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PREVALENCE AND CORRELATES OF SMOKING STATUS AMONG DEPRESSED  
INDIVIDUALS IN VETERANS AFFAIRS PRIMARY CARE

By

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Prevalence and correlates of smoking status among depressed individuals in Veterans Affairs primary care

Chairperson: Duncan Campbell

Smoking is the primary and most preventable cause of morbidity and mortality in the United States, with smoking rates being particularly high among Veterans who experience high rates of mental health and substance use disorders. This study investigates the prevalence of smoking among depressed patients in Veterans Affairs primary care. Correlates of smoking status were examined in order to improve understanding of the relations among smoking status, psychosocial characteristics, physical and mental health problems, suicide risk, mental health stigma and substance misuse, and to find predictive factors of smoking abstinence and cessation over time. Study findings have potential to inform development and/or implementation of targeted smoking cessation interventions for depressed Veterans presenting in VA primary care.

Cigarette smoking is the leading preventable cause of morbidity and mortality in the US (Centers for Disease Control [CDC], 2004). It evidences a causal relationship with eleven types of cancer, increases risk for cardiovascular and respiratory diseases, and raises risk for adverse reproductive and early childhood effects (US Department of Health and Human Services [USDHHS], 2001; CDC, 2004; CDC, 2008). About half of all smokers in the United States who fail to quit will die of a smoking related illness (Morbidity and Mortality Weekly Report [MMWR], 2007), and estimates suggest that cigarette smoking accounts for roughly 443,000 deaths annually (CDC, 2008). Approximately 200,000 of these deaths are accounted for by persons with mental illness and substance abuse disorders (Mauer, 2006). Indeed, tobacco use is the most significant contributor to premature mortality among people with chronic mental illness, who tend to die an average of 25 years earlier than the general population (Schroeder & Morris, 2010). These statistics highlight the importance for physicians to advise all smokers--including those with mental illness--to quit, and in fact, the Agency for Healthcare Research and Quality (AHRQ) Clinical Practice Guideline for Treating Tobacco Use and Dependence recommends that all tobacco users should be provided with screening and treatment at every healthcare visit (Fiore, Bailey, & Cohen, 2000; Fiore, Jaén, Baker, Bailey, Benowitz, Curry, et al., 2009).

Understanding the links between smoking and mental health has potential to inform development and/or implementation of treatment aimed at smoking cessation for patients with mental health concerns. Some negative mental health conditions associated with smoking—including mood disorders, anxiety disorders, personality disorders, and substance use disorders—appear to predict persistent nicotine dependence among adults in the United States (Goodwin, Pagura, Siwak, Leshow, & Sareen, 2011). Indeed, Ong, Zhou, & Sung (2011) found

that without smoking cessation counseling, the predicted probabilities of quitting smoking in primary care were lower for patients with alcohol, drug, or mental disorders (6.0%) than for smokers without these disorders (10.5%). In addition to the obvious health demoting effects of smoking, Zevin and Benowitz (1999) noted that smoking increases the metabolism of a variety of psychiatric medications, which effectively decreases therapeutic blood levels.

Whereas causal links regarding associations between smoking and mental health are not fully understood, research suggests that multiple physiological and psychological factors contribute to the elevated rates of smoking among individuals with mental health and substance use disorders (Dursun & Kutcher, 1999; Kendler, Neale, MacLean, Heath, Eaves, & Kessler, 1993; Ziedonis, Kosten, Glazer, & Frances, 1994). Indeed, the relationship between smoking and mental illness has been well documented in the US general population (American Psychiatric Association, 1994), with population based studies showing smoking rates among individuals with mental disorders to be nearly twice those of the general population (41% versus 23%) (Lasser et al., 2000, Rohde et al., 2003).

### **Smoking and Depression**

Many studies have established associations between depression and cigarette smoking in the general population (Kendler, Neale, MacLean, Heath, Eaves & Kessler, 1993; Degenhardt, 2001) with smokers being more likely than nonsmokers to report symptoms of depression (Kinnunen, Haukkala, Korhonen, Quiles, Sprio & Garvey, 2006). Research has also shown that compared to non-depressed smokers, depressed smokers are less likely to stop smoking and more likely to experience smoking relapse (Kinnunen, Doherty, Militello, & Garvey, 1996; Niaura, Britt, Shadel, Goldstein, Abrams, & Brown, 2001).

Despite the extensive literature on the association between depression and smoking in the general US population, researchers have only begun to understand the causal associations, suggesting contributing factors such as psychological, social, and genetic (Ziedonis, Hitsman, Beckham, Zvolensky, Adler, Audrain-McGovern et al., 2008). One explanation of the relationship between depression and tobacco use posited by researchers is the use of smoking as a self-regulating mechanism to decrease negative affect, or acute emotional distress associated with mental illness (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). However, little empirical evidence has been found to support this explanation of the co-occurrence of smoking and depression (Kassel, Stroud, & Paronis, 2003; Johnson & Breslau, 2006).

Other proposed explanations supported in the literature include bidirectional causality, suggesting that smoking influences depression and depression influences smoking (Breslau, Peterson, Schultz, Chilcoat, & Andreski, 1998; Brown, Lewinsohn, Seeley, & Wagner 1996; Windle & Windle, 2001), and unidirectional causality, proposing that smoking causes depression (Choi, Patten, Gillin, Kaplan, & Pierce, 1997; Klungsoyr, Nygard, Sorensen, & Sandanger, 2006; Steuber & Danner, 2006). Evidently, further research is needed to clarify the relationship between smoking and depression. Regardless of what the causal relationship may be, it is still important to recognize smoking and depression comorbidity and the fact that the two often go together.

### **Smoking and Mental Illness Among Veterans**

Considering the negative public health burden of smoking, US military Veterans represent a unique group of persons, as they present in primary care settings with both higher smoking prevalence (27% versus 21%) and with higher prevalence of some mental health disorders (50% versus 25%) than those of the adult civilian population (Brown, 2009; Office of

Public Health and Environmental Hazards, Department of Veterans Affairs, 2010; Sansone & Sansone, 2010; Ziedonis, Williams, Steinberg, Smelson, Sussnr, Foulds, et al., 2005). While findings differ based on the VA population assessed, settings, and other factors (Brancu, Straits-Troster & Kudler, 2011), depression and PTSD represent the most common mental health diagnoses among military personnel and Veterans (20% and 27% respectively) (Brancu, Straits-Troster & Kudler, 2011; Hankin, Spiro, Miller & Kazis, 1999).

