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Loneliness in HIV-infected smokers

Cassandra A. Stanton¹, Alyson B. Moadel², Ryung S. Kim², Andrea H. Weinberger^{3,4}, and Jonathan Shuter⁵

¹Lombardi Comprehensive Cancer Center, Georgetown University Medical Center, Washington, DC

²Department of Epidemiology and Population Health, Albert Einstein College of Medicine, Albert Einstein Cancer Center, Bronx, NY

³Department of Psychiatry, Yale University School of Medicine, New Haven, CT

⁴Cancer Prevention and Control Research Program, Yale Cancer Center, New Haven, CT

⁵AIDS Center and Division of Infectious Diseases, Montefiore Medical Center and the Albert Einstein Cancer Center, Albert Einstein College of Medicine, Bronx, NY

Abstract

Loneliness is common in persons living with HIV (PLWH). Lonely people smoke at higher rates than the general population, and loneliness is a likely contributor to the ongoing smoking epidemic among PLWH. We explored factors associated with loneliness in a cohort of 272 PLWH smokers enrolled in two separate tobacco treatment trials. Loneliness was independently associated with lack of a spouse or partner, lower educational attainment, “other or unknown” HIV exposure category, depression, anxiety, recent alcohol consumption, and higher daily cigarette consumption. Referral to group therapy reduced loneliness whereas referral to an individual web-based tobacco treatment did not.

Keywords

loneliness; HIV; tobacco; cigarette; smoking

INTRODUCTION

Loneliness has been defined as a discrepancy between one’s desired and achieved levels of social connectedness or communality with others which evokes an unpleasant emotional response (Peplau & Perlman, 1982). It has been a key theme of life with AIDS since the beginning of the epidemic, and it remains a major source of distress among persons living with HIV (PLWH) in the current era (Dowd, 1983; Anonymous 2004; Vance, 2006). It is a complex phenomenon related to many factors including depression, social isolation, stigmatization, discrimination, poverty, and physical illness. In the general population, loneliness is deadly. Multiple studies have shown loneliness to be a predictor of early

mortality (Luo, Hawkley, Waite, & Cacioppo, 2012; Shiovitz-Ezra & Ayalon, 2010). The mechanism/s of this effect are probably multifactorial, including adverse behavioral, sociologic, and physiologic concomitants (Luo, Hawkley, Waite, & Cacioppo, 2012). Lonely people also smoke cigarettes at a higher rate than the non-lonely (Lauder, Mummery, Jones, & Caperchione, 2006), and their tobacco use is a likely contributor to their shorter survival.

Cigarette smoking is epidemic in persons living with HIV (PLWH), and it has become a leading, *perhaps the leading*, cause of death in the HAART era (Helleberg et al., 2013). In the realm of tobacco treatment, PLWH are “complicated” smokers from the standpoint of comorbid psychiatric illness and other substance use (Shuter, Bernstein, & Moadel, 2012). Tobacco treatments employing standard approaches, such as motivational interviewing and one-on-one culturally-tailored counseling (Heckman, Eggleston, & Hofmann, 2010; Woodruff, Talavera, & Elder, 2002), have yielded disappointing results in the HIV-infected population (Lloyd-Richardson et al., 2009; Stanton et al., 2013). In our prior work, loneliness was one of the few independent predictors of treatment failure in a study of intensive group cessation therapy for PLWH smokers (Moadel, Bernstein, Mermelstein, Arnsten, Dolce, & Shuter, 2012). A better understanding of loneliness in PLWH smokers may help guide the development of more effective tobacco treatments.

Based on cognitive discrepancy theory (Perlman & Peplau, 1981), loneliness stems from the mismatch between actual and expected quality and frequency of social interaction, sometimes attributable to specific circumstances and/or life events. Behavioral and psychosocial variables that may trigger feelings of loneliness include negative affect (e.g., depression, anxiety), comorbid substance use, and life circumstances unique to the stresses of living with HIV (e.g. disease-related stigma). This study seeks to explore the complex interplay among demographic, behavioral, and sociologic correlates of loneliness in a sample of urban PLWH smokers participating in one of two smoking cessation intervention trials. Changes in loneliness occurring during the course of the tobacco treatment interventions are also examined.

