Among African American Adults in Midlife. *Nicotine & Tobacco Research*, 14(10), 1161–1169. 10.1093/ntr/nts011 [PubMed: 22367977]
- Sroussi HY, & Epstein JB (2007). Changes in the pattern of oral lesions associated with HIV infection: implications for dentists. *Journal (Canadian Dental Association)*, 73(10), 949–952. [PubMed: 18275698]
- Van Der Kooy K, van Hout H, Marwijk H, Marten H, Stehouwer C, & Beekman A. (2007). Depression and the risk for cardiovascular diseases: systematic review and meta analysis. *International journal of geriatric psychiatry*, 22(7), 613–626. 10.1002/gps.1723 [PubMed: 17236251]
- van Zoest RA, van den Born BH, & Reiss P. (2017). Hypertension in people living with HIV. *Curr Opin HIV AIDS*, 12(6), 513–522. 10.1097/COH.0000000000000406 [PubMed: 28787286]
- Weber R, Ruppik M, Rickenbach M, Spoerri A, Furrer H, Battegay M, Cavassini M, Calmy A, Bernasconi E, Schmid P, Flepp M, Kowalska J, & Ledergerber B. (2013). Decreasing mortality

and changing patterns of causes of death in the Swiss HIV Cohort Study. *HIV Medicine*, 14(4), 195–207. 10.1111/j.1468-1293.2012.01051.x [PubMed: 22998068]

Weinstein TL, & Li X. (2016). The relationship between stress and clinical outcomes for persons living with HIV/AIDS: a systematic review of the global literature. *AIDS Care*, 28(2), 160–169. 10.1080/09540121.2015.1090532 [PubMed: 26565754]

Williams EC, Joo YS, Lipira L, & Glass JE (2017). Psychosocial stressors and alcohol use, severity, and treatment receipt across human immunodeficiency virus (HIV) status in a nationally representative sample of US residents. *Substance Abuse*, 38(3), 269–277. 10.1080/08897077.2016.1268238 [PubMed: 27925867]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1.

Demographics and Key Study Variables by Group at Baseline (Categorical Variables)

<i>Variable</i>	HIV-COC⁻ (<i>n</i> = 201; 39.3%)	HIV⁺COC⁻ (<i>n</i> = 101; 19.7%)	HIV⁺COC⁺ (<i>n</i> = 109; 21.3%)	HIV-COC⁺ (<i>n</i> = 101; 19.7%)	Total Sample (<i>n</i> = 512)	<i>p</i>
Gender						< .001
Male	102 (50.7%)	35 (34.7%)	45 (41.3%)	74 (73.3%)	256 (50%)	
Female	98 (48.8%)	65 (64.4%)	61 (56%)	26 (25.7%)	250 (48.8%)	
Transgender	1 (0.5%)	1 (1%)	3 (2.8%)	1 (1%)	6 (1.2%)	
Ethnicity						.004
Caucasian	22 (10.9%)	5 (5%)	12 (11%)	18 (17.8%)	57 (11.1%)	
African American	117 (58.2%)	73 (72.3%)	79 (72.5%)	49 (48.5%)	318 (62.1%)	
Haitian	7 (3.5%)	5 (5%)	1 (0.9%)	0 (0%)	13 (2.5%)	
Hispanic/Latino	41 (20.4%)	14 (13.9%)	15 (13.8%)	27 (26.7%)	97 (18.9%)	
Caucasian						
Hispanic/Latino Black	5 (2.5%)	2 (2%)	2 (1.8%)	3 (3%)	12 (2.3%)	
Other	9 (4.5%)	2 (2%)	0 (0%)	4 (4%)	15 (2.9%)	
Employment Status						< .001
Working Full Time	65 (32.3%)	13 (12.9%)	3 (2.8%)	8 (7.9%)	89 (17.4%)	
Working Part Time	33 (16.4%)	13 (12.9%)	7 (6.4%)	16 (15.8%)	69 (13.5%)	
Not Working	100 (49.8%)	73 (72.3%)	99 (90.8%)	76 (75.2%)	348 (68%)	
Volunteering	3 (1.5%)	1 (1%)	0 (0%)	1 (1%)	5 (1%)	
Living Arrangements						< .001
Own House/Apartment	101 (50.2%)	64 (63.4%)	50 (45.9%)	17 (16.8%)	232 (45.3%)	
Someone Else's House	80 (39.8%)	32 (31.7%)	28 (25.7%)	33 (32.7%)	173 (33.8%)	
Squatting/Street	1 (0.5%)	0 (0%)	4 (3.7%)	5 (5%)	10 (2%)	
Treatment Facility or Halfway House	3 (1.5%)	1 (1%)	17 (15.6%)	29 (28.7%)	50 (9.8%)	
Homeless Shelter	16 (8%)	4 (4%)	10 (9.2%)	17 (16.8%)	47 (9.2%)	
Marital Status						.043
Single	144 (71.6%)	69 (68.3%)	76 (69.7%)	72 (71.3%)	361 (70.5%)	
Married	25 (12.4%)	17 (16.8%)	9 (8.3%)	8 (7.9%)	59 (11.5%)	
Divorced	15 (7.5%)	3 (3%)	3 (2.8%)	5 (5%)	26 (5.1%)	
Separated	3 (1.5%)	0 (0%)	5 (4.6%)	6 (5.9%)	14 (2.7%)	
Widowed	0 (0%)	2 (2%)	3 (2.8%)	1 (1%)	6 (1.2%)	
Partner	14 (7%)	10 (9.9%)	13 (11.9%)	9 (8.9%)	46 (9%)	
Income (Monthly)						< .001
\$0 – \$500	76 (37.8%)	35 (34.7%)	48 (44%)	60 (59.4%)	219 (42.8%)	
\$500 – \$1000	57 (28.4%)	54 (53.5%)	54 (49.5%)	31 (30.7%)	196 (38.3%)	
\$1000 – \$5000	64 (31.8%)	12 (11.9%)	7 (6.4%)	6 (5.9%)	89 (17.4%)	
\$5000 – \$10000	2 (1%)	0 (0%)	0 (0%)	2 (2%)	4 (0.8%)	
\$10000+	2 (1%)	0 (0%)	0 (0%)	0 (0%)	2 (0.4%)	

