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Examining Transdiagnostic Vulnerabilities among HIV Positive Smokers Seen at Three Inner City Community Based Organizations

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Abstract

Investigators have proposed a “transdiagnostic vulnerability framework” that examines the relationship between smoking and broader emotional factors, including anhedonia, anxiety sensitivity, and distress tolerance. Because smoking and depression are more common in persons living with HIV and AIDS (PLWHA) than in the general population, understanding the relationship between smoking and mental health is critical. The following study aims to characterize levels of clinically significant depressive symptoms and these broader emotional factors as well as the relationship between these factors and smoking-related variables in a sample of PLWHA. This cross-sectional study employed convenience sampling to survey adult clients who attended one of three AIDS service organizations in New York City. The questionnaires assessed sociodemographic and HIV health care variables, tobacco use, and anxiety- and depression-related constructs. 150 PLWHA completed surveys. Among the 118 smokers, the prevalence of clinically depressive symptoms was 53%. Participants with clinically significant depressive symptoms had significantly higher mean anhedonia scores and anxiety sensitivity scores and lower mean distress tolerance total scores compared to participants without clinically significant depressive symptoms ($p < 0.001$). Smoking cessation treatment for persons with co-morbid psychiatric disorders has been suboptimal and treatment for co-morbid mental health conditions tends to align with disorder-specific treatment. Given that PLWHA are a priority population, further research should address how to best tailor interventions to a group with multiple obstacles to successful tobacco cessation.

Keywords

HIV/AIDS; smoking; depression; emotions; community networks

Introduction:

While life expectancy and health-related quality of life (HRQOL) of persons living with HIV or AIDS (PLWHA) has significantly improved (Samji et al., 2013; Siddiqi, Hall, Hu, & Song, 2016), the prevalence of certain risk behaviors and co-morbid conditions exceeds the general population (Burkhalter, Springer, Chhabra, Ostroff, & Rapkin, 2005; Centers for Disease Control and Prevention, 2016; O’Cleirigh, Magidson, Skeer, Mayer, & Safren, 2015). Compared to the adult general population, PLWHA are more likely to smoke and less likely to quit smoking (Mdodo et al., 2015). Rates of depression among PLWHA also exceed the general population (O’Cleirigh, et al., 2015), and multiple psychiatric conditions are common among PLWHA (Gaynes et al., 2015).

Because of the higher prevalence of smoking and depression among PLWHA and findings that current (as well as history of) depression is an impediment to smoking cessation, understanding the relationship between smoking and mental health is crucial (Weinberger, Mazure, Morlett, & McKee, 2015). Applying research findings in non-HIV-infected populations, Leventhal and Zvolensky proposed a “transdiagnostic vulnerability framework” to better understand the linkage between emotional psychopathology and smoking (Leventhal & Zvolensky, 2015). Instead of emphasizing individual psychiatric syndromes, Leventhal and Zvolensky focused on broader smoking-associated emotional factors, including anhedonia (Anh: tendency to experience reduced happiness, pleasure, and interest in response to rewards); anxiety sensitivity (AS: fear that anxiety symptoms are harmful); and distress tolerance (DT: perceived or actual ability to tolerate emotional and physical distress) (Leyro, Zvolensky, & Bernstein, 2010; Carleton et al., 2013; Reiss & McNally, 1985). Specifically, Anh magnifies smoking’s pleasure enhancing properties, AS magnifies smoking’s anxiety reduction effects, and poor DT magnifies smoking’s distress-terminating effects. (Leventhal & Zvolensky, 2015)

Similar emotional vulnerabilities may impact the management of HIV and smoking, but, to date, no studies have examined these vulnerabilities in PLWHA smokers or assessed the relationship between these vulnerabilities and depressive symptoms in PLWHA. In the literature, higher AS is a predictor of greater HIV symptom severity. (Leyro, Vujanovic, & Bonn-Miller, 2015). For DT, there is a more complex relationship, as lower levels of DT have been associated with poorer retroviral adherence (Leyro, et al., 2015) while high self-reported DT has been associated with a *decreased* likelihood of antiretroviral therapy use (Magidson et al., 2013).

