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Assessment of Depression among African American Light Smokers

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Abstract

Given the relationship between depression and smoking, we compared the two-item Patient Health Questionnaire (PHQ-2) and 10-item Center for Epidemiological Studies Depression Scale (CESD-10) in assessing depressive symptoms among African American light smokers in a clinical trial of bupropion. Of 539 participants, 21.3 percent reported significant depressive symptoms on the PHQ-2, 31.0 percent screened positive per CESD-10, 36.8 percent reported symptoms on either, and 15.6 percent screened positive on both ($r = 0.47$, $p < .001$). Having depressive symptoms was associated with less education, decreased positive affect and social support, and greater levels of negative affect and perceived stress. Cessation treatment should assess depression and address these symptoms.

Keywords

depression; nicotine dependence; psychological distress; race; smoking; smoking cessation

Introduction

Among US adults, 7 percent experience major depression in a given year (Pratt and Brody, 2010). However, up to 20 percent may experience significant symptoms of depression (Office of the Surgeon General, 1999). While the overall prevalence of smoking in the United States is 21 percent (Centers for Disease Control and Prevention, 2009), approximately 43 percent of adults diagnosed with depression are smokers (Pratt and Brody, 2010). It is well documented that a history of major depression is positively related to

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Competing Interests

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smoking initiation (Breslau et al., 1991; Carmody, 1989; Lerman et al., 1996), smoking intensity (Breslau et al., 1991; Carmody, 1989; Lerman et al., 1996), less likelihood of quitting (Glassman et al., 1990; Pratt and Brody, 2010), and nicotine withdrawal during quit attempts (Breslau et al., 1992; Covey et al., 1990).

Despite the literature suggesting high rates of depression and higher depressive symptoms among smokers, little research has documented depressive symptoms among African American smokers. One study (Catley et al., 2003) of 498 African American light smokers found that over the course of the study, the percentage of African American smokers meeting the threshold for significant depressive symptoms on the Medical Outcomes Survey Short Depression Screen (Burnam et al., 1988) varied between 32 percent and 36 percent. Moreover, depressive symptoms were positively associated with smoking level, and increases in depressive symptoms from baseline to week four predicted higher smoking levels at six-month follow-up among this population. Another study (Catley et al., 2005) of 600 African American light smokers found that as many as 28 percent had significant depressive symptoms per the 20-item Center for Epidemiological Studies Depression Scale (CESD; Radloff, 1977; Weissman et al., 1977). However, another study of 520 African American adults (Klonoff and Landrine, 2001) found no relationship between smoking status and depressive symptomatology using the Symptom Checklist-58 (Derogatis et al., 1974). Given these mixed findings and mixed findings regarding the prevalence of major depression among different races/ethnicities (Weissman et al., 1991), identifying depressive symptoms among African Americans is critical, especially because African Americans may be less likely to be diagnosed or to receive treatment for depression compared to Whites (Gonzalez et al., 2009).

In the general population, greater depressive symptoms have been associated with several factors. For example, greater symptoms of depression have been related to lower income (Lorant et al., 2003) and lower education (Lorant et al., 2003), as well as psychosocial factors such as greater negative affect (Denollet and De Vries, 2006; Dua, 1993), less positive affect (Denollet and De Vries, 2006; Dua, 1993), less social support (George et al., 1989; Stice et al., 2004a, 2004b), and greater stress levels (Caspi et al., 2003; Cohen et al., 1983; Dua, 1993). Thus, it is important to examine the concurrent validity of measures of depression among different subpopulations.

Two brief measures used to identify depressive symptoms include the two-item Patient Health Questionnaire (PHQ-2) (Kroenke et al., 2003) and the 10-item Center for Epidemiologic Studies Short Depression Scale (CESD-10) (Cole and Dendukuri, 2004). Prior research has compared PHQ-2 and the CESD-10 and found substantial agreement ($\kappa = 0.77$) (Fitzgerald et al., 2009). Equivocal findings have been documented regarding ethnic differences in meeting thresholds for significant depressive symptoms on the PHQ-2 (Li et al., 2007; Magnus et al., 2010) and the CESD-10 (Berkman et al., 1986; Jones-Webb and Snowden, 1993; McBarnette, 1996; Murrell et al., 1983; Nguyen et al., 2004) among African Americans and Whites. However, prior research has not examined the prevalence of significant symptoms of depression among African American smokers. Moreover, no prior research has investigated the agreement among these measures in African Americans.