<i>Variable</i>	HIV⁻COC⁻ (<i>n</i> = 201; 39.3%)	HIV⁺COC⁻ (<i>n</i> = 101; 19.7%)	HIV⁺COC⁺ (<i>n</i> = 109; 21.3%)	HIV⁻COC⁺ (<i>n</i> = 101; 19.7%)	Total Sample (<i>n</i> = 512)	<i>p</i>
Smokes Currently	60 (29.9%)	37 (36.6%)	81 (74.3%)	88 (87.1%)	266 (52%)	< .001
Smoked Previously	92 (45.8%)	50 (49.5%)	95 (87.2%)	93 (92.1%)	330 (64.5%)	< .001

* *Note.* *N* = 512 participants were included. 201 were HIV⁻COC⁻ (39.3%), 101 HIV⁺COC⁻ (19.7%), 109 HIV⁺COC⁺ (21.3%), and 101 HIV⁻COC⁺ (19.7%). Variables reported as number (%) falling into group. 1 missing response for employment status, 2 for personal income. P-values are from chi-square tests.

Table 2.

Demographics and Key Study Variables by Group at Baseline (Continuous Variables)

<i>Variable</i>	HIV⁻COC⁻ (<i>n</i> = 201)	HIV⁺COC⁻ (<i>n</i> = 101)	HIV⁺COC⁺ (<i>n</i> = 109)	HIV⁻COC⁺ (<i>n</i> = 101)	Total Sample (<i>n</i> = 512)	<i>p</i>
Age (Years)	34.31 (34; 8.96)	34.57 (36; 10.64)	40.75 (44; 8.66)	36.55 (37; 8.6)	36.18 (37; 9.5)	< .001
Education (Years)	13.12 (12; 2.48)	11.3 (12; 1.91)	11.25 (12; 2.08)	11.73 (12; 1.94)	12.09 (12; 2.35)	< .001
Total Depression Score	8.84 (6; 9.46)	13.54 (11; 10.84)	23.19 (22; 12.72)	21.64 (19; 12.42)	15.35 (12; 12.68)	< .001
Cigarettes Smoked Per Day	2.23 (0; 5.13)	2.76 (0; 5.17)	8.21 (8; 7.86)	10.09 (10; 8.78)	5.17 (1; 7.42)	< .001
Cigarettes Smoked Per Day (Smokers Only; <i>n</i> = 264)	7.56 (6; 7.02)	7.67 (6; 6.08)	11.04 (10; 7.18)	11.58 (10; 8.44)	9.98 (10; 7.63)	< .001

* *Note.* *N* = 512 participants were included. 201 were HIV⁻COC⁻ (39.3%), 101 HIV⁺COC⁻ (19.7%), 109 HIV⁺COC⁺ (21.3%), and 101 HIV⁻COC⁺ (19.7%). Continuous variables presented as *M* (Median; *SD*). 2 missing for number of cigarettes smoked per day. The minimum observed number of cigarettes per day in each group was 0, and the maximum values were 40 (HIV⁻COC⁻), 25 (HIV⁺COC⁻), 30 (HIV⁺COC⁺), and 40 (HIV⁻COC⁺). P-values from Kruskal-Wallis tests.

