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## **Current Major Depression Among Smokers Using a State Quitline**

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**Background:** Smokers seeking treatment to quit smoking are generally not assessed for current depression, yet depression among smokers may influence quitting outcome.

**Purpose:** This study aims to formally assess current major depression among smokers calling a state tobacco quitline.

**Methods:** A total of 844 smokers calling the California Smokers' Helpline in 2007 were screened for depression by the mood module of the Patient Health Questionnaire (PHQ-9). The Social Functioning Questionnaire (SFQ) was also administered to these callers. Two months after the screening, follow-up evaluations were conducted to assess cessation outcome.

**Results:** In all, 24.2% of smokers met criteria for current major depression and 16.5% reported symptoms indicating mild depression. Callers with current major depression were more likely to be heavy smokers and on Medicaid. Moreover, 74.0% of smokers with current major depression had substantial social and occupational functioning deficits. Two months later, those with major depression at baseline were significantly less likely to have quit smoking (18.5% vs 28.4%).

**Conclusions:** Almost one in four smokers to the California Smokers' Helpline met criteria for current major depression. Over 400,000 smokers call state quitlines in the U.S. for help with quitting each year, which means that as many as 100,000 smokers with serious depressive symptoms are using these services annually. The large number of depressed smokers who seek help suggests a need to develop appropriate interventions to help them quit successfully.

## Introduction

Epidemiologic studies have found that smokers have a higher prevalence of major depression than nonsmokers.<sup>1-2</sup> National surveys indicate that 11%–12% of smokers, compared to 5%–6% of nonsmokers, meet criteria for current major depression.<sup>3-4</sup> Smokers with current depression are less likely to quit smoking than those without.<sup>5-7</sup> This link to lower levels of quitting success has increased interest in examining the impact of depression on quitting in treatment settings.<sup>8-11</sup>

It is common in smoking-cessation research, both behavioral and pharmacologic, to exclude smokers with acute mental illness unless they are the specific focus of investigation.<sup>8,11-12</sup> While intervention studies often include smokers with a history of major depression or with subclinical symptoms of depression, they usually exclude smokers with severe levels of current depression such as current Major Depressive Episode (MDE). The few treatment studies that have included smokers with severe current depression estimate the prevalence to be 11.4%–23.8% with some indication that level of depression is related to difficulty quitting.<sup>13-14</sup>

Regardless of the limited data on the impact of severe current depression on cessation, there is ample evidence that subclinical depressed mood predicts worse quitting outcomes<sup>9,12,15-16</sup> which suggests that more severe depression would also be a risk factor for quitting. This study assesses current major depression among smokers in a treatment setting by sampling callers to a state tobacco quitline, a telephone counseling program that provides free smoking-cessation services to state residents.

Quitlines have become a popular and effective method of delivering behavioral counseling to a large number of smokers who want to quit.<sup>17-19</sup> Currently every state in the U.S. has an operating quitline; collectively they serve over 400,000 smokers annually.<sup>20</sup> No state quitline, to our knowledge, has formally assessed for current major depression, although some have asked callers a single question on mood. One study found a high percentage of quitline callers, 46%, endorsed feeling “sad or blue everyday for the last two weeks.”<sup>21</sup>

The present study focuses on the practical application of measuring depression in the context of smoking-cessation treatment programs. The main goals are to determine (1) whether a relatively short questionnaire, administered over the telephone, can be used to identify current major depression and (2) whether depression is predictive of cessation outcome. The Patient Health Questionnaire mood module (PHQ-9) was used to assess for current major depression. Developed as a screening tool, the PHQ-9 has been used extensively as a diagnostic measure for current depression.<sup>22-27</sup> The PHQ-9 is a self-report measure of depressive symptoms and is relatively easy to administer over the phone.<sup>28</sup> The Social Functioning Questionnaire (SFQ) was also used to assess the level of impairment in smokers’ daily lives.<sup>29</sup>

## **METHODS**

### **Participants and Settings**

Participants were recruited from among callers to the ongoing state quitline in California, the California Smokers’ Helpline, between August and November 2007. This study was approved by the Human Research Protections Program at the University of California, San Diego. For increased efficiency in training and monitoring, a decision was made a priori to restrict data

collection to staff who typically conduct high numbers of intakes each week; thus 22 staff members were selected to participate. The Helpline uses a computerized intake script which was programmed so that all eligible callers screened by eligible staff were asked to participate.