Although the mechanisms affecting smoking among individuals with PTSD remain unclear (Cook, Jakupcak, Roshenheck, Fontana & McFall, 2009), multiple studies have documented a link between PTSD and smoking among Veterans (Fu, McFall, Saxon, Beckham, Carmody, Baker, & Joseph, 2007). More than half of treatment-seeking Veterans with PTSD report smoking (Beckham, Crawford, Feldman, Kirby, Hertzberg, Davidson, et al., 1997). In light of findings linking smoking and PTSD, McFall et al. (2005) designed a multisite randomized controlled effectiveness trial to test an integrated smoking cessation treatment for Veterans with PTSD. In this study, McFall et al. assigned smokers who were in PTSD treatment to one of two conditions. The first condition was integrated care, consisting of smoking cessation treatment provided by mental health specialists and integrated within psychiatric care. The second condition was a standard care condition wherein smoking cessation treatment was provided by a smoking cessation specialist. The authors found that those patients assigned to the integrated care condition were five times more likely to quit smoking and to remain abstinent during the study window (2, 4, 6, and 9 months) than those PTSD patients assigned to the standard care condition (smoking treatment delivered by a smoking cessation specialist).

## **Smoking Relationships with Stigma, Social Support, Alcohol Abuse, and Suicidal Ideation**

Several additional psychosocial and psychiatric factors with potential to contribute to smoking are worth examining. Stigma related to mental health conditions and their treatment confers stress and subsequent negative affective outcomes (USDHHS, 1999). For example, stigma has been found to contribute to loneliness, distress, and discrimination among individuals with mental disorders (Hocking, 2003). Mental health stigma also results in a great number of negative consequences, such as discrimination in employment and housing (Byrne, 1997). If smoking is employed as a means to regulate the experience of negative affect associated with the increased stressors instigated by mental health stigma (Kassel, Stroud, & Paronis, 2003), then it is possible that stigma may also contribute indirectly to smoking. Although there appears to be limited research on the role of mental health stigma in cigarette smoking and substance abuse in general, Lawn, Pols and Barber (2002) found that stigma reduction played a significant role in smoking behavior for a sample of community-living psychiatric clients. For these clients, smoking provided a sense of freedom and a means to regain autonomy in a world where mental health stigma had become part of daily life.

Tobacco and alcohol use are often co-occurring conditions, with drinkers being more likely to smoke cigarettes than nondrinkers, and smokers being more likely to drink than nonsmokers (Jackson, Sher, Cooper, & Wood, 2002; Torabi, Bailey, & Jabbari, 1993; Wetzels, Kremers, Vitoria & de Vries, 2003). Furthermore, smoking has been associated with relapse to drinking (Sandor, 1991; Sobell & Sobell, 1991) and drinking has been associated with smoking relapse (Krall, Garvey, & Garcia, 2002). In addition, the interaction between drinking and smoking appears to increase the risk for specific types of cancer and cardiovascular problems

(Schlech, Franco, Pintos, Negassa, Kowalski, Oliveira, et al, 1999). Targetting smoking in alcohol abuse treatment has not been found to have adverse effects on alcohol abuse treatment outcome, and quitting smoking has been found to improve success rates in alcohol abuse treatment (Shiffman & Balabanis, 1996).

Of note, smoking status has demonstrated an association with increased risk of suicidal behavior (Hemmingsson & Kriebel, 2003; Iwasaki, Akechi, Uchitomi, & Tsugane, 2005; Moriya & Hashimoto, 2005; Riala, Alaraisanen, Taanila, Timonen, & Rasanen, 2007). Although suicidal ideation is a well-known predictor of suicidal behavior and completed suicide (Coombs, Miller, Alarcon, Helrihy, Lee, & Morrison, 1992; De Leo, Cerin, Spathonis, & Burgis, 2005), there are fewer studies in the literature examining the association between suicidal ideation and smoking status. In a study examining suicidal ideation among smokers, former smokers, and never smokers, Clarke, Eaton, Petronis, Chatterjee, and Anthony (2010), found current smokers to have an increased risk for suicidal ideation, even after controlling for symptoms of depression, anxiety, and substance abuse. Understanding the relationship between smoking and suicidal ideation can help elucidate mechanisms underlying this association and has potential implications for smoking cessation and suicide prevention efforts.

Finally, a lack of social support confers increased risk of depression (Hefner & Eisenberg, 2009), and some evidence suggests that social support may moderate the relationship between depression and smoking cessation (Turner, Mermelstein, Hitsman, Warnaecke, 2008). For example, Turner et al. found that depressed women with a recent history of depression who reported higher levels of perceived social support were as likely to quit as women without a recent history of depression. Indeed, increased social support facilitates smoking cessation

efforts, resulting in increased abstinence rates (Cobb, Graham, Bock, Papandonatos, & Abrams, 2005; Johnson, Alexander, Kapke, McClure, Wiese, Greene, et al., 2009).

### **Smoking Cessation Treatment for Individuals with Mental Illness**

Emerging evidence in the treatment domain highlights the importance of mental health status considerations in smoking cessation efforts. Multiple studies have shown that smoking cessation interventions tailored to the specific needs of individuals with mental illness appear to yield more optimal outcomes than non-tailored treatments, including higher cessation rates and prolonged abstinence (Hayford et al., 1999; Patten, Martin, Myers, Calfas, & Williams, 1998). In a representative study in this area, Schleicher and colleagues (2012) found that, relative to controls, depressed smokers in a mood-oriented group treatment for smoking were more likely to reduce smoking intensity by 50% and evidenced a greater increase in smoking reduction confidence. Whereas these findings hold promise, a recent review and meta-analysis of the evidence on the comparative effectiveness of smoking cessation treatment for patients with depression, Gierish, Bastian, Calhoun, McDuffie, and Williams (2010) found that very few smoking cessation trials included smokers with current depression, and that current or recent depressive episodes in patients who smoked actually constituted exclusion criteria for many studies (Gierisch, Bastian, Calhoun, McDuffie, & Williams, 2010).

While the increased effectiveness of smoking cessation interventions tailored for patients with mental disorders is worth considering, the high smoking rates among Veterans with mental health disorders indicate that smoking cessation services for this population is still in need of further improvement. Simple smoking cessation counseling services provided in VA primary care settings, beyond obtaining smoking status and offering referrals to smoking cessation clinics, could improve cessation rates for smokers with mental disorders. Indeed, a study

examining the effects of primary care providers counseling patients on smoking cessation by talking to them about quitting or avoiding smoking, found that those smokers with mental health and alcohol and substance abuse disorders were as likely to quit smoking as those without these disorders (Ong, Zhou, & Sung, 2011).