Little is known about effective tobacco cessation treatments for PLWHA (Niaura, Chander, Hutton, & Stanton, 2012). Because cessation interventions have yielded modest results, transdiagnostic factors may serve as potential targets for future interventions. This study examined and characterized levels of transdiagnostic factors and their relationship with the smoking-related variables of smoking rate, level of nicotine dependence, and quit attempts

in a sample of PLWHA. We hypothesized that clinically significant depressive symptoms would be associated with greater levels of Anh and AS, and lower levels of DT, and that smoking-related constructs of quitting motivation, quitting self-efficacy, and prior quit attempts would be associated with a higher DT and lower levels of AS and Anh.

Methods:

Sample:

This cross-sectional study employed convenience sampling to survey adult clients attending one of three New York City (NYC) community-based AIDS service organizations (ASOs) during April-August, 2015. These ASOs provided diverse services, e.g., psychosocial and educational services, food pantries, and substance abuse treatment. Recruitment occurred in each site's client waiting areas, was scheduled on high-volume days of client attendance for services, and did not specifically target tobacco users. All ASOs had worked with the investigators in past collaborations.

The questionnaires assessed sociodemographic and HIV health care variables, tobacco use, and anxiety- and depression-related constructs using validated survey measure items (Centers for Disease Control and Prevention, 2014). A trained research study assistant administered the measures and participants completed the remaining questions without assistance, unless requested. The study questionnaire was only available in English. No identifying information was collected. Participants were compensated with \$50 upon questionnaire completion. The research study was approved as exempt by the institutional review boards at Memorial Sloan Kettering Cancer Center, GMHC, and The City College of New York.

Measures:

Center for Epidemiologic Studies Depression Scale.—CES-D is a 20-item measure assessing symptoms of depression. Ratings are based on a 4-point Likert scale ranging from 0 (rarely or none of the time) to 3 (most or all the time). CES-D scores of ≥ 16 are considered at risk for clinical depression (Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). Global Anhedonia (Anh) scores are measured with CES-D items that assess reduced happiness and life enjoyment (items 4, 8, 12, and 16). (Carleton et al., 2013; Radloff, 1977).

Anxiety Sensitivity Index.—The Anxiety Sensitivity Index (ASI-3) is an 18-item measure assessing the extent to which respondents are concerned about possible negative consequences of anxiety symptoms. Responses are rated on a 5-point Likert scale ranging from 0 (very little) to 4 (very much) and summed to create a total (Taylor et al., 2007). Higher AS scores indicate greater anxiety sensitivity.

Distress Tolerance Scale.—The Distress Tolerance Scale (DTS) is a 16-item scale assessing perceived capacity to tolerate distress. The items are rated on a 5-point scale with higher scores indicating higher levels of distress tolerance. (Simons & Gaher, 2005)

Smoking-related Variables: We assessed lifetime and current smoking patterns, number of cigarettes smoked daily (cigarettes per day), time to first cigarette, smoking cessation

stage of change, quitting self-efficacy, and number of prior quit attempts in the past year (Centers for Disease Control and Prevention, 2011; DiClemente et al., 1991) The Heaviness of Smoking Index comprised the items “number of cigarettes per day” and “time to the first cigarette of the day” (Heatherton, Kozlowski, Frecker, Rickert, & Robinson, 1989).

Analyses

Internal consistency of the CES-D and three transdiagnostic measures was assessed using Cronbach α , where $\alpha > 0.7$ is considered reliable. Differences in distributions of demographic factors between current, former, and never smokers were tested using non-parametric tests, Fisher’s exact test for categorical variables, and the Kruskal-Wallis test for continuous variables. Differences in means of DT, AS, and CES-D composite/Anh scores among the three smoking statuses were assessed using the nonparametric Kruskal-Wallis test. Independent samples t-tests tested for significant differences between CES-D score group (high/low) and means of the emotional vulnerability measures. Mean DT, ASI, and CES-D composite/Anh subscale measures stratified by CES-D score group (high/low) were calculated for current smokers. Significant differences were identified using independent sample t-tests.

Logistic and ordinal regression models assessed the joint significance of DT, AS, and Anh measures on seven smoking-related variables. All models controlled for age and gender. Statistical analyses were conducted using IBM SPSS Statistics (Version 22.0).

Results:

Fifty clients were sampled at each ASO; 118 (78.7%) were current smokers, 22 (14.7%) were former smokers, and 10 (6.7%) were never smokers (Table 1). The sample’s mean age (SD) was 49.8 (10.1), and 68.7% (n= 103) were male. The majority was Black/African American (72.7%), and nearly 59% identified as heterosexual/straight.