METHODS

Montefiore Medical Center’s Center for Positive Living provides comprehensive HIV-care to over 2,800 individuals in the Bronx, New York. Between 2009 and 2013 we conducted two randomized controlled trials of intensive behavioral cessation interventions, one consisting of live, group therapy and the other a web-based individual program, versus standard care (all subjects were offered nicotine patches). Participants were recruited primarily through referral from their medical care providers in clinic although they could also self-refer in response to flyers in the clinic waiting area. Interested subjects were screened for enrollment by study staff in a nearby research suite, and eligible subjects completed the informed consent process in a private space with a research assistant. Study data were collected using pencil and paper questionnaires in a private area of the research suite, and responses were double-entered into the study databases linked to a study ID number but without any personally identifying information. All aspects of the trials were approved by the Montefiore Medical Center Institutional Review Board.

The inclusion criteria for the studies, published elsewhere (Moadel, Bernstein, Mermelstein, Arnsten, Dolce, & Shuter, 2012; Shuter, Morales, Considine-Dunn, An, & Stanton, in press), were similar: documented HIV infection, receipt of care at the Center for Positive Living, current cigarette smoking, motivation to quit, and no contraindication to nicotine patches. In the second study, there were additional computer/internet access and literacy requirements. Program content was summarized in detail in these prior publications, but, in short, both programs consisted of eight educational/motivational sessions, guided by social cognitive theory, delivered over seven weeks. The program content was thoroughly tailored to address the specific needs and concerns of smokers living with HIV. In both studies, subjects provided sociodemographic information, tobacco use history, and completed a range of behavioral scales (measuring depression, anxiety, self-efficacy, etc.) at the time of enrollment. A complete list of the psychobehavioral scales used has been published elsewhere (Moadel, Bernstein, Mermelstein, Arnsten, Dolce, & Shuter, 2012). The primary smoking outcome for both trials was exhaled carbon monoxide (ECO) verified, seven-day point prevalence abstinence at three months. Loneliness was assessed using a 10-item version of the UCLA Loneliness Index (Valvatne, 2014). Responses to questions probing for feelings of loneliness (e.g. "How often do you feel you have nobody to talk to?") were scored on a four-point scale with 1=never and 4=often. A sum of the scores for all responses was calculated for each subject, with a possible range of 10–40. The loneliness scale was completed at baseline and at day 42 (post-treatment).

For the purpose of the present study, we combined the patient samples from the two treatment trials. For the small group of subjects (N=11) who participated in both trials, only data from the original study were retained for these analyses.

For summary statistics, means and standard deviations were calculated. Cronbach's alpha was calculated for the loneliness scale. To build a predictive model of loneliness, variables were chosen based on univariate analyses including comparisons of means using Student's *t*-test or the Mann-Whitney U-test and bivariate correlation using Spearman's rank-order correlation. Next, multiple linear regression and logistic regression were performed using a backward stepwise methodology serially removing covariates without significant effect on the model and retaining in the final model only those covariates that were associated with the dependent variable at an $\alpha < 0.10$ when adjusted for the other covariates. Statistical analyses were completed using SPSS V18.0.

RESULTS

The final sample consisted of 272 PLWH smokers. Of these, 262 (96.3%) completed the loneliness scale at baseline, and 240 (88.2%) completed it post-treatment. Baseline sociodemographic and behavioral data are presented in Table 1. The mean age of the sample was 47 years, 53% were male, 81% self-identified as Black/African American, 35% self-identified as Latino/a, 35% had attended at least some college, 31% had graduated high school but had not attended any college, and 34% did not complete high school.

The 10-item UCLA Loneliness index demonstrated good internal consistency reliability in our PLWH sample with a Cronbach's $\alpha = 0.92$.

The mean overall loneliness score for the cohort was 23.6 ± 7.8 . Scores ≤ 20 fall in normal range and >30 indicate severe loneliness (Valvatne, 2014). By these criteria, 36.6% of our sample reported loneliness in normal range, while 19.1% reported severe loneliness.