Table 3.

Games-Howell Post-Hoc Comparisons on Baseline Depression Between Key Study Groups (HIV⁻COC⁻ $n = 201$; HIV⁺COC⁻ $n = 101$; HIV⁺COC⁺ $n = 109$; HIV⁻COC⁺ $n = 101$)

Contrast	Mean Difference	SE	p
HIV ⁻ COC ⁻ vs. HIV ⁺ COC ⁻	-4.7	1.27	.002
HIV ⁻ COC ⁻ vs. HIV ⁺ COC ⁺	-14.35	1.39	< .001
HIV ⁻ COC ⁻ vs. HIV ⁻ COC ⁺	-12.8	1.4	< .001
HIV ⁺ COC ⁻ vs. HIV ⁺ COC ⁺	-9.65	1.63	< .001
HIV ⁺ COC ⁻ vs. HIV ⁻ COC ⁺	-8.1	1.64	< .001
HIV ⁻ COC ⁺ vs. HIV ⁺ COC ⁺	-1.55	1.74	.809

* *Note.* Depression was measured using the CES-D. Groups are represented by HIV serostatus and cocaine use status.

Table 4.

GEEs Examining Baseline Depression, Cocaine Use, and HIV Status on Smoking and Number of Cigarettes

Model/Variables	<i>b</i>	<i>SE</i>	95% CI	χ^2	<i>p</i>
Smoking (Yes/No)					
Intercept	0.87	0.3	[0.28 1.46]	8.45	.004
HIV Status (HIV-)	0.86	0.37	[0.13 1.59]	5.39	.02
Cocaine Use (Non-Users)	-1.53	0.31	[-2.15 -0.92]	23.99	<.001
HIV Status x Cocaine Use (HIV- Non-Users)	-1.13	0.45	[-2.01 -0.25]	6.33	.012
Depression	0.01	0.01	[-0.01 0.03]	0.95	.331
Smoking (Number of Cigarettes Per Day)					
Intercept	2.04	0.17	[1.71 2.37]	149.44	<.001
HIV Status (HIV-)	0.22	0.13	[-0.03 0.47]	2.88	.09
Cocaine Use (Non-Users)	-1.06	0.21	[-1.47 -0.65]	25.74	<.001
HIV Status x Cocaine Use (HIV- Non-Users)	-0.42	0.28	[-0.96 0.13]	2.25	.134
Depression	0.003	0.01	[-0.01 0.01]	0.20	.654
Negative Binomial	2.94	0.26			

* Note. GEEs fit using robust standard errors. Model examining dichotomous smoking used a logit link and binomial family. Model examining number of cigarettes per day used a log link and negative binomial family. The reference group for HIV status was PLWH, the reference group for cocaine use was cocaine users, and the reference group for the interaction term were PLWH who used cocaine (interaction term entered for HIV-non-cocaine users). Within the model examining dichotomous smoking, omnibus model tests HIV status ($\chi^2(1) = 1.69, p = .193$) and depressive symptomatology ($\chi^2(1) = 0.95, p = .331$) were not significant. Within the model examining continuous smoking, depressive symptomatology ($\chi^2(1) = 0.2, p = .654$), the main effect for HIV status ($\chi^2(1) = 0.04, p = .948$), and the interaction between HIV status and cocaine use ($\chi^2(1) = 2.25, p = .134$) were not significant.

Table 5.

Baseline Differences Between PSS Completers and Non-Completers

<i>Variable</i>	<i>PSS Completers (n = 75)</i>	<i>PSS Non-Completers (n = 437)</i>	<i>p</i>
Gender			.112
Male	31 (41.3%)	225 (51.5%)	
Female	42 (56%)	208 (47.6%)	
Transgender	2 (2.7%)	4 (0.9%)	
Ethnicity			.008
Caucasian	5 (6.7%)	52 (11.9%)	
African American	60 (80%)	258 (59%)	
Haitian	2 (2.7%)	11 (2.5%)	
Hispanic/Latino Caucasian	5 (6.7%)	92 (21.1%)	
Hispanic/Latino Black	2 (2.7%)	10 (2.3%)	
Other	1 (1.3%)	14 (3.2%)	
Employment Status			.001
Working Full Time	6 (8%)	83 (19%)	
Working Part Time	3 (4%)	66 (15.1%)	
Not Working	66 (88%)	282 (64.7%)	
Volunteering	0 (0%)	5 (1.1%)	
Living Arrangements			.28
Own House/Apartment	36 (48%)	196 (44.9%)	
Someone Else's House	20 (26.7%)	153 (35%)	
Squatting/Street	3 (4%)	7 (1.6%)	
Treatment Facility or Halfway House	10 (13.3%)	40 (9.2%)	
Homeless Shelter	6 (8%)	41 (9.4%)	
Marital Status			.771
Single	49 (65.3%)	312 (71.4%)	
Married	12 (16%)	47 (10.8%)	
Divorced	4 (5.3%)	22 (5%)	
Separated	2 (2.7%)	12 (2.7%)	
Widowed	1 (1.3%)	5 (1.1%)	
Partner	7 (9.3%)	39 (8.9%)	
Income (Monthly)			.028
\$0 – \$500	29 (38.7%)	190 (43.7%)	
\$500 – \$1000	39 (52%)	157 (36.1%)	
\$1000 – \$5000	6 (8%)	83 (19.1%)	
\$5000 – \$10000	1 (1.3%)	3 (0.7%)	
\$10000+	0 (0%)	2 (0.5%)	
Smokes Currently	46 (61.3%)	220 (50.3%)	.081
Smoked Previously	61 (81.3%)	269 (61.6%)	.001
Age (Years)	42.21 (45; 8.43)	35.14 (36; 9.29)	< .001
Education (Years)	11.16 (12; 1.93)	12.25 (12; 2.38)	< .001