Callers were eligible for the study if they were current smokers or had recently quit, were aged  $\geq 18$  years, English speaking, and not pregnant. From August 2007 to November 2007, a total of 5594 callers met eligibility criteria, of which 861 (or 15%) were screened by the participating intake staff members and were asked questions assessing depression and social functioning.

### **Procedures and measures**

Smokers were assessed on sociodemographic and smoking-related variables including gender, ethnicity, age, education, type of health insurance, and cigarettes smoked per day using the standard intake form. Participants answered the Patient Health Questionnaire mood module (PHQ-9) and the Social Functioning Questionnaire (SFQ). After intake, smokers were offered telephone counseling and sent a package of self-help materials.<sup>30</sup> Evaluators, independent of the counseling staff, conducted follow-up interviews 2 months after intake.

The PHQ-9 is a self-report screening, diagnostic, severity, and outcome measure for current depression.<sup>22-27</sup> It has been demonstrated to have superior criterion validity for the diagnosis of major depression compared to two other established depression questionnaires.<sup>23-25</sup> The measure is considerably shorter than other self-report depression measures with frequency categories that make it relatively easy to administer over the phone.<sup>7,28</sup> The PHQ-9 has been used successfully in telephone surveys such as the Behavioral Risk Factor Surveillance System (BRFSS) survey.<sup>7</sup>

The PHQ-9 asks how frequently respondents have experienced the nine symptoms of Major Depression (anhedonia, depressed mood, insomnia or hypersomnia, fatigue, appetite fluctuation, feelings of worthlessness, diminished concentration, psychomotor agitation or retardation, and thoughts of self harm) from the DSM-IV.<sup>7,31</sup> The questionnaire reads “Over the last 2 weeks, how often have you been bothered by any of the following problems?” Response options are: “not at all, several days, more than half the days, nearly every day.” The PHQ-9 can be scored using an algorithm that corresponds to DSM-IV diagnosis criteria for Major Depression or by using a severity score.<sup>22-23</sup> The DSM-IV diagnoses of Major Depressive Disorder (MDD) or MDE require that a clinician rule out symptoms caused by bipolar disorder, a medical condition, or bereavement, all of which would be difficult to assess in a quitline setting. They also require that depressive symptoms cause substantial distress or impairment. To assess impairment as a separate construct from depression, the 8-item Social Functioning Questionnaire (SFQ) was used.

The SFQ assesses functioning in the previous 2 weeks in areas of work, home, finances, relationships, family, and free time with statements such as “I find my tasks at work and at home very stressful.” and answers from “most of the time” to “not at all.”<sup>29</sup> Social functioning is an important part of mental health assessment and gives an indication of the potential impact of depression and other mental and physical health conditions on daily functioning. Like the PHQ-9, the SFQ is brief, has good psychometric properties, and categoric answers that make it easy to administer over the telephone.<sup>29</sup>

The main outcome measure for this study is the percentage of smokers who were not smoking for at least 30 days at the 2-month evaluation interview, in accordance with the recommendation for assessing cessation outcome in quitlines.<sup>32</sup> A secondary outcome measure is the quit attempt rate, which is defined as the percentage of smokers making a quit attempt that lasts for at least 24 hours.

### **Referral Procedure**

This study followed standard Helpline procedures for risk assessment and referral. All staff members who have contact with callers are trained to handle clients who directly or indirectly indicate they have suicidal ideation or who may be a danger to themselves or others. Risk assessment includes clarification of intent, plan, and available support for the client and involvement of a clinical supervisor. After a thorough assessment, a decision is made about the appropriate course of action which could include a referral to mental health providers, verbal agreement for safety, transfer to a local crisis line, and/or contacting appropriate local services including police.<sup>30</sup> Callers who endorsed depressive symptoms on the PHQ-9 were offered a community mental health resource for further support. Additionally, crisis-line numbers were given to 12 callers but no participants indicated a threat to themselves or others that required an emergency response.

### **Data Analysis**

Questionnaires used in this study were scored and coded in accordance with the established literature.<sup>23,29</sup> The scoring algorithm was used to categorize participants as meeting criteria for major depression, mild depression, or minimal depressive symptoms. To meet criteria for major depression, five or more items had to be endorsed “more than half the days” or “nearly every



day” including at least one of the first two items which assess for symptoms of low mood and anhedonia. This scoring algorithm corresponds to the DSM-IV criteria and has been shown to be a valid measure of major depression with a sensitivity and specificity of 88%.<sup>23</sup> For mild depression 2–4 symptoms had to be endorsed, including at least one of the first two items. Those not meeting these criteria were considered to have minimal to no depressive symptoms.