Univariate analyses were conducted to identify factors associated with loneliness at baseline. No association was observed between loneliness score and age, race, ethnicity, gender, or baseline CD4+ lymphocyte count. Factors that were significantly associated with a higher loneliness score included not being married/not living with a partner (24.3 vs. 21.4, $P=0.01$), lack of a high school diploma (25.6 vs. 22.7, $P=0.005$), risk factor for HIV acquisition reported as "Other or Unknown," i.e. not via same-sex sex, heterosexual sex, injection drug use, or transfusion (26.3 vs. 23.3, $P=0.03$), any alcohol consumption in the past 30 days (24.6 vs. 22.7, $P=0.05$), higher motivation to quit smoking ($Rho=0.165$, $P=0.008$), higher nicotine dependence ($Rho=0.186$, $P=0.003$), lower self-efficacy to quit ($Rho=-0.289$, $P<0.001$), higher depression score ($Rho=0.638$, $P<0.001$), higher anxiety score ($Rho=0.507$, $P<0.001$), higher daily cigarette consumption ($Rho=0.144$, $P=0.02$), and higher ECO level ($Rho=0.123$, $P=0.05$).

All variables associated with loneliness score on univariate analyses were entered into a multivariate linear regression model. The covariates that remained after the backward, stepwise removal process were: higher depression score ($\beta=0.52$, $P<0.001$), not being married/not living with a partner ($\beta=0.16$, $P=0.002$), HIV acquisition via other/unknown risk factor ($\beta=0.14$, $P=0.006$), any alcohol consumption in the past 30 days ($\beta=0.10$, $P=0.04$), higher anxiety score ($\beta=0.14$, $P=0.05$), higher daily cigarette consumption ($\beta=0.09$, $P=0.06$), and lack of a high school diploma ($\beta=0.09$, $P=0.06$). The R^2 for the final model was 0.50, indicating that these seven factors accounted for fully half of the variance observed in loneliness scores.

We performed additional analyses to determine whether subjects with severe loneliness ($N=50$) differed sociodemographically from the remainder of the cohort, and we did not detect any differences by age, gender, ethnicity, or race. Logistic regression analysis was conducted with the same 11 covariates included in the multiple linear regression described above. The factors shown to have independent associations with severe loneliness in the final adjusted model were: higher depression score ($OR_{adj}=1.15$ [1.09-1.20], $P<0.001$), higher ECO level ($OR_{adj}=1.03$ [1.01-1.06], $P=0.02$), and HIV acquisition via other/unknown risk factor ($OR_{adj}=3.06$ [1.05-8.87], $P=0.04$).

Finally, we evaluated the change in loneliness score between baseline and day 42 (post-treatment). For the overall cohort, there was a significant decrease in loneliness score on paired-sample analysis between the baseline and post-treatment visit (23.5 vs. 22.6, $P=0.05$). Notably, this difference was driven by a significant decrease in loneliness scores among those randomized to the live group therapy intervention in the earlier study (22.5 vs. 20.4, $P=0.04$), whereas those in the control arms of the studies (24.0 vs. 23.6, $P=0.57$), and those randomized to web-based tobacco treatment in the second study (23.5 vs. 22.3, $P=0.11$) experienced no significant decrease in loneliness.

DISCUSSION

In this study we present a detailed examination of loneliness in a group of PLWH smokers. Discussions of the challenges inherent in tobacco treatment targeting PLWH place particular emphasis on comorbid substance use and psychiatric illness (Nahvi & Cooperman, 2009). These factors are pervasive among PLWH smokers, and they do, indeed, represent barriers to quitting. Other, potentially modifiable factors, such as loneliness, may also play a role but have received lesser attention.

Prior studies have shown relationships between loneliness, affective disorders, chronic illness, poverty, educational attainment, marital status, and alcohol use (Luo, Hawkley, Waite, & Cacioppo, 2012; Immonen, Valvanne, & Pitkale, 2011; Page & Cole, 1991). Although there is evidence to support the existence of a cause and effect relationship between loneliness and depression (Luo, Hawkley, Waite, & Cacioppo, 2012), the actual relationship between loneliness and these various sociobehavioral attributes are certainly complex, and are likely both bidirectional and interactive. We found a similar constellation of factors associated with loneliness in a population of urban PLWH smokers. The multivariate model identified significant associations between loneliness and depression, marital status, “other or unknown” as reported HIV risk factor, alcohol use, anxiety, daily cigarette consumption, and educational attainment, with the first three covariates exhibiting the most statistically significant relationships. The observation that this group of covariates explained 50% of the variance in loneliness score, suggests that, collectively, they are highly influential factors in the loneliness experienced by PLWH smokers. The higher loneliness scores among those not reporting a traditional risk factor for HIV acquisition is interesting. Follow-up interviewing and statistical modeling of a group of PLWH women denying HIV risk behaviors revealed that the vast majority did, in fact, engage in risky sexual or drug use activities (Lansky, Fleming, Byers, Karon, & Wortley, 2001). It is possible that denial of these behaviors reflects a degree of shame and regret that could express itself in social isolation and loneliness. It is also possible that lonely people are less inclined to disclose information about themselves because the act of disclosure promotes personal bonding and intimacy.

