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Internalized stigma among cancer patients enrolled in a smoking cessation trial: The role of cancer type and associations with psychological distress

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Abstract

Purpose: Cancer patients who smoke may experience significant stigma due both to their disease, and negative attitudes and beliefs regarding smoking. We investigated whether internalized stigma differed between currently smoking cancer patients diagnosed with lung or head and neck cancers, other smoking related cancers, and non smoking-related cancers, and whether internalized stigma was associated with psychological distress.

Methods: This cross-sectional analysis used baseline data on 293 participants enrolled in a multi-site randomized smoking cessation intervention trial of patients with recently diagnosed cancer. Internalized stigma was assessed using five Internalized Shame items from the Social Impact of Disease Scale. Smoking-related cancers included lung, head and neck, esophageal, bladder, kidney, liver, pancreatic, colorectal, anal, small intestinal, gastric, and cervical. We used multivariable linear regression to examine whether mean internalized stigma levels differed between individuals with lung and head and neck cancers, other smoking-related cancers, and non

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CONFLICT OF INTEREST

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smoking-related cancers, adjusting for potential confounders. We further examined the association of internalized stigma with depression, anxiety, and perceived stress, overall and among cancer type groups.

Results: Thirty-nine percent of participants were diagnosed with lung or head and neck cancer, 21% with another smoking-related cancer, and 40% with a non smoking-related cancer. In multivariable-adjusted models, participants with lung or head and neck cancers (11.6, 95% confidence intervals (CI) = 10.8-12.2; $p < 0.0001$) or other smoking-related cancers (10.7, 95% CI = 9.8-11.7; $p = 0.03$) had higher mean internalized stigma scores compared to those non-smoking-related cancers (9.3, 95% CI = 8.6-10.0). We observed similar positive associations between internalized stigma and depressive symptoms, anxiety, and perceived stress among participants with smoking-related and non smoking-related cancers.

Conclusions: Among smokers, those with smoking-related cancers experienced the highest levels of internalized stigma, and greater internalized stigma was associated with greater psychological distress across cancer types. Providers should assess patients for internalized and other forms of stigma, refer patients for appropriate psychosocial support services, and address stigma in smoking cessation programs.

Keywords

cancer survivors; cigarette smoking; psycho-oncology; shame; social stigma

1 | BACKGROUND

Smoking is a stigmatized behavior, with current smokers reporting feeling ostracized, judged, and noticing negative nonverbal communication (e.g., stares and sneers), comments, and interactions due to their smoking.[1] Patients with cancer may also experience disease-related stigma defined as "a social process or related personal experience characterized by exclusion, rejection, blame or devaluation that results from experience or reasonable anticipation of an adverse social judgment about a person or group identified with a particular health problem."[2] Stigma can be enacted by others and felt by the stigmatized person.[3] Among lung cancer patients, three patient reported forms of cancer-related stigma have been identified: (1) perceived stigma (stigmatizing beliefs and behaviors of others); (2) internalized stigma (effect of perceived stigma on patients via guilt and self-blame); and (3) constrained disclosure (limits on sharing disease status with other due to stigma).[4] Cancer patients who smoke at the time of diagnosis may experience these forms of stigma both because of their smoking behavior and their cancer diagnosis, and this could vary by the type of cancer and whether the cancer is smoking-related.

Much of the existing literature on cancer-related stigma has focused on lung cancer patients,[5] however it remains unclear whether patients with other smoking-related cancers, or those with non smoking-related cancers who smoked at the time of diagnosis experience similar levels of internalized stigma. Perceived stigma differs by cancer type with data showing 70% of survey respondents believed that patients with lung cancer were at least partially to blame for their diagnosis–significantly higher than reported for leukemia (9%) and breast cancer (15%).[6] Compared to breast and prostate cancer patients, non-small

cell lung cancer (NSCLC) patients reported higher perceived cancer-related stigma and were more likely to agree their behavior contributed to their cancer.[7] In another study, baseline levels of internalized stigma, expressed as feelings of guilt and shame about their disease, were similar between breast, prostate, and NSCLC cancer patients.[8] However, while lung cancer patients experience higher levels of stigma than patients with other cancer types, there is variation in reported stigma according to smoking history with greater total, internalized, and perceived lung cancer stigma among patients who currently smoked compared to those who formerly or never smoked.[9] More work is needed to further tease apart the impact of smoking status and the type of cancer (smoking-related or non-smoking related) on experiences of cancer-related stigma.