PHQ-9 severity scores ranged from 0–27 and were calculated by adding the value for each response (scale: 0–3).<sup>23</sup> Missing values were imputed using the average score of the nonmissing items if there were 2 or fewer missing items.<sup>24</sup> Callers with more than two missing values were excluded from the analyses ( $n=17$ ). Sum scores were also calculated for the SFQ with each of the 8 items assigned a value of 0–3 for responses ranging from no problem to severe problems with total scores ranging from 0–24.<sup>29</sup> SFQ sum scores of 10 or more met criteria for social functioning impairment<sup>29</sup>.

Outcome analysis included only participants reached for follow-up. Logistic regression analysis was used to compare the 30-day quit rate by baseline depression status, controlling for the following variables: gender, ethnicity, education, Medicaid, age, and use of Helpline cessation counseling and/or cessation medication. Data were analyzed using SAS version 8.0.

## **RESULTS**

### **Sample Characteristics and Depression Prevalence**

Table 1 shows the demographic characteristics of the study participants and callers who met the criteria but were not sampled in the study. There were significantly more female participants

compared to nonparticipants during the same time period. There is no significant difference in any other demographic measure.

There were 861 callers who agreed to participate in this study while 12 callers declined to answer the additional intake questions. Of the 861 participants, 17 were excluded from further analyses due to missing more than 2 responses on the baseline PHQ-9. This resulted in a final sample for the baseline analyses of 844. Over half of these respondents (64.2%) were female and the average age was 42.4 years (SD=12.9). The ethnicity breakdown was 61.4% Caucasian, 10.4% Hispanic, 14.8% African-American, 3.8% Asian/Pacific Islander, 5.7% Native American, and 3.9% other. The sample had a large proportion of Medicaid recipients (59.1%).

Table 2 shows by demographics the percentage of participants meeting criteria for major depression, mild depression, and minimal depressive symptoms at baseline. A total of 24.2% of callers met criteria for major depression while an additional 16.5% met criteria for mild depression. Lower prevalence of major depression was found among the youngest age group (18–24 years) while those with Medicaid had a significantly higher prevalence of current major depression than those not covered by Medicaid.

Social functioning impairment was greatest among those with major depression compared to those with mild depression or with minimal depressive symptoms (74.0%, 44.9%, 22.3%, respectively,  $p < 0.01$ ). The Pearson correlation between PHQ-9 and SFQ sum scores was large and significant ( $r = 0.72$ ,  $p < 0.01$ ).

### **Quitting Outcomes**

Two months after the initial call, 658 participants were reached for follow-up evaluation, a response level of 78%. There was no significant difference in the prevalence of major depression at baseline between participants who were and were not reached for follow-up (24.7% vs 22.3%,  $p = 0.08$ ). More than half of all smokers reported that they made at least one quit attempt that lasted more than 24 hours in the 2 months since they called the quitline. The quit attempt rates were 56.1%, 63.7%, and 55.6%, for the groups with major, mild, and minimal depression, respectively. These rates are not significantly different ( $p = 0.34$ ).

Table 3 shows the 30-day point prevalence quit rates at 2 months, along with the ORs obtained from univariate and multivariate analyses. In this table, smokers from all ethnic minorities were collapsed into one group because the sample size for each subgroup was small. Overall, smokers with current major depression were much less likely to have quit for at least 30 days at the time of the 2-month evaluation, compared to those with minimal depressive symptoms (18.5% vs 28.4%). Both univariate and multivariate logistic regression analyses found the difference to be significant. In contrast, smokers with mild depressive symptoms were no less likely to have quit than smokers with minimal depressive symptoms (31.4% vs 28.4%). Ethnic minority status, use of Helpline cessation counseling and use of cessation medication predicted quitting outcome at 2 months, whereas gender, age, education, Medicaid status, and impaired social functioning did not. Multivariate analysis confirmed that the three significant baseline factors were independent predictors of quitting outcome.

## DISCUSSION

The present study uses a formal instrument to assess for current major depression among callers to a large state quitline and it is one of the few studies to assess major depression among smokers seeking cessation treatment<sup>13-14</sup>. Using the PHQ-9, this study found that almost 1 of 4 smokers seeking help through a quitline has current major depression. The study shows that it is feasible to assess depression with the PHQ-9 in the context of a quitline. The PHQ-9 score correlated well with the measure of social functioning and it predicted quitting success.