### **Smoking Cessation Implementation Efforts within VA**

Although chronic disease prevention practices have improved dramatically in the VA health care system since the 1990s (Sherman, 2008), and AHRQ smoking cessation guidelines have been implemented in this system, there is still room for improvement regarding adherence to these guidelines. Studies suggest that only between 50% and 75% of VA smokers are advised to quit (Ward et al., 2003; Joseph et al., 2004). Moreover, those smokers who planned to quit (approximately 40%) reported receiving help only about half the time, with a small minority (21%) receiving medications to aid with smoking cessation (Joseph, Arikian, An, Nugent, Sloan, Pieper, et al., 2004).

In a quality improvement report of a framework for tobacco control, Sherman (2008) listed among the lessons learned from Veterans Health Administration, the requirement of “a more concerted effort than simply having a smoking cessation clinic and waiting for referrals” (pg. 1018). Sherman also stressed the need for evidence-based standards of care, measuring performance, and systematically identifying and disseminating best practices. Currently, most VA settings depend on nursing staff to ask about smoking, but there is no systematic approach to offering counseling (Sherman, Yano, Lanto, Simon & Rubenstein, 2005). In addition to improving efforts to follow smoking cessation guidelines, physicians in the VA primary care system need to recognize the complexities and added benefits of quitting smoking for smokers

with mental illness (Schroeder & Morris, 2010) so that they may implement and follow the most effective procedures to help this vulnerable population.

The smoking behavior of depressed Veterans has received considerably less attention than that of smokers with PTSD, and to our knowledge, the smoking behavior of depressed Veterans in primary care settings in particular has received even less interest. Understanding the specific proportions of depressed smokers with co-occurring physical and mental health conditions can provide valuable information on the distinctive issues relevant to smoking cessation treatment in this setting. In addition, if smoking is used as a self-regulation mechanism, then comparing individuals who are depressed and smoke to those who are depressed and do not smoke can provide a means of evaluating differences in features of depression as well as other psychological or social factors that may influence smoking behavior (Ziedonis, Hitsman, Beckham, Zvolensky, Adler, Audrain-McGovern et al., 2008).

Depression has also been shown to be a risk factor for negative health consequences, such as cardiovascular illness and several types of cancer (Knet, Raitasalo, Heliövaara, Lehtinen, Pukkala, Teppo, Maatela & Aromaa, 1996; Glassman & Shapiro, 1998; Linkins & Comstock, 1990). A greater understanding of the increased morbidity of depressed smokers, including the role of co-occurring PTSD, substance use, anxiety disorders, and possible attenuating factors such as the role of social support, can help elucidate important issues worth considering in the development of effective smoking cessation treatment for this population. Furthermore, Barnett, Wong, & Hall (2008) evaluated a smoking cessation program for outpatients with depression and deemed it to be cost effective. Indeed, smoking cessation programs have been found to be significantly more cost-effective than most medical care interventions (Warner, 1997).

It appears that smoking cessation counseling that is easily accessible and does not require the smoker to take an additional step to receive smoking cessation services (e.g., go to a separate appointment at a smoking cessation clinic) can improve cessation rates for individuals with these disorders. Study findings indicate that simply offering referrals to smoking cessation clinics does not improve quit rates in a VA primary care, and that having an on-call smoking cessation counselor can be an effective approach to improving smoking cessation treatment (Yano et al., 2008; Sherman, 2007). Evidently, there is a need to change the current approach to cessation counseling in the VA health care system. Since VA primary care settings are likely to treat smokers who also present with alcohol, substance, or mental health disorders, and who may not enroll in specialty mental health treatment, the role and effectiveness of smoking cessation in VA primary care clinics for Veterans with mental health and substance use disorders is worth investigating.

In sum, chronic mental illness and smoking both demonstrate associations with morbidity and mortality, and US military Veterans present in primary care with smoking prevalence and prevalence of some mental health disorders at relatively high rates. Among Veterans, depression and PTSD are particularly common mental health concerns, and both confer risk for negative health outcomes. Emerging evidence in the smoking cessation treatment domain for individuals with mental illness suggests that integrated smoking cessation services provided by a mental health specialist lead to better cessation outcomes than the current standard of care, although further research in this domain is still desperately needed. Within the VA health care system, smoking cessation guideline implementation efforts have room for improvement, as studies show that only between 50% and 75% of smokers are advised to quit, and there is currently no systematic approach to offering counseling. A better understanding of the characteristics of

depressed smokers and correlates of smoking in the VA primary care system may help identify issues important in the development of effective smoking cessation treatments for this population, which when considering cost-effectiveness and potential health benefits should be a high priority preventive service.

### **Relevance of the Current Study**

Our sample of Veterans is unique in that it consists solely of depressed individuals, allowing us to examine differences between depressed smokers and nonsmokers so that we may help clarify important and distinctive factors that can influence smoking behavior in this population. We maintain that improved understanding of predictors and correlates of smoking status among depressed Veterans is crucial in the development of effective cessation interventions in this population. In addition, because all of the participants in our sample are depressed, we are provided with a unique opportunity to examine the impact of stigma on cigarette smoking between those who have the illness and experience greater levels of stigma and those who may not experience such high levels of stigma regarding their depression.

Smoking status confers multiple health risks, which appear to exact particularly high costs for Veterans, many of whom already have multiple physical and mental health concerns. As noted above, smoking is linked to an increased risk of suicidal ideation and to a variety of negative physical and mental health outcomes, and the smoking behavior of depressed Veterans has received little attention in the research literature. In an effort to inform development of smoking cessation interventions for the population of depressed Veterans, the proposed study examined correlates and predictors of smoking status and successful smoking cessation among a sample of depressed Veterans in primary care.

The specific aims of the current study were: (1) To determine smoking rates among depressed Veterans in primary care, (2) to identify physical and mental health correlates of smoking status (present, past, never) among depressed Veterans in primary care, and (3) to identify factors that predict smoking abstinence and cessation among depressed individuals over time. Ancillary aims included an examination of the relationship between smoking and suicidal ideation. Specifically, we wanted to investigate whether smoking status was predictive of higher risk for suicidal ideation and if this relationship still held after accounting for psychological comorbidities. A second ancillary aim was to examine the relationship between mental health stigma and smoking status.

**Anticipated Findings/Hypotheses:**

Consistent with previous studies, we predicted that compared to nonsmokers, smokers would evince higher depression severity, higher levels of alcohol consumption, worse PTSD symptomatology, more complex medical comorbidities, lower social support, increased risk for suicidal ideation, higher levels of mental health stigma, and increased care utilization for both emotional and physical problems. We also anticipated that few depressed primary care smokers would successfully quit smoking in the study window.