Quantifying the extent of cancer-related stigma experienced by patients is important because it has been associated with multiple measures of psychological distress including low self-esteem, anxiety, anger, and depression.[10,11] A recent meta-analysis demonstrated that cancer-related stigma was strongly associated with depression (14 included studies) and anxiety (five included studies).[12] The authors observed significant heterogeneity across studies, which they attributed to sample size variation, but may also be due to differences in the cancer types included in each study and type of stigma (perceived or internalized) examined. Further work is needed to explicate the association between internalized cancer-related stigma and psychological distress across cancer types.

Using baseline data from a randomized smoking cessation trial of newly diagnosed cancer patients who report current smoking, this cross-sectional study was designed to answer two research questions: (1) Does internalized stigma differ between cancer patients diagnosed with lung or head and neck cancer, other smoking-related cancers, and non smoking-related cancers?; (2) Is internalized stigma associated with psychological distress (depression, anxiety, and perceived stress) among individuals with smoking-related and non-smoking related cancers? We hypothesized that being diagnosed with a smoking-related cancer would be associated with greater internalized stigma and that greater internalized stigma would be associated with higher levels of depression, anxiety and perceived stress.

2 | METHODS

2.1 | Study population

Participants were enrolled in the Smokefree Support Study, a randomized controlled comparative effectiveness trial of two strategies that promote smoking cessation in suspected or newly diagnosed cancer patients (NCT01871506).[13] Participants were recruited from Massachusetts General Hospital/Dana-Farber/Harvard Cancer Center in Boston, MA and Memorial Sloan Kettering Cancer Center in New York, NY between November 2013 and July 2017. Ethical approval for study procedures was granted by the institutional review boards of the participating sites (Mass General Brigham Institutional Review Board Protocol #2013P001036). All participants provided written informed consent. Details of study design, participant recruitment, treatment interventions, and study methods are available elsewhere.[14] In brief, study participants were current adult smokers with recently diagnosed (within 3 months) thoracic, breast, genitourinary, gastrointestinal, head and neck, lymphoma, melanoma, or gynecological cancers. Participants had to speak English or Spanish (MGH

only) and be willing to consider trying to quit smoking (i.e., willing to talk to a tobacco treatment counselor). Current smoking was self-reported and defined as any cigarette smoking (even a puff) within the previous 30 days. Of 2659 patients who met the initial electronic health record (EHR) screening criteria (adult, current smoker, cancer diagnosis): 1808 refused the eligibility confirmation screen, 405 were ineligible, 143 declined, and 303 were randomized.[13]

Participants were randomized 1:1 to receive intensive treatment or standard treatment both of which involved a motivational interviewing approach to smoking cessation but differed in terms of the number of sessions. At baseline, participants completed a survey (in English or Spanish) at home, online using Research Electronic Data Capture, or over the phone. The survey captured sociodemographic, medical, physical, and psychosocial factors as well as health and cancer beliefs, smoking history and beliefs, environmental influences, and quality of life.

2.2 | Study measures

2.2.1 | Internalized stigma—We measured internalized stigma using five items from the 24-item Social Impact of Disease Scale: (1) “I feel others think I am to blame for my illness”; (2) “I do not feel I can be open with others about my illness”; (3) “I fear someone telling others about my illness without my permission”; (4) “I feel I need to keep my illness a secret”; (5) “I feel I am at least partially to blame for my illness.”[15] Each item was scored on a 5-point scale from 1 “Strongly Disagree” to 5 “Strongly Agree” to generate a composite score that ranged from 5 to 25 (Cronbach’s $\alpha = 0.77$). In the initial validation study, mean scores for the internalized stigma items were 13.7 among individuals with HIV/AIDS and 8.45 among individuals with cancer.[15]

2.2.2 | Smoking-related cancer—Information on each participant’s cancer diagnosis including cancer type was obtained via medical chart review. We defined smoking-related cancers as lung, esophageal, head and neck, bladder, kidney, liver, pancreatic, colorectal, anal, small intestinal, gastric, and cervical while non smoking-related cancers included prostate, testicular, penile, breast, lymphoma, melanoma, and non-cervical gynecologic cancer.[16] We further separated the smoking-related cancers into two groups: lung or head and neck and other smoking-related cancers.

2.2.3 | Psychological distress—We examined three types of distress: anxiety, depression, and perceived stress. The Generalized Anxiety Disorder Scale[17] and the Patient Health Questionnaire-9 (PHQ-9)[18] assessed anxiety and depression symptoms (within the past two weeks) using a 4-point Likert scale from 0 “not at all” to 3 “nearly every day.” The Perceived Stress Scale-4 (PSS-4) is a four-item generalized measure of the degree to which a respondent appraises situations in the past month as stressful.[19] The PSS-4 was scored on a 5-point scale from 0 “never” to 4 “very often.”