The limited information regarding how different depression assessments identify those at risk for depression, specifically in the African American population, suggests a critical gap in the literature. Given the relationship between smoking and depression, screening for depressive symptoms within the context of smoking cessation treatments may identify individuals for whom addressing depression is important to cessation success. This information may be critical in addressing health disparities (i.e. reducing smoking in a vulnerable population). Thus, the purpose of this study was to: (1) compare prevalence of screening positive for depressive symptoms on the PHQ-2 and the CESD-10 within a sample of African Americans enrolled in a smoking cessation trial for light smokers; and (2) examine psychosocial correlates commonly related to depression (e.g. affect, perceived stress, social support) to outcomes on these measures within this population.

Methods

The current study evaluated baseline data from Kick It at Swope III (KIS-III), a randomized, placebo-controlled trial to evaluate the efficacy of bupropion SR combined with health education counseling for smoking cessation among African American light smokers (Cox et al., 2011). Five hundred and forty African American light smokers were recruited from the Kansas City metropolitan area at an urban community-based clinic that serves predominantly low-income African American patients. The trial procedures were approved and monitored by the University of Kansas Medical Center's Human Subjects Committee.

Eligible individuals were African American, age 18 or older, interested in stopping smoking, smoked < 10 cigarettes per day (CPD) for > 2 years and smoked on > 25 days in the past month. They smoked for at least three years, had a home address and a functioning telephone number. Exclusion criteria included: current use of bupropion; use of psychoactive medications; use of nicotine replacement therapy, fluoxetine, clonidine, buspirone, or doxepin in the past 30 days; history of alcohol or substance abuse within the past year; current drinking of 14 or more alcoholic drinks per week and/or binge drinking (five or more drinks on one occasion) two or more times in the past month; history of seizures or head trauma; history of bulimia or anorexia nervosa; pregnant (verified by over the counter pregnancy test kit for women of child-bearing age only) or contemplating pregnancy; breast feeding; myocardial infarction in the past 30 days; use of other forms of tobacco in the past 30 days; reported use of opiates, cocaine, or stimulants; diabetes treated with oral hypoglycemics or insulin; planning to move from the Kansas City metro area in the next 12 months; and another smoker in the household enrolled in the study.

Study staff reviewed procedures with individuals who were eligible to participate in the study and administered written informed consent to these individuals at the baseline visit. For the baseline assessment, all questionnaire items were read to, or along with, the participants by a trained research assistant.

Measures

The current study is an examination of variables assessed at baseline for all participants in this study. Demographics included age, gender, income, and educational level. Assessments of smoking history included current smoking level (single item cigarettes per day (CPD))

and time to first cigarette after waking, an indicator of nicotine dependence (Baker et al., 2007; Heatherton et al., 1991).

Patient Health Questionnaire, PHQ-2 (Kroenke et al., 2003)—Participants were asked to complete the Patient Health Questionnaire (PHQ-2), a two-item depression screening tool, based on DSM-4 diagnostic criteria, assessing frequency of depressed mood ‘feeling down, depressed or hopeless’ and anhedonia ‘little interest or pleasure in doing things’ over the past two weeks. Responses were rated on a four-point Likert scale and range from ‘not at all’ (0) to ‘nearly every day’ (3). A total score > 3 has been used to reflect clinical depression (Kroenke et al., 2003). As depression severity increases per the PHQ-2, functional status per the Short-Form General Health Survey decreases (Lowe et al., 2004, 2005). Using a mental health professional interview as the criterion standard, a PHQ-2 score of 3 had a sensitivity of 83 percent and a specificity of 92 percent for major depression, indicating that a PHQ-2 score of 3 is the optimal cutpoint for screening purposes. With reference to the Structured Clinical Interview for DSM Disorders, the PHQ-2 had a sensitivity of 87 percent and a specificity of 78 percent for major depressive disorder and a sensitivity of 79 percent and a specificity of 86 percent for any depressive disorder. Its diagnostic performance was comparable with that of longer depression scales. PHQ-2 change scores accurately reflected improved, unchanged, and deteriorated depression outcomes (Lowe et al., 2005).

Center for Epidemiologic Studies Short Depression Scale – 10 item, CESD-10 (Cole and Dendukuri, 2004)—Participants also completed the Center for Epidemiologic Studies Short Depression Scale (CESD-10), which is a 10-item depression screening tool but not a diagnostic tool. It assesses distress associated with depressive symptoms in past week. Response options range from ‘rarely or none of the time’ (0) to ‘all of the time’ (3). Higher total scores reflect greater distress. A score of 10 or higher has been used to indicate significant distress or a positive screen for depression. Cross-validation of the Rasch-derived CESD-10 short form supported its utility and structural validity across samples. Tests of structural validity using latent variable modeling methodology indicated that a hierarchical, single-factor model of depression had the best fit for the original full form and the Rasch-derived short form of the CESD-10 (Cole and Dendukuri, 2004).