**Methods:**

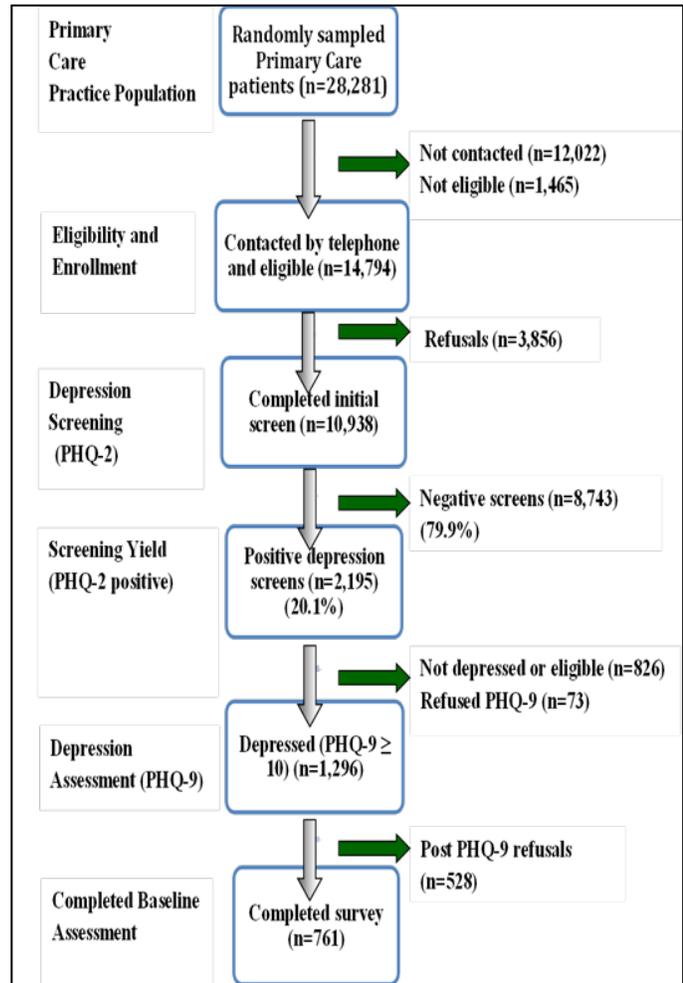
The present project consists of a secondary data analysis of a longitudinal study, the Well-being Among Veterans Enhancement Study (WAVES), which evaluated a quality improvement depression intervention by means of a cluster randomized trial. WAVES employed 10 VA primary practices in rural/semirural settings across 5 states. Seven sites were randomized to receive an Evidence-Based Quality Improvement Collaborative Care Model for

depression (EBQI-CCM) and three were used as comparison sites. Full details regarding WAVES can be found elsewhere (Chaney, Rubenstein, Liu, Yano, Bolkan, Lee, et al., 2011).

## Participants

Researchers used VA electronic medical records from participating practices to identify possible participants based on whether they had a primary care appointment at one of the participating sites in the preceding 12 months and a pending appointment within three months. Figure 1 describes the WAVES sampling strategy and the resulting sampling sizes for the baseline assessment. Potential participants were contacted by phone and screened for depression by trained interviewers from a contracted firm. Consenting participants

*Figure 1: Sampling Flow Chart*



were included in the study if they reported major depressive symptomatology on the Patient Health Questionnaire – 9 (PHQ-9: Kroenke, Spitzer, & Williams, 2001), a self-report measure of depressive symptomatology. Exclusion criteria included conditions requiring urgent care (e.g., acute suicidality, psychosis) or lack of capacity to communicate over the telephone.

As presented in the Figure, 14,794 patients were contacted by telephone and nearly 11,000 patients were screened for depression with the PHQ-2, the first two items of the PHQ-9.

Just over 20% of these participants screened positive on the PHQ-2; ultimately, after full screening with the PHQ-9, 1,296 (59% of PHQ-2 screen positive) patients reported major depressive symptomatology and met WAVES inclusion criteria. Of these, 761 completed the full baseline measures. Follow-up assessments were conducted at 7- ( $n = 546$ , 72% of baseline) and 18- ( $n = 370$ , 49% of baseline) months from baseline. Survey data were adjusted for enrollment probability (Chaney et al., 2011). Since the current proposal is unrelated to treatment, we will examine all WAVES participants simultaneously, collapsing the treatment and control site participants. IRB approval for the proposed analyses is granted and active at UCLA, and an exemption from full board review was granted by the University of Montana IRB.

## **Measures**

The measures described below were collected by a contracted firm using Computer Assisted Telephone Interviews (CATI).

***Cigarette Smoking.*** Two questions assessed cigarette smoking at baseline. Participants were asked whether they had smoked 100 cigarettes in their lifetimes and whether they still smoked cigarettes. The CDC (2002) defines an “ever smoker” using this 100 cigarette threshold. An additional question was asked to determine how long ago they quit smoking if they answered that they no longer smoked cigarettes. The follow-up smoking question at 7- and 18-month time points asked whether participants had smoked any cigarettes in the past 30 days (See Appendix). Smoking self-report has been found to be accurate in most smoking studies (Patrick, Cheadle, Thompson, & Diehr, 1994). We considered someone a ‘current smoker’ if he/she had smoked at least 100 cigarettes in his/her lifetime and answered ‘yes’ to whether or not he/she still smoked cigarettes. Participants who had smoked 100 cigarettes in their lifetimes, but answered ‘no’ to the question of whether or not they still smoked cigarettes were classified as ‘former smokers.’

Finally, if participants answered ‘no’ to whether they had smoked 100 cigarettes in their lifetime and whether they still smoked, they were classified as ‘never smokers.’ We created a dichotomous category (smoker versus nonsmoker) by combining former and neversmoker and categorizing them as nonsmokers and current smokers were considered smokers. We used this dichotomous variable for our analysis because we considered it to be the most helpful and relevant for physicians assessing smoking status in primary care.

***Demographic characteristics.*** Study staff gathered demographic information regarding participant gender, age, ethnicity (dichotomized to White vs. non-White), level of education (dichotomized to high school or less vs. some college or more), relationship status (dichotomized to married/living as married vs. single), and current employment status (employed full or part-time, unemployed, on disability, retired, or other).

***Depressive symptomatology.*** The PHQ-9 assessed depressive symptom severity. Participants indicated the frequency of Diagnostic and Statistical Manual of Psychiatric Disorders—4<sup>th</sup> edition (DSM-IV) (American Psychiatric Association [APA], 1994) major depressive episode symptoms over the past two weeks using a 4-point scale (0 = “not at all” – 3 = “every day/nearly every day”). Higher scores indicated worse symptomatology. The diagnostic validity of the PHQ-9 was established in studies involving 8 primary care and 7 obstetrical clinics, and PHQ scores  $\geq 10$  had a sensitivity of 88% and a specificity of 88% for major depression (Kroenke, Spitzer, & Williams, 2001).