The CES-D, ASI-3, DTS, and CES-D Anhedonia Subscale showed high consistency across the sample, with all α reliabilities > 0.7 ($\alpha = 0.89$ for CES-D, $\alpha = 0.91$ for ASI-3, $\alpha = 0.80$ for DTS, and $\alpha = 0.72$ for CES-D Anhedonia Subscale). The sample’s mean (SD) CES-D score was 18.0 (SD=12.1) (Table 2), and the prevalence of clinically significant depressive symptoms (CES-D ≥ 16) was 49.3% (74/150). Mean CES-D scores differed according to smoking status ($p < 0.05$). Participants with a “high” CES-D score (≥ 16) had higher mean ASI-3 composite scores and lower mean DTS total scores compared to participants with “low” CES-D scores (< 16) ($p < 0.001$). Among current smokers, the prevalence of “high” CES-D scores was 53% (62/118). The pattern of scores for smokers with regard to differences in transdiagnostic factors according to CES-D scores resembled that of the total sample ($p < 0.001$ for all three measures).

In the multiple regression models, Anh, DT, and AS were not associated with number of prior quit attempts, quitting self-efficacy, quitting readiness (stages of change), or reported heaviness of smoking, when controlling for age and gender (data not shown).

Discussion:

To our knowledge, this is the first study in PLWHA to examine the relationship of smoking status with three transdiagnostic emotional vulnerability factors hypothesized to be important in tobacco cessation. Our hypothesis that clinically significant depressive symptoms would be associated with greater levels of AS and lower levels of DT was confirmed, suggesting these conditions and vulnerabilities track together. Although we found that higher Anh scores tracked with higher depression, the Anh construct was a subscale of the CES-D ($r=0.64$); thus, such a relationship would be expected. Future studies should use a measure of Anh independent of the depression measure. These findings are consistent with a proposed transdiagnostic vulnerability framework (Leventhal & Zvolensky, 2015). Our second hypothesis that quitting motivation, quitting self-efficacy, and prior quit attempts would be associated with a higher DT and lower levels of AS and Anh was not supported. This finding should be replicated in a larger study, as specific interventions targeting these factors may not provide added value beyond assessing and treating co-occurring depression itself.

This study's observed prevalence of clinically significant depressive symptoms was comparable to a sample of PLWHA who attended community-based AIDS service organizations in Ontario, Canada (Williams, Narciso, Browne, et al., 2005). Given the elevated prevalence of depression in PLWHA, and more so among PLWHA smokers and in PLWHA using community-based services, these findings would be expected (Williams, et al., 2005).

This study has multiple limitations. The sample was drawn from clients at three NYC community-based ASOs, thereby limiting the generalizability. The clients were not randomly sampled and the prevalence of smoking, although on the high end for PLWHA clinic samples (e.g., Burkhalter et al., 2005; Tesoriero et al., 2008), may have been higher than the true smoking prevalence at those ASOs. Further, the small sample size of smokers ($n=118$) means the relationship between transdiagnostic factors and smoking variables may have existed with a larger study sample. On the other hand, a strength of the study is its engagement of community-based ASOs for recruitment of their clients into research studies. CBOs play a vital role in health promotion and disease prevention, and they reach the most vulnerable PLWHA who may have higher levels of tobacco use and depression than persons with less need for ASO social services (Williams, et al., 2005).

In conclusion, our community-based sample of PLWHA had high rates of tobacco use and clinically significant depressive symptoms. Amongst smokers, PLWHA with depressive symptoms had higher levels of anhedonia and anxiety sensitivity and lower levels of distress tolerance. Given that PLWHA are a priority population, further research should examine how to best tailor interventions to a group with multiple obstacles to successful tobacco cessation. Understanding emotional vulnerabilities might provide a means to construct a novel, multi-faceted intervention that is not limited to a single diagnostic condition but, rather, is linked to multiple psychiatric co-morbidities.