<i>Variable</i>	PSS Completers (<i>n</i> = 75)	PSS Non-Completers (<i>n</i> = 437)	<i>p</i>
Total Depression Score	18.61 (16; 13.38)	14.79 (11; 12.48)	.011
Cigarettes Smoked Per Day	6.55 (5; 7.35)	4.93 (0; 7.42)	.02

* *Note.* (*N* = 512). Categorical variables reported as number (%) falling into group. Continuous variables presented as *M* (Median; *SD*). P-values from Fisher's exact tests for categorical variables and Mann-Whitney U tests for continuous variables. 1 missing response for employment status, 2 for personal income, and 2 for daily number of cigarettes smoked.

Table 6.

Perceived Stress Group Medians and Mean Ranks for Kruskal-Wallis Tests Between Key Study Groups
(HIV⁻COC⁻ $n = 201$; HIV⁺COC⁻ $n = 101$; HIV⁺COC⁺ $n = 109$; HIV⁻COC⁺ $n = 101$)

<i>Variable</i>	<i>n</i>	<i>Mean (SD)</i>	<i>Median</i>	<i>Mean Rank</i>
HIV ⁻ COC ⁻	13	16.38 (7.39)	14	29.88
HIV ⁺ COC ⁻	17	16.41 (5.55)	17	29.18
HIV ⁺ COC ⁺	39	20.18 (7.86)	22	42.26
HIV ⁻ COC ⁺	6	23.83 (4.67)	23.5	52.92

* *Note.* Perceived stress was measured using the PSS. Groups are represented by HIV serostatus and cocaine use status.

Table 7.

GEEs Examining Depression, Perceived Stress, Cocaine Use, and HIV Status on Smoking and Number of Cigarettes

Model/Variables	<i>b</i>	<i>SE</i>	95% CI	χ^2	<i>p</i>
Smoking (Yes/No)					
Intercept	2.51	1.28	[0 5.02]	3.85	.05
HIV Status (HIV-)	0.83	0.68	[-0.5 2.16]	1.5	.221
Cocaine Use (Non-Users)	-3.07	0.74	[-4.53 -1.62]	17.12	< .001
Perceived Stress	-0.05	0.06	[-0.17 0.07]	0.75	.386
Depression	0.03	0.03	[-0.02 0.08]	1.2	.274
Smoking (Number of Cigarettes Per Day)					
Intercept	2.58	0.4	[1.8 3.35]	42.22	< .001
HIV Status (HIV-)	0.77	0.37	[0.04 1.5]	4.26	0.039
Cocaine Use (Non-Users)	-1.56	0.33	[-2.2 -0.92]	23.02	< .001
Perceived Stress	-0.04	0.02	[-0.08 0.004]	3.11	0.078
Depression	0.02	0.01	[-0.01 0.04]	1.66	0.197
Negative Binomial	1.16	0.27			

* *Note.* GEEs fit using robust standard errors. Model examining dichotomous smoking used a logit link and binomial family. Model examining number of cigarettes per day used a log link and negative binomial family. The reference group for HIV status was PLWH, and the reference group for cocaine use was cocaine users. Within the model examining dichotomous smoking, omnibus tests revealed neither HIV status ($\chi^2(1) = 1.5$, $p = .221$), perceived stress ($\chi^2(1) = 0.75$, $p = .386$), nor depressive symptomatology ($\chi^2(1) = 1.2$, $p = .274$) were significant. Within the model examining continuous smoking, omnibus tests revealed perceived stress ($\chi^2(1) = 3.11$, $p = .078$) and depressive symptomatology ($\chi^2(1) = 1.67$, $p = .197$) were not significant.