Lonely PLWH, despite their high level of depression, were motivated to quit. However, self-confidence in their own ability to quit was low. Tobacco treatment programs targeting PLWH smokers should reinforce the desire to quit among the lonely, and should also provide tools and strategies to foster self-efficacy.

Almost 20% of the cohort met the criterion for severe loneliness. These subjects were not distinct in terms of sociodemographic characteristics from other subjects. Severe loneliness in this group was associated with depression, HIV acquisition via other/unknown risk factor, and higher tobacco consumption as reflected by exhaled carbon monoxide levels.

Repeated measurement of the loneliness score permitted us to assess for change in this parameter between pre- and post-treatment levels in the two tobacco treatment trials. There was a significant decrease in loneliness score for the entire cohort from pre- to post-treatment, and this decrease was driven by the subset of individuals who were randomized to

Positively Smoke Free, an intensive, multisession, live, group-based intervention. Loneliness is a modifiable characteristic (Cohen-Mansfield & Perach, 2014), and it is not surprising that referral to a supportive group program reduced overall loneliness in this patient sample. It is similarly not surprising that referral to a tobacco treatment website without a social component did not affect loneliness scores. There is a growing body of evidence that online social interaction, social networks or web-based support groups, may effectively combat loneliness without the need for travel or physical contact (Deters & Mehl, 2012; Mo & Coulson, 2013). Meta-analytic data support the use of web-based tobacco treatment although results are inconsistent and overall effect sizes are modest (Civljak, Stead, Hartmann-Boyce, Sheikh, & Car, 2013). Our findings suggest that the incorporation of a social networking component into traditional web-based tobacco treatments may be one way to enhance their effectiveness.

The current study had certain limitations. Patients were recruited from a single center in the Bronx, and most belonged to ethnic/racial minority groups. Our findings may not be generalizable to geographically or demographically different populations. There was overlap between some of the measures, e.g. the depression scale had a question probing for loneliness, and the nicotine dependence scale included a measure of daily cigarette consumption. This may have amplified any collinearity present, although the amount of explicit overlap between scales was small. It is also important to point out that this report is not based on a direct comparison of a group versus web-based intervention. However, the findings do suggest that group treatment may offer particular benefits to lonely PLWH smokers, and that web-based treatments targeting such individuals should consider the inclusion of online social support capabilities.

In conclusion, loneliness is a distressing reality for many PLWH. Lonely people smoke more, and loneliness is a likely contributor to the tobacco use epidemic in PLWH. It is a complex characteristic that is intertwined with social factors, depression, anxiety, and alcohol use. HIV care providers should assess for loneliness and provide referrals to address it and to access social support resources. In this study, referral to a live, group therapy tobacco treatment program reduced loneliness in PLWH smokers, whereas referral to a targeted quit-smoking website (without a social component) did not. Tobacco treatment interventions that integrate a social support component may be particularly appropriate for the sizeable subset of PLWH smokers suffering from loneliness.

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Table 1

Baseline characteristics of the combined study cohort.

Characteristic	Result ^a
Age	46.8±8.8
Gender	
Male	144 (53.3%)
Female	123 (45.6%)
Transgender	3 (1.1%)
Ethnicity	
Latino	91 (35.3%)
Non-Latino	167 (64.7%)
Race	
Black/African American	182 (80.5%)
White	36 (15.9%)
American Indian or Alaskan native	8 (3.5%)
HIV risk behavior	
Heterosexual contact	137 (50.9%)
Same sex contact	60 (22.3%)
Injection drug use	26 (9.7%)
Transfusion	8 (3.0%)
Other/unknown	38 (14.1%)
Most recent CD4+ count (cells/ul)	537±320
Daily cigarette consumption	11.4±8.3
Nicotine dependence score ^b	5.0±2.1
Motivation to quit ^c	6.7±1.4
Loneliness score ^d	23.6±7.8

^a Response totals do not equal the cohort size for all items because of incomplete reporting.

^b As measured using the Modified Fagerstrom Tolerance Questionnaire

^c As measured using the Abrams and Biener Readiness to Quit Ladder

^d As measured using the 10-item UCLA Loneliness Index