***Suicidality.*** A single question taken from the PHQ-9 was used to assess suicidality. Participants were asked to rate on a 4-point scale whether they had “thoughts that [they] would be better off dead or of hurting [themselves] in some way.” Higher scores represented more frequent thoughts about suicide. Any response greater than “not at all” was coded positive for suicidal ideation.

***Alcohol consumption.*** The Alcohol Use Disorders Identification Test consumption questions (AUDIT-C) (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998) assessed alcohol consumption. AUDIT-C responses were summed and higher scores indicated higher consumption. The AUDIT-C predicts poor alcohol-related outcomes and scores greater than 8 are associated with morbidity and mortality (Bradley, Maynard, Kivlahan, et al., 2001). Because the research evidence indicates that low-level drinkers have lower rates of morbidity and mortality than nondrinkers, we categorized AUDIT-C scores into 8 levels (0, 1-3, 4-5, 6-7, 8-9, and  $\geq 10$ ), using scores of 1-3 as the reference category for our multivariate analysis (Dawson, 2006; Marmot, Shipley, Rose, & Thomas, 1981; Williams, Peytremann-Bridevaux, Fan, Bryson, Blough, Kivlahan, et al., 2010).

***Posttraumatic Stress Disorder.*** The primary care PTSD Screen (PC-PTSD) (Prins, Ouimette, Kimerling, Cameron, Hugelshofer, Shaw-Hegwer, et al., 2003) assessed PTSD. The PC-PTSD presents four questions that assess the presence or absence of four PTSD symptoms (i.e., reexperiencing, avoidance, hypervigilance, and emotional numbing related to past trauma). The measure produces scores ranging from 0 to 4, with scores greater than 3 predicting PTSD with acceptable sensitivity (0.78) and specificity (0.89) (Prins, Ouimette, Kimerling, Cameron, Hugelshofer, Shaw-Hegwer, et al., 2003).

***Anxiety and Panic.*** Participants were asked two ‘yes /no’ questions regarding the presence of general anxiety and panic attacks over the past 6 months. The questions asked whether they had felt “anxious much of the time and whether [they] experienced a panic attack when [they] suddenly felt intense fear and discomfort.” A follow-up question asked whether they had experienced a panic attack during the past month (CIDI, 1989).

**General Health.** A single item from the Health Status Questionnaire (Kazis et al., 1991) was used as an indicator of general health. Participants were asked to rate their overall perceived health on a five-point scale, ranging from “1 = excellent” to “5 = poor.”

**Medical comorbidities.** The Seattle Index of Comorbidity (SIC) (Fan, Au, Heagerty, Deyo, McDonnell, & Fihn, 2002) was used to assess medical comorbidities by means of determining the presence/absence of seven chronic illness conditions, cigarette smoking status (see Appendix), and participant age. The SIC predicts hospitalization and mortality (Fan, Au, Heagerty, Deyo, McDonnell, & Fihn, 2002).

**Self-reported health care utilization.** Participants reported the frequency of medical care utilized in the previous six months. Frequency of care for both physical and emotional problems was reported separately for the following treatment venues: outpatient, inpatient, and emergency department care. The derived variables were created by combining the total number of hospital admissions including those inside and outside the VA system for physical problems in the past 6 months, and the total number of hospital admissions in and outside of the VA system for emotional problems. For outpatient care, we combined the total number of outpatient visits inside and outside of the VA system for a physical problem, and then the total number of outpatient visits inside and outside of the VA for an emotional problem.

**Perceptions about depression.** Participants’ beliefs about depression and depression treatment were assessed using several items, with responses on a 5-point Likert scale (1 = ‘strongly agree’ to 5 = ‘strongly disagree’). To assess participants’ beliefs relevant to stigma, participants were asked whether they would conceal depression treatment from an employer and about their amenability to a depression diagnosis and depression treatment. Using a conceptual approach, we created a treatment amenability index by combining three items reflective of participants’

'perceptions about depression'. The three items ( $\alpha = .72$ ) included participants' openness to depression treatment, their openness to a diagnosis of depression, and their beliefs that they were currently in need of depression treatment. Lower mean scores were considered to be indicative of higher amenability to treatment and diagnosis. At 18-months, participants answered questions regarding their beliefs that depression treatment would result in devaluation by other people, the relative degree of comfort they felt related to depression vs. medical illness treatment, and their relative degree of comfort with primary vs. specialty mental health clinic depression care.

***Physical and mental health function.*** 11 items taken from the Short Form 36 v2 (SF-36) (Ware & Sherbourne, 1992) measure were used to assess physical and mental health function. The SF-36 v2 is a widely use measure of quality of life and has been used in multiple studies with chronic illnesses (Asamo, Reid, Ali, Lipps, & Williams-Green, 2008). SF-11 and MHI-5 scaled scores indicating degree of limitations in function due to physical and mental illness were used. Higher scores were indicative of better physical and mental health function.

***Social support.*** Eight items from the Medical Outcomes Study Social Support Scale (Sherbourne & Stewart, 1991) measured emotional and tangible social support. Higher mean scores indicated higher social support.

### **Analysis**

Descriptive analyses were used to determine self-reported smoking rates in our sample. Smoking variables included having smoked at least 100 cigarettes in their lifetime, current smoking status, and how long ago participants quit smoking cigarettes. We also reported smoking status at 7- and 18-month follow-up time periods. Baseline differences between depressed current, former and never smokers were examined with respect to measures of theoretical and clinical interest. Initial comparisons examined bivariate differences for current, former and never smokers on a range of

demographic, psychosocial, health status and health utilization variables. A follow-up multivariate logistic regression analysis examined the odds of current smoking associated with the following measures: Demographic characteristics (gender, age, ethnicity, education, relationship status, living situation, and employment), depression severity, PTSD status, alcohol consumption, general and medical comorbidities, and social support. For this follow-up logistic regression analysis, we examined all of our predictor variables and looked for both conceptual and statistical reasons for including them in the model (e.g., if the literature indicated associations, and if the relationship was significant at the bivariate level at  $p \leq .10$ ). Finally, descriptive analyses examined the proportion of depressed smokers at baseline who quit during the study window (i.e., over the course of 18 months).