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Table 1

Participant Characteristics by Smoking Status

	Current=118	Former=22	Never=10	Total, N=150
Participating Sites				
ACQC	38 (76.0)	10 (20.0)	2 (4.0)	-
BOOM	35 (70.0)	9 (18.0)	6 (12.0)	-
GMHC	45 (90.0)	9 (18.0)	3 (6.0)	-
Age (in years)	49.9 (9.5)	53.3 (9.6)	41.2 (13.6)	49.8 (10.1)
Gender Assigned at Birth				
Female	31 (66.0)	11 (23.4)	5 (10.6)	47 (100.0)
Male	87 (84.5)	11 (10.7)	5 (4.9)	103 (100.0)
Sexual Identity				
Female	34 (66.7)	12 (23.5)	5 (9.8)	51 (100.0)
Male	78 (83.9)	10 (10.8)	5 (5.4)	93 (100.0)
Transgender/Male to female	6 (100.0)	-	-	6 (100.0)
Sexual orientation				
Lesbian or gay	43 (82.7)	6 (11.5)	3 (5.8)	52 (100.0)
Straight or heterosexual	67 (76.1)	16 (18.2)	5 (5.7)	88 (100.0)
Bisexual	4 (66.7)	-	2 (33.3)	6 (100.0)
Something else	1 (100.0)	-	-	1 (100.0)
Decline to answer	3 (100.0)	-	-	3 (100.0)
Hispanic, Latino, or Spanish?				
No	85 (78.0)	18 (16.5)	6 (5.5)	109 (100.0)
Yes	32 (80.0)	4 (10.0)	4 (10.0)	40 (100.0)
I don't know	1 (100.0)	-	-	1 (100.0)
Ethnicity				
White	11 (64.7)	3 (17.6)	3 (17.6)	17 (100.0)
Black or African American	78 (78.8)	14 (14.1)	7 (7.1)	99 (100.0)
Asian or Pacific Islander	1 (50.0)	1 (50.0)	-	2 (100.0)
American Indian or Alaskan Native	2 (66.7)	1 (33.3)	-	3 (100.0)
Other	26 (89.7)	3 (10.3)	-	29 (100.0)
Education				
Less than high school degree	1 (20.0)	2 (40.0)	2 (40.0)	5 (100.0)
Graduated high school/GED	42 (79.2)	10 (18.9)	1 (1.9)	53 (100.0)
Some college or above	62 (81.6)	8 (10.5)	6 (7.9)	76 (100.0)
Over the past month, how many cigarettes did you smoke a day?				
Mean (SD)	9.42 (8.280)	-	-	-
Range	1 – 60	-	-	-
How soon after waking up do you smoke your first cigarette?				
Within first 30 minutes	78 (66.1)	-	-	-
After first 30 minutes	40 (33.9)	-	-	-
Heaviness of Smoking Index (HSI)				

	Current=118	Former=22	Never=10	Total, N=150
Mean Composite Score (SD)	3.27 (0.594)	-	-	-
Are you seriously thinking about quitting smoking?				
No, I am not thinking about quitting	32 (27.1)	-	-	-
Yes, sometime within the next 6 months	45 (38.1)	-	-	-
Yes, I am taking action (now)	41 (34.7)	-	-	-
If thinking about quitting, how confident are you that you can quit?				
Not at all to a little bit confident	47 (39.8)	-	-	-
Moderately confident	30 (25.4)	-	-	-
Quite a bit to extremely confident	41 (34.7)	-	-	-
In the past year, did you make any quit attempts lasting longer than 24 hours?				
No quit attempts >24 hours	50 (46.7)	-	-	-
Yes, 1 or more quit attempts >24 hours	57 (53.3)	-	-	-

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Table 2

Mean Scores for CES-D and Transdiagnostic Factors by Smoking Status and CES-D Clinical Cutoff Groups

	Total Sample		Smoking Status		Groups by CES-D clinical cutoff scores	
	N=150	Current N=118	Former N=22	Never N=10	Low (0–15) N=76	High (16 to 60) N=74
CES-D Total Score (M, SD)	17.97 (12.10)	19.08 (12.16) ^b	15.91 (11.89) ^b	9.40 (8.18) ^b	8.16 (4.92) ^a	28.04 (8.43) ^a
CES-D Anhedonia Subscale (M, SD)	3.21 (3.00)	3.39 (3.00)	2.91 (3.12)	1.80 (2.53)	1.43 (1.99) ^a	5.04 (2.76) ^a
ASI-3 Composite Score (M, SD)	27.60 (16.60)	28.02 (15.93)	29.09 (18.54)	19.40 (19.52)	19.32 (13.29) ^a	36.11 (15.36) ^a
DTS Total Score (M, SD)	2.62 (0.98)	2.60 (0.98)	2.54 (0.91)	3.08 (0.93)	3.08 (0.93) ^a	2.16 (0.81) ^a

^a p<.001;^b p<0.05