The percentage of smokers with current major depression found in this study is more than double the 11%–12% reported for smokers who participated in national surveys.<sup>3-4</sup> What explanation is there for the high percentage of current depression found among quitline callers compared to smokers in general? One possibility is found in the relationship between smoking and depression. Heavy smoking is associated with depression<sup>33-35</sup> and heavier smokers are more likely to seek help.<sup>36-37</sup> As a result, smokers in treatment would be more likely to have major depression than smokers at large. Another possibility is that the quitline receives a large number of calls from smokers on Medicaid. Since Medicaid is associated with low income and low income is associated with depression, the high number of Medicaid callers may contribute to the high prevalence of major depression (Table 2).<sup>38</sup>

A limitation of this study was the nonrandom sampling procedure which could have inflated the percentage of smokers with major depression. Callers to the quitline were assessed for depression only if their intake were conducted by quitline staff who were selected to be part of

the project. It turned out that a greater number of selected staff worked the day shift, when callers were more likely to be women, a group with a higher prevalence of depression.<sup>39</sup> This could lead to an overestimate of the percentage of smokers with depression for the quitline as a whole, although the gender differential shown in Table 1 is not very large. Another limitation is the use of PHQ-9 to assess for major depression. There is evidence that PHQ-9 results correspond well to the DSM IV diagnosis of MDE<sup>22-25</sup>. In a clinical setting, where the emphasis is on treating a disorder, a formal diagnosis of MDE requires additional assessment to rule out bipolar disorder, medical conditions and bereavement as the cause of the depressive symptoms, and requires evidence of substantial impairment. In a quitline setting, the primary reason to screen for depressive symptoms would be to trigger additional help to improve quit rates, not to make psychiatric diagnoses. Consequently, in this study no assessment was made for bipolar disorder, medical conditions, or bereavement, which may have resulted in a higher percentage of smokers being classified as depressed than would be otherwise. However, impairment was measured, which may be used to estimate the percentage of smokers with MDE. Among the 24.2% of callers found to have current major depression from the PHQ-9, 74.0% also had substantial impairment as measured by the SFQ. This means about 18% of quitline callers (24.2% X 74.0%) could have MDE, a substantial proportion.

The PHQ-9 proved to be useful in the quitline context because it predicted the quit rate at the 2-month follow-up. This study found it is feasible to administer the 9 questions over the phone. Future quitline studies may want to explore the use of PHQ-8, which does not include the item “thoughts that you would be better off dead, or hurting yourself in some way.” This would make it easier to compare data with large population surveys such as BRFSS, which has used PHQ-8.<sup>7</sup>

This study provides data to confirm the clinical experience of quitlines. State quitlines have long noted that many depressed smokers call the quitlines and are motivated to quit.<sup>21,40</sup> This is noteworthy given that about 400,000 smokers call the 50 U.S. state quitlines each year. If the results from this study are representative, it would be expected that 100,000 depressed smokers would utilize the state quitline system each year (or 72,000 if adjusted by SFQ measured impairment).

This study shows that depressed smokers attempt to quit at the same rate as their nondepressed counterparts, a finding consistent with previous research that depressed smokers are motivated to quit.<sup>41-44</sup> And although depressed smokers had greater difficulty staying quit than nondepressed smokers, it is promising that as many as 1 in 5 were abstinent after 2 months. Questions remain as to how much current quitline counseling protocols help depressed smokers quit and what can be done to improve their quit rates. The proportion of quitline callers with major depression is large and it might increase as the smoking prevalence in the U.S. decreases. There is a need to develop effective treatments for this population because quitlines represent an important opportunity to reduce health disparities by helping a particularly vulnerable population to quit smoking.

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Table 1. Demographic characteristics of participants and non-participants

		Participants		Non-Participants	
		N	% ( $\pm$ 95%CI)	N	% ( $\pm$ 95%CI)
Gender					
	Men	302	35.8 (32.6, 39.0)	2029	42.8 (41.4, 44.2)
	Women	542	64.2 (61.0, 67.4)	2709	57.2 (55.8, 58.6)
Ethnicity					
	non-Hispanic White	518	61.4 (58.1, 64.7)	2950	62.4 (61, 63.8)
	Hispanic	88	10.4 (8.3, 12.5)	502	10.6 (9.7, 11.5)
	African American	125	14.8 (12.4, 17.2)	653	13.8 (12.8, 14.8)
	Asian/Pacific Islander	32	3.8 (2.5, 5.1)	188	4.0 (3.4, 4.6)
	Native American	48	5.7 (4.1, 7.3)	231	2.8 (2.3, 3.3)
	Other	33	3.9 (2.6, 5.2)	205	4.3 (3.7, 4.9)
Education					
	$\leq$ 12 years	452	53.9 (50.5, 57.3)	2414	51.4 (50, 52.8)
	>12 years	388	46.1(42.7, 49.5)	2283	48.6 (47.2, 50.0)
Medicaid					
	Yes	495	59.1(55.8,62.4)	2516	54.2 (52.8, 55.6)
	No	343	40.9 (37.6, 44.2)	2127	45.8 (43.7, 47.9)