## **Results**

### ***Participants***

Table 1 presents demographic characteristics for our sample. Participants had a mean age of 60 (SD=12). 94% of our participants were male, 85.3% were Caucasian, 49.4% had less than a high school education, and 60.1% were married or living as married. 17.5% of participants were employed, and the mean depression score on the PHQ-9 was 17.5 (SD=4.2).

### ***Smoking Rates***

39.8% of our sample reported currently smoking cigarettes, and 81.6% reported lifetime smoking ( $\geq 100$  cigarettes). Three (.4%) participants reported that they had quit within the past 30 days, 13 (1.7%) reported quitting from one month to one year prior to baseline, and 301 (39.6%) reported quitting more than one prior to baseline. Regarding quit rates at 7 and 18-month follow-up assessments, only 7 (<1%) smokers had quit smoking at the 7 month follow-up, and 16 (2.1%) had quit at 18 months.

### ***Bivariate Analyses***

As shown in Table 1, bivariate analyses for physical and mental health correlates of smoking status indicated that relative to non-smokers, current smokers were more likely to be younger ( $p < .001$ ), less likely to be married ( $p < .001$ ), and more likely to be employed ( $p = .020$ ). As hypothesized, in terms of physical and mental health problems, smokers exhibited higher depressive symptomatology (16.3 vs. 15.5,  $p = .02$ ), reported more symptoms of PTSD on the PC-PTSD (2.1 vs. 1.5,  $p < .001$ ), higher alcohol consumption (AUDIT-C) (2.8 vs. 1.5,  $p < .001$ ), worse overall mental health status (MHI-5) (37.5 vs. 46,  $p < .001$ ), more medical comorbidities (SIC) (7.6 vs. 6.7,  $p < .001$ ), and less social support (3.4 vs. 3.8,  $p < .001$ ). Anxiety and panic did not differ between groups, and contrary to our predictions, presence of suicidal ideation did not vary with smoking status.

Regarding health utilization patterns, smokers and nonsmokers did not differ by number of hospitalizations for a physical problem over the past 6 months. Smokers and nonsmokers also reported similar proportions of outpatient visits for a physical or emotional problem and similar numbers of in-person visits with a mental health specialist. However, compared to nonsmokers, smokers reported higher numbers of hospitalizations for an emotional problem (1.1 vs. 0.4,  $p = .05$ ), and were more likely to have visited any mental health specialist, either in person or by telephone, over the 6 months prior to baseline (51.7% vs. 40.8%,  $p = .003$ ). Smokers were also more likely to have missed a health care appointment over the past 6 months (41.3% vs. 31.4%,  $p = .005$ ), and to have missed medication doses over the past 6 months (38.3% vs. 30.3%,  $p = .02$ ). In addition, smokers were more amenable to depression treatment than nonsmokers (1.95 vs. 2.3,  $p < .001$ ).

**Table 1. Bivariate Comparisons: Demographic Characteristics and Physical and Mental Health Correlates of Smoking Status**

Characteristic	Overall (n=761)	Smokers (n=303)	Non-Smokers (n=458)	P-Values
<b>Demographics</b>				
Mean Age (SD)	60.3 (12)	55.4 (9)	63.6 (13)	<.001
Gender (% Male)	94.0	92.4	95.0	.15
Ethnicity (% White)	85.3	83.2	86.8	.17
Education (% <High School)	49.4	50.2	48.9	.73
Relationship Status (% Married/living as married)	60.0	50.2	66.6	<.001
Employment (% Working)	17.5	21.5	14.9	.02
<b>Physical and Mental Health</b>				
Mean Depression Score (SD)	15.8 (4.3)	16.3 (4.4)	15.6 (4.2)	.02
Mean PTSD Score (SD)	1.8 (1.7)	2.1 (1.6)	1.5 (1.7)	<.001
Mean Alcohol Consumption Score (AUDIT-C) (SD)	2.0 (3.1)	2.8 (3.8)	1.5 (2.4)	<.001
Mean Mental Health Status Score (SD)**	42.6 (20.2)	37.5 (18.9)	46.0 (20.3)	<.001
Overall Health (% fair/poor)	80.4	83.2	78.6	0.12
Mean Medical Comorbidities (SIC)	7.1 (3.3)	7.6 (2.8)	6.7 (3.6)	<.001
Anxiety (% anxious)	64.0	67.7	61.5	.08
Panic (% yes)	16.5	19.3	14.6	.09
Suicidal Ideation (% yes)	31.7	33.6	30.5	0.37
<b>Self-Reported Healthcare Utilization</b>				
Any health care at VA—past 6 months (% yes)	90.3	91.4	89.5	.39
Visits to any mental health specialist—past 6 months (% yes)	45.1	51.7	40.8	.003
Primary care visit at VA – past 6 months (% yes)	91.9	93.2	91.0	.30
# of physical problem hospital admissions	2.0 (2.1)	2.2 (2.3)	2.0 (2.0)	.67
# of emotional problem hospital admissions	0.7 (2.1)	1.1 (2.7)	.4 (1.8)	.05
# of physical problem outpatient visits	5.0 (6.9)	5.3 (8)	4.9 (6)	.54
# of emotional problem outpatient visits	2.7 (7.5)	3.0 (7.9)	2.5 (7.3)	.50
# of in-person visits with a mental health specialist	6.4 (9.7)	5.8 (9.7)	6.9 (9.8)	.29
Missed an appointment—past 6	35.4	41.4	31.4	.005

months (% yes)				
Missed doses of meds—past 6 months (%yes)	33.5	38.3	30.3	0.02
<b>Psychosocial Variables</b>				
Total Social Support (SD)	3.6 (1.2)	3.4 (1.2)	3.8 (1.1)	<.001
Stigma (Treatment Amenability) (SD)	2.1 (.9)	2.0 (.8)	2.3 (.9)	<.001

*\*Data are adjusted for population weights and probability of enrollment. Significance tests included  $X^2$  analyses for categorical data and  $t$  tests for continuous data.*

*\*\*Mental health status refers to mental health function over the past month.*

### ***Multivariate Analyses***

Table 2 shows results for multivariate analyses. After controlling for demographic characteristics, the most significant predictors of smoking status that emerged from the data were higher levels of alcohol consumption (scores of 1-3 on the AUDIT-C were used as the reference group), specifically AUDIT-C scores of 8-9, and scores of 10 or higher ( $p = .04$  and  $p < .001$  respectively), and lower levels of social support ( $p = .01$ ). Logistic regression results indicate that depressed patients with scores between 8-9 on the AUDIT-C are almost three times more likely to smoke (OR=2.81,  $p = .04$ ), than depressed patients who are low-level drinkers (scores of 1-3 on the AUDIT-C) and depressed patients with scores of 10 or higher on the AUDIT-C are almost 5 times more likely to smoke compared to depressed patients who drink less (OR=4.76,  $p < .001$ ). Depressed patients with lower social support were more likely to smoke than depressed patients with higher levels of social support (OR=0.88,  $p = .01$ ).