Positive and Negative Affect Scale, PANAS (Watson et al., 1988)—Participants completed the Positive and Negative Affect Scale (PANAS), which includes two subscales assessing positive and negative affective states. Higher subscale scores reflect greater positive affect and greater negative affect, respectively.

Perceived Stress Scale, PSS-4 (Cohen and Lichtenstein, 1990)—Participants completed the Perceived Stress Scale (PSS-4) to assess the amount of stress they experienced in the past month. Higher total scores indicate greater levels of perceived stress.

Interpersonal Support Evaluation List, ISEL-12 (Cohen et al., 1988)—Participants were asked to complete the Interpersonal Support Evaluation List (ISEL-12), which assessed social support. Higher scores indicate greater social support.

Data analysis and statistical consideration

Baseline demographic, smoking-related, and psychosocial variables were summarized using descriptive statistics. Results were expressed as mean (standard deviation (SD)) for continuous variables and frequency (percentage) for categorical variables. Cronbach's alpha coefficient was calculated for both the PHQ-2 and CESD-10 to evaluate internal consistency. Following directions for clinical use, responses were categorized according to the cutoff scores for elevated depression for PHQ-2 (≥ 3) and CESD-10 (≥ 10). Bivariate associations with elevated depression were assessed using ANOVA for continuous variables and chi-square tests for categorical variables. Variables that were identified as potential predictors of depression ($p < .10$) for each of the screeners were entered into binary logistic regression models for each assessment tool using stepwise entry with a retention criterion of $p < .05$. The final models were confirmed based upon best subset criteria. The Spearman correlation coefficient was calculated to assess the degree of agreement between PHQ-2 and CESD-10 when each were dichotomized at the clinical use cutoff scores to assess the degree of association between the two measures in identifying significant depressive symptoms. For the current analyses, $\alpha = .05$ was used to determine statistical significance. All analyses were conducted using SAS 9.2 (SAS Institute Inc., Cary, NC, USA).

Results

Among the total of 540 African American light smokers, the majority (66.1%) was female, and the mean age was 46.5 (SD = 11.3) years. The majority (60.7%) earned a monthly family income of $\leq \$18,000$, and 454 (84.3%) had high school or greater level of education. Average CPD was 8.0 cigarettes (SD = 2.5), with 389 (72.2%) smoking within 30 minutes of waking. Averages for the psychosocial measures were as follows – PSS-4: 5.2 (SD = 3.2); PANAS – Negative affect: 19.8 (SD = 8.0); PANAS – Positive affect: 37.6 (SD = 7.5); and ISEL-12: 39.8 (SD = 7.2).

Responses to the PHQ-2 demonstrated an average score of 1.4 (SD = 1.5) with a range of 0–6. Responses to the CESD-10 showed an average score of 7.7 (SD = 5.2) and Cronbach's alpha was 0.67. Among this sample, 167 (31.0%) had significant depressive symptoms per the criteria of CESD-10 scores ≥ 10 , and 115 (21.3%) had significant depressive symptoms per criteria of PHQ-2 scores ≥ 3 . The PHQ-2 and CESD-10 demonstrated moderate agreement (Spearman correlation coefficient, $r = 0.47$, $p < .001$).

As shown in Table 1, having significant depressive symptoms, as indicated by both the PHQ-2 and the CESD-10, was associated with lower monthly family income, lower educational attainment, higher scores on the PANAS Negative affect subscale, lower scores on the PANAS Positive affect subscale, higher PSS-4 scores, and lower ISEL-12 scores. Age was statistically associated with CESD-10 ($p = .03$) but not PHQ-2 ($p = .84$). However, the differences based upon CESD-10 cutoff values do not appear to be clinically relevant (47.2 versus 45.0 years of age).

Table 2 shows the frequencies of significant depressive symptoms using the PHQ-2 cutoff of ≥ 3 and CESD-10 scores of ≥ 10 . Using PHQ-2 criteria, 115 participants (21.3%) met criteria; using the CESD-10, 167 (31.0%) met criteria. When using either criteria, a total of

198 (36.7%) met criteria for significant depressive symptoms; however, 15.6 percent ($n = 84$) of the sample were identified as having significant depressive symptoms on both measures.