Table 2. Depression status by caller demographics at baseline

	N	Major	Mild Depression	Minimal Depression
		Depression	% ( $\pm 95\%$ CI)	% ( $\pm 95\%$ CI)
Total	844	24.2 (21.3, 27.1)	16.5 (14.0, 19.0)	59.4 (56.1, 62.7)
Gender				
Men	302	21.9 (17.2, 26.6)	16.9 (12.7, 21.1)	61.3 (55.8, 66.8)
Women	542	25.5 (21.8, 29.2)	16.2 (13.1, 19.3)	58.3 (54.1, 62.5)
Age				
$\leq 24$	106	12.3 (6.0, 18.6)	20.8 (13.1, 28.5)	67.0 (58.0, 76.0)
25-44	350	24.6 (20.1, 29.1)	16.3 (12.4, 20.2)	59.1 (53.9, 64.3)
45-64	358	27.7 (23.1, 32.3)	15.9 (12.1, 19.7)	56.4 (51.3, 61.5)
$\geq 65$	32	18.8 (8.4, 36.8)	9.4 (2.9, 23.6)	71.9 (53.4, 85.1)
Ethnicity				
Caucasian	518	23.9 (20.2, 27.6)	16.0 (12.8, 19.2)	60.0 (55.8, 64.2)
Hispanic	88	23.9 (15, 32.8)	10.2 (3.9, 16.5)	65.9 (56.0, 75.8)
African American	125	23.2 (15.8, 30.6)	16.8 (10.2, 23.4)	60.0 (51.4, 68.6)
Asian/Pacific Islander	32	12.5 (1.0, 24.0)	18.8 (5.3, 32.3)	68.8 (52.7, 84.9)
Native American	48	41.7 (27.8, 55.6)	18.8 (7.7, 29.9)	39.6 (25.8, 53.4)
Other	33	18.2 (5.0, 31.4)	30.3 (14.6, 46.0)	51.5 (34.4, 68.6)
Education				
$\leq 12$ years	452	26.1 (22.1, 30.1)	18.1 (14.6, 21.6)	55.8 (51.2, 60.4)
$> 12$ years	388	21.9 (17.8, 26)	14.4 (10.9, 17.9)	63.7 (58.9, 68.5)
Medicaid				
Yes	495	28.7 (24.7, 32.7)	17.4 (14.1, 20.7)	53.9 (49.5, 58.3)
No	343	17.5 (13.5, 21.5)	15.5 (11.7, 19.3)	67.1 (62.1, 72.1)

Table 3. Quit rates by caller characteristics

Characteristics	Quit rate %	Univariate OR (95% CI)	Multivariate OR (95% CI)
Depression status			
Minimal	28.4	ref	ref
Mild	31.4	1.2 (0.7, 1.8)	1.0 (0.6, 1.7)
Major	18.5	0.6 (0.4, 0.9)	0.5 (0.3, 0.9)
Gender			
Men	28.5	ref	ref
Women	25.5	0.9 (0.6, 1.2)	0.9 (0.6, 1.3)
Age			
<=24	26.3	ref	ref
25–44	27.6	1.1 (0.6, 1.9)	0.7 (0.4, 1.4)
45–64	26.6	1.0 (0.6, 1.8)	0.6 (0.3, 1.2)
>=65	13.0	0.4 (0.1, 1.6)	0.3 (0.1, 1.2)
Ethnicity			
Non-Hispanic white	23.5	ref	ref
Other ethnicities	31.6	1.5 (1.1, 2.1)	2.1 (1.4, 3.1)
Education			
≤12 years	26.2	ref	ref
>12 years	26.8	1.0 (0.7, 1.5)	1.1 (0.8, 1.6)
Medicaid			
No	27.6	ref	ref
Yes	25.7	0.9 (0.6, 1.3)	0.6 (0.4, 1.0)
Cessation counseling			
No	14.9	ref	ref
Yes	30.2	2.5 (1.5, 4.0)	2.7 (1.5, 4.7)
Cessation medication			
No	16.2	ref	ref
Yes	42.5	3.8 (2.7, 5.5)	4.3 (2.9, 6.4)