To further examine and confirm the unique contributions of alcohol consumption and social support, we added an interaction term for the different levels of the AUDIT-C  $\times$  social support means. The interaction was not significant, suggesting that the effects of social support on smoking were not dependent upon levels of alcohol consumption and that each of these variables appeared to evince independent relations with smoking status. In short, results of the

multivariate logistic regression suggested that, in our sample of older, depressed patients, the predominant factors that predicted smoking status were high levels of alcohol consumption that were indicative of significant misuse and low levels of social support. Although presence of PTSD and depression and high levels of stigma were associated with smoking status in the bivariate comparisons, these factors did not remain significant predictors of smoking in the controlled logistic analysis. Lastly, given that so few depressed Veterans had quit smoking at 7 and 18 months, we did not have sufficient power to examine predictors of smoking cessation during the study window. Therefore, we did not conduct these follow-up analyses.

**Table 2. Summary of Logistic Regression Analyses for Variables Predicting Smoking Status (smoker versus nonsmoker) among Veterans with Depression (n= 761).**

Predictor Variables	95% Confidence Interval		
	Odds Ratio	LL-UL	P-values
<u>Mental Health</u>			
Depression Severity	1.0	0.97 – 1.06	.56
Alcohol Consumption *			
AUDIT-C Sum = 0	1.1	0.73 – 1.74	.59
AUDIT-C Sum = 4 -- 5	1.1	0.56 – 2.22	.76
AUDIT-C Sum = 6 -- 7	1.5	0.69 – 3.05	.33
AUDIT-C Sum = 8 -- 9	2.8	1.03 – 7.63	.04
AUDIT-C Sum $\geq$ 10	4.8	1.98 – 11.46	<.001
PTSD	1.1	0.75 – 1.59	.64
<u>Psychosocial Variables</u>			
Stigma	1.1	0.98 – 1.26	.15
Total Social Support	0.8	0.69 – 0.95	.01
% Veterans with depression who smoke		39.8	

*Note: Controls are age, ethnicity, education level, relationship status, and employment status (omitted from the table). LL-UL= Lower Limit-Upper Limit. Interaction term between AUDIT-C and Social Support was nonsignificant. Data are Weighted for Population and Probability of Enrollment.*

*\*Scores of 1-3 were used as the reference group.*

## Discussion

Consistent with the existing mental health and smoking literature, study findings revealed high smoking rates in this population. Moreover, lifetime history of smoking in this sample was high, and the likelihood of quitting smoking over time was low. The low likelihood of quitting smoking over time in this population is extremely disconcerting, considering the increased risk for negative health outcomes associated with smoking, depression, and PTSD status. This population of depressed Veterans presenting in primary care is likely to continue to deteriorate in health as their smoking continues, their depression does not improve, problematic drinking continues, and their number of medical comorbidities increases while they remain socially isolated.

Results from bivariate analyses indicated that compared to depressed nonsmokers, depressed smokers present to VA primary care settings with complex health circumstances in physical and mental health domains, including higher depressive symptomatology, higher likelihood of presence of comorbid PTSD, higher alcohol consumption, worse overall mental health status, more medical comorbidities, and lower levels of social support. A focused VA primary care intervention is imperative, as it appears that the usual care for smoking cessation is not very effective in this population. Although further research in this area is needed, integrated smoking cessation approaches in primary care, such as cessation counseling offered by a primary care provider, or the availability of on-call tobacco cessation staff, are showing promising results in the tobacco cessation literature.

Our study also revealed higher numbers of hospital admissions for an emotional problem, higher amenability to depression treatment, and higher proportions of depressed

smokers reporting visits to any mental health specialist in the past six months. These findings present the potential gains of offering smoking cessation treatment for depressed smokers in VA mental health settings. Integrated tobacco treatment in mental health settings appear to be more effective than assessment of smoking followed by referral to separate smoking cessation clinics. For example, McFall's (2005) findings showing a 5-fold increased likelihood of cessation at 2, 4, 6, and 9 months in smokers with PTSD by providing integrated smoking cessation treatment demonstrate outstanding results in this domain. Moreover these results can have long-term effects. McFall's (2010) second study—the only other randomized tobacco treatment study among patients with PTSD—found integrated care to improve long-term (18-months) smoking abstinence rates by more than double of those referred to smoking cessation clinics.

Studies in the tobacco treatment domain among smokers in outpatient depression treatment have also shown encouraging results. A stepped-care intervention tailored to depressed patients' readiness to quit that included computerized motivational feedback, and an optional 6-session psychological counseling and pharmacological tobacco cessation treatment, resulted in significantly higher cessation rates than for the group receiving brief contact, a self-help guide to quit and referrals to smoking cessation clinics (Hall, Tsoh, Prochaska, Eisendrath, Redding, Rosen, et al., 2006). Similarly to depressed patients in these trials, depressed Veterans who smoke could also benefit by having integrated smoking cessation treatment in mental health settings.

Controlling for covariates, multivariate analyses revealed that in our sample of older, depressed smokers in VA primary care, high levels of alcohol consumption and low levels of social support were the most significant predictors of smoking status. The levels of

alcohol consumption that were predictive of smoking in this study were indicative of problematic drinking (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998). Considering the synergistic role of smoking and alcohol misuse on increased risk for certain types of cancer and cardiovascular disease described earlier, addressing both alcohol consumption and smoking in primary care can be crucial in preventing worsening of current conditions and the development of new potentially life-threatening diseases.

Brief alcohol interventions have been shown to reduce alcohol use and health care related costs (Fleming, Mundt, French, Manwell, Stauffacher, & Barry, 2002), yet in a recent study examining VA medical records of outpatient soldiers serving in Operations Enduring Freedom and Iraqi Freedom with substance abuse from a cross-sectional national sample, findings indicated that only half of those patients with alcohol misuse had documented brief intervention or referral to alcohol treatment (Hawkins, Lapham, Kivlahan, & Bradley, 2010). These brief interventions (5-15 minutes) included advice to abstain from drinking or to drink within the recommended limits and some feedback regarding the health-related risks of drinking. Management of alcohol misuse in primary care has been found to be cost-effective and to have a positive impact on patients' health, yet research suggests that a minority of patients with alcohol misuse are currently being managed effectively (Calhoun, Elter, Jones, Kudler, & Straits-Troster, 2008; D'Amico, Paddock, Burman, & Kung, 2005; Rose, Miller, Nemeth, Jenkins, Nietert, Wessell, et al., 2008).