Table 3 presents the binary logistic regression models identifying correlates of CESD-10 and PHQ-2. Correlates of CESD-10 included High school education ($p < .001$), higher PANAS Negative affect subscale scores ($p < .001$), lower PANAS Positive affect subscale scores ($p = .004$), higher PSS-4 scores ($p < .001$), and lower LISEL scores ($p = .003$). Correlates of PHQ-2 included High school education ($p = .007$), higher PANAS Negative affect subscale scores ($p < .001$), higher PSS-4 scores ($p = .002$), and lower LISEL scores ($p = .004$).

Discussion

The current study examined the prevalence of significant depressive symptoms using the PHQ-2 and CESD-10 among a sample of African American light smokers enrolled in a clinical trial and identified predictors of screening positive for significant depressive symptoms on these screeners. While both the PHQ-2 and CESD-10 indicated significant depressive symptoms among 16 percent of the sample, 37 percent of participants were screened as positive for depression using at least one measure. Thus, a notable proportion of our sample reported symptoms of depression despite the fact that smokers using antidepressant medications were excluded from this study.

These findings highlight the need to address depression among African American light smokers. Cessation interventions must attend to the role of smoking in regulating affect, which is a widely documented motivator for smoking (Moghaddam and Ferguson, 2007; Xu et al., 2008). Attention must also be provided to the barriers to initiating treatment of depression among this group of African Americans. Prior research has documented several barriers to treatment, including perceptions of stigma, beliefs that life experiences are the cause of depression, that problems should not be discussed outside one's family, mistrust of health care professionals, and concerns about the effects of psychotropic medication (Alvidrez, 1999; Cooper-Patrick et al., 1997, 1999). Prior research has documented that addressing depressive symptoms may improve smoking cessation treatment outcomes (Brown et al., 2001; Munoz et al., 1997), particularly for smokers with a significant history of depression (Brown et al., 2001). Thus, further work is needed to examine how to most effectively identify depression and address depressive symptoms among African Americans and smokers, particularly when smokers attempt to quit.

While the PHQ-2 and CESD-10 demonstrated moderate agreement, each scale provided some unique identification of elevated symptoms. In considering which assessment to use, it is worthwhile to recognize the distinct information regarding depressive symptomatology provided by each measure. The PHQ-2 assesses depressed mood and anhedonia within the prior two weeks, the two primary symptoms used in diagnosing current clinical depression (Cook et al., 2010; Lerman et al., 1996). Thus, it might be most appropriately used as a brief screener to identify people at high-risk for depression. The CESD-10 may be a better indicator of an overall level of distress while providing a broader range of information

regarding the symptom profile, assessing symptoms in the past week. In both cases, additional follow-up evaluation would be needed for those screening positive for depressive symptoms.

Both the PHQ-2 and CESD-10 showed expected relationships with sociodemographic and psychosocial factors. Consistent with prior research, greater depressive symptoms were associated with lower income (Lorant et al., 2003) and lower education (Lorant et al., 2003). Psychosocial factors also demonstrated the expected relationships, such that greater depressive symptoms were associated with greater negative affect (Denollet and De Vries, 2006; Dua, 1993), less positive affect (Denollet and De Vries, 2006; Dua, 1993), less social support (George et al., 1989; Stice et al., 2004a, 2004b), and greater stress levels (Caspi et al., 2003; Cohen et al., 1983; Dua, 1993). These findings support the concurrent validity of these measures within this sample. Furthermore, the current study extends these findings by demonstrating that screening positive for depressive symptoms on both the PHQ-2 and the CESD-10 is related to an attenuation of these trends. Thus, screening positive on both the PHQ-2 and the CESD-10 may indicate a particularly high-risk group for significant symptoms and high risk factors for depression; this argues that using a combination of depressive screeners might have added benefit.

Limitations to the generalizability of these findings should be considered given the sample of Midwest, urban African Americans smoking an average of 10 CPD or less. Furthermore, this sample was seeking smoking cessation treatment and those using antidepressant medications were excluded from study participation. Also, we did not assess for history of depression diagnoses nor did we include a full diagnostic battery (e.g. Structured Clinical Interview for DSM Disorders), which limits our ability to draw conclusions about the convergent validity of both measures within this sample.