Along similar lines, although integrated tobacco, alcohol, and substance abuse treatments has been shown to be the most effective method of treating concurrent addictions (U.S. Department of Health and Human Services, 2007), only 41% of outpatient substance abuse treatment programs offer smoking cessation counseling, with 17% providing cessation

medication (Friedmann, Jiang, & Richter, 2008). Some of the reasons for the low rates of smoking cessation treatment in substance abuse treatment settings include providers' beliefs that smoking cessation would jeopardize substance abuse treatment (Goldsmith & Knapp, 1993; Gulliver, Kamholz, & Helstrom, 2006), and reliance on cigarettes by some providers to stabilize patients' moods (Richter, 2006). Furthermore, only about 33% of alcohol abuse treatment providers in the United States reported that they agreed that alcohol abusers in treatment should be advised to quit smoking (Bobo, Slade, & Hoffman, 1995). As stated earlier in this paper, targeting smoking in alcohol abuse treatment has not been found to negatively affect alcohol treatment outcomes, and has even been shown to result in improved success rates in alcohol abuse treatment. These misconceptions about integrated tobacco and alcohol and substance abuse treatment, and the undertreatment of tobacco dependence are alarmingly problematic, given the increased synergistic effects of smoking and alcohol abuse. Implementation of smoking cessation services in these settings is strongly called for.

One option to consider in addressing smoking in these settings is a harm-reduction approach. Intervention strategies recommending cessation counseling, but with an additional offering of an alternative smoking reduction program, can have the added advantage of attracting smokers who may not otherwise be interested in smoking cessation (Glasgow, Gaglio, France, Marcus, Riley, Levinson, et al; 2006). Some studies suggest that smokers who reduce their number of cigarettes smoked, can show improvements in biomarkers and respiratory symptoms (Gilpin & Pierce, 2003; Falba, Jofre-Bonet, Busch, Duchovny, & Sindelar, 2004; Hatsukami et al., 2002). In two studies conducted in the Kaiser Permanente Colorado healthcare system, among patients who were going to undergo outpatient surgery or outpatient surgery and GI

procedures, Glasgow et al., (2006) found a smoking reduction intervention offering both cessation and reduction options to be effective in attracting a large proportion of smokers to participate in smoking control efforts (12%-38% chose the cessation option, and an additional 22-39% of smokers chose to participate in the smoking reduction program). Although further research is needed in this area, reduction approaches can be more appealing than cessation interventions to some smokers, attract a larger number of smokers, and reduce some of the health risks and symptoms associated with smoking.

The findings related to social support are interesting and consistent with the literature showing associations between low social support and depression and to higher smoking cessation among smokers in smoking cessation treatment reporting more perceived social support. Smokers attempting to quit on their own show abstinence rates of about 5% or less (Hughes, Keely, & Naud, 2004). Although our data are correlational and we cannot make causal inferences about social support and smoking, our findings suggests that our sample of depressed smokers may lack resources in terms of social support networks that could facilitate cessation services and lower depression rates. Smoking cessation groups, quit lines, individual cessation counseling, and electronic technologies, can be used to increase emotional, instrumental, and informational social support to individuals who are making quit attempts, and many smokers have been helped using these methods (Westmaas, Bontemps-Jones, & Bauer, 2010). Efforts aimed at increasing social support among depressed Veterans may prove beneficial in alleviating symptoms of depression and in raising their likelihood of quitting smoking.

Finally, contrary to our expectations based on the literature linking smoking to completed suicide, smoking status in our sample was not associated with increased suicidal ideation.

However, it is possible that depression and comorbid medical and mental health conditions, both of which were high in our study play a mediating role in the increased risk for suicide that has been consistently associated with smoking in the literature. Further research in this area with more comprehensive controls may be needed in order to clarify the nature of the smoking and suicide association.

The current study has several limitations. First, our sample consisted largely of older, male, Caucasian Veterans with depression, so these findings may apply to lesser or greater degrees in different populations. Second, because our sample consisted solely of depressed individuals, there was likely a restriction of range in depression scores that hamstrung our ability to predict smoking status by the severity of our participants' depression. However, we were interested in finding differences between depressed smokers and nonsmokers rather than finding differences between depressed and nondepressed smokers, as other studies have examined. The predictors of smoking status are therefore, predictors of smoking among depressed patients and cannot be generalized beyond this population.

Third, our smoking measures were not the standard measures used in the smoking literature. We simply had information regarding smoking status and lacked the ability to examine nicotine dependence, number of cigarettes smoked per day, etc., and how these could vary based on depression, PTSD, etc. However, for the purposes of primary care cessation guidelines, simply knowing about smoking status may be sufficient to take appropriate action for cessation efforts. Furthermore, primary care providers rely mostly on self-report and so are likely to take it at face value when addressing smoking issues with

patients. Lastly, our stigma measure consisted of one question regarding whether a participant would want to conceal their depression from their employer. Although this question is likely to get at some aspect of stigma, it probably does not encompass the full extent in which stigma can be experienced by a mental health patient.

In spite of the limitations listed above, our study provides valuable information about depressed Veterans in primary care, a population that has not received much interest in the literature. These patients present with complicated physical, mental health, and psychosocial problems that don't appear likely to improve with standard care. Our research suggests a need for more comprehensive, integrated care in primary care, mental health settings, and substance abuse treatment settings in an effort to improve the current conditions of smokers presenting with depression, alcohol abuse, and mental and physical health comorbidities.

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## SMOKING

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Now I would like to ask you about your cigarette smoking.

**43. Have you smoked at least 100 cigarettes in your lifetime?**

- ,θ YES      ➔ **Continue with 43A**
- ,θ NO        ➔ **GO TO Q0**
- ,θ UNCODABLE ➔ **GO TO Q0**
- ,θ DON'T KNOW ➔ **GO TO Q0**
- ,θ REFUSED ➔ **GO TO Q0**

**43A. Do you still smoke cigarettes?**

- ,θ YES      ➔ **GO TO Q0**
- ,θ NO        ➔ **Continue with Q43B**
- ,θ UNCODABLE ➔ **GO TO Q0**
- ,θ DON'T KNOW ➔ **GO TO Q0**
- ,θ REFUSED ➔ **GO TO Q0**

**43B. How long ago did you quit smoking cigarettes?**

DO NOT READ

- ,θ WITHIN THE PAST 30 DAYS
- ,θ FROM ONE MONTH TO ONE YEAR AGO
- ,θ MORE THAN ONE YEAR AGO
- ,θ UNCODABLE
- ,θ DON'T KNOW
- ,θ REFUSED