Conclusions

The current study contributes to the literature by evaluating the use of two brief measures of depression within a sample of African American light smokers, highlighting both the prevalence of depressive symptoms within this population and important correlates of depression (e.g. SES, education). Both PHQ-2 and CESD-10 identified a notable proportion of our sample of African American light smokers reporting symptoms of depression (up to 37 percent meeting criteria using either the PHQ-2 or the CESD-10), despite the fact that smokers using antidepressant medications were excluded from this study. Furthermore, the number of screeners indicating significant depressive symptoms increased with lower education and as negative affect and perceived stress increased and positive affect and social support decreased. Assessing depressive symptoms using a combination of screeners might yield additional benefit in identifying particularly high-risk groups and emphasize the need to address depression within the context of treatment and clinical trials. Future research will include evaluation of changes in depressive symptoms over the course of cessation treatment, the relationship between depressive symptoms and cessation outcomes, and the impact of bupropion on both depressive symptoms and smoking abstinence.

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Table 1

Participant characteristic differences in PHQ-2 and CESD-10.

Variable	PHQ-2 <3 n = 424	PHQ-2 3 n = 115	Test value	p	CESD-10 <10 n = 372	CESD-10 10 n = 167	Test value	p
<i>Demographic variables</i>								
Age (SD)	46.46 (11.5)	46.68 (10.6)	F = 0.04	.84	47.2 (11.1)	45.0 (11.5)	F = 4.53	.03
Gender (%)			$\chi^2 = 1.75$	.19			$\chi^2 = 0.40$	.40
Women	286 (67.5)	70 (60.9)			250 (67.2)	106 (63.5)		
Men	138 (32.5)	45 (39.1)			122 (32.8)	61 (36.5)		
Monthly family income (%)			$\chi^2 = 11.71$	.001			$\chi^2 = 7.84$	.005
<\$1800	242 (57.1)	85 (73.9)			211 (56.7)	116 (69.5)		
\$1800	182 (42.9)	30 (26.1)			161 (43.3)	51 (30.5)		
Education (%)			$\chi^2 = 10.75$	<.001			$\chi^2 = 12.19$	<.001
<high school	55 (13.0)	30 (26.0)			45 (12.0)	40 (24.0)		
high school	369 (87.0)	85 (74.0)			327 (88.0)	127 (76.0)		
<i>Smoking-related variables</i>								
CPD (SD)	7.9 (2.5)	8.2 (2.6)	F = 1.50	.22	8.0 (2.5)	7.8 (2.6)	F = 1.50	.22
Time to first cigarette (%)			$\chi^2 = 0.50$	.48			$\chi^2 = 0.52$	.47
30min	303 (71.5)	86 (74.8)			265 (71.2)	124 (74.3)		
>30min	121 (28.5)	29 (25.2)			107 (28.8)	43 (25.8)		
<i>Psychosocial variables</i>								
PANAS Negative Affect (SD)	17.8 (6.5)	26.7 (9.1)	F = 140.01	<.001	16.9 (5.7)	26.0 (8.7)	F = 240.99	<.001
PANAS Positive Affect (SD)	38.1 (7.5)	35.7 (7.4)	F = 9.07	.003	38.6 (7.4)	35.2 (7.3)	F = 23.78	<.001
Stress (PSS-4) (SD)	4.6 (2.9)	7.4 (3.2)	F = 81.54	<.001	4.2 (2.8)	7.4 (2.9)	F = 152.86	<.001
Social support (ISEL-12) (SD)	40.8 (6.4)	35.9 (8.3)	F = 45.82	<.001	41.6 (6.0)	35.8 (7.9)	F = 88.29	<.001

Table 2

Agreement between PHQ-2 and CESD-10.

		PHQ-2	
		<3 n = 424 (78.7%)	3 n = 115 (21.3%)
CESD-10	<10 n = 372 (69.0%)	341 (63.3%)	31 (5.8%)
	10 n = 167 (31.0%)	83 (15.4%)	84 (15.6%)

Kappa = .46; 95% CI (0.38 – 0.54).

Table 3

Predictors of CESD-10 10 and PHQ2 3.

Variable	OR	95% CI	<i>p</i>
<i>CESD-10 10</i>			
Education HS	2.64	1.39, 5.01	<.001
PANAS Negative affect	1.16	1.12, 1.21	<.001
PANAS Positive affect	0.95	0.92, 0.98	.004
Stress (PSS-4)	1.21	1.11, 1.33	<.001
Social support (ISEL-12)	0.92	0.89, 0.96	.003
<i>PHQ-2 3</i>			
Education HS	2.32	1.26, 4.27	.007
PANAS Negative affect	1.12	1.09, 1.16	<.001
Stress (PSS-4)	1.15	1.05, 1.26	.002
Social support (ISEL-12)	0.95	0.92, 0.98	.004