2.2.4 | Covariate assessment—Data on covariates was obtained via the baseline survey or EHR review. We considered the following variables for inclusion in our multivariable models. Sociodemographic factors included: age (in years), sex (male or

female), education (less than high school, high school diploma or equivalent, some college or vocational school, college graduate or greater), race (white or non-white). Smoking history variables included number cigarettes smoked per day, age initiated smoking (in years), past 24-h quit attempts, and motivation to quit (1-item, 10-point contemplation ladder).[20] Smoking beliefs and social influences included perceived benefits of quitting (5-item Benefits of Quitting Scale),[21] self-efficacy to not smoke/resist smoking urges (11-item Quit Self-Efficacy Questionnaire),[22] patient perception of social support (8 items from the Partner Interaction Questionnaire),[23] types of support patients receive from others (4 items from the Medical Outcomes Study Social Support Survey),[24] and quality of the patient experiences with their oncology care team (6 items from the Hospital Consumer Assessment of Healthcare Providers and Systems Survey).[25] We also considered number of alcoholic drinks per week, stage at diagnosis (early or late stage) and in psychological distress analyses, cancer site (lung or head and neck, other smoking-related cancer, breast, prostate, or other non-smoking related cancer). Variables that were associated with each outcome with a type III p-value ≤0.20 were included in our multivariable models.[26]

2.2.5 | Statistical analysis—Our analytic sample included 293 participants. We excluded individuals missing data on depression (n = 1), anxiety (n = 2), and perceived stress (n = 3) from analyses of each outcome. Missing indicators were used to account for missing covariate data. We defined outliers in our study outcomes as values less than 25th percentile minus 3 times the interquartile range or more than 75th percentile plus 3 times the interquartile range. Outliers were identified for perceived stress only (n = 20) and were removed from those analyses.

We generated means and frequencies for the total sample and among individuals with smoking-related and non-smoking related cancer types. We used multivariable linear regression to estimate least square means and 95% confidence intervals for internalized stigma scores according to smoking-related cancer status and cancer site (lung, head and neck, other smoking-related cancer, breast, prostate, and other non smoking-related cancer). We also estimated unstandardized beta coefficients and standard errors for the association between internalized stigma and measures of psychological distress overall and stratified by smoking-related cancer status. All p-values are two sided and analyses were conducted using SAS (Cary, NC) version 9.4.

3 | RESULTS

Table 1 shows participant demographic information overall and according to cancer type. Mean age of all participants was 58.3 years. Individuals with lung or head and neck (60.1 years) or other smoking-related cancers (59.2 years) had an older mean age than those with non smoking-related cancer (55.8 years), started smoking at an earlier age, smoked more cigarettes per day, were more likely to be White, and have stage IV cancer at diagnosis.

Mean internalized stigma scores were significantly higher among patients with lung or head and neck or other smoking-related cancers compared to those with non smoking-related cancers (Table 2). Unadjusted and multivariable adjusted results were similar. In multivariable adjusted models, individuals with lung or head and neck cancers had a similar

mean total internalized stigma score of 11.5 (95% CI: 10.8–12.2) compared to those with other smoking-related cancers (10.7, 95% CI: 9.8–11.7; $p = 0.20$) and a higher mean score compared to those with non-smoking related cancers (9.3, 95% CI: 8.6–10.0; $p < 0.0001$). Individuals with other smoking-related cancers had higher internalized stigma scores than those with non smoking-related cancers ($p = 0.03$).

Higher total internalized stigma scores were associated with higher levels of depression, anxiety, and perceived stress (Table 3). In multivariable adjusted models, each one unit increase in total internalized stigma score was associated with a 0.36 unit increase in depression score ($p \leq 0.001$), a 0.24 unit increase in anxiety score ($p < 0.05$), and a 0.13 unit increase in perceived stress score ($p \leq 0.01$). Given that head and neck and other smoking related cancers had similar internalized stigma levels, we stratified the results into two groups: smoking-related or non-smoking cancers. We found associations of similar magnitude within strata, however we did not observe a significant association between internalized stigma and anxiety or perceived stress among participants with non-smoking related cancers. This may have been due to small sample size within that group.

4 | CONCLUSIONS

In this study, we evaluated whether cancer patients with lung and head and neck or other smoking-related cancers had higher levels of internalized stigma than those with non-smoking related cancers within a population of newly diagnosed cancer patients enrolled in a smoking cessation intervention trial. Our results demonstrate that participants with lung and head and neck or other smoking-related cancers reported significantly higher levels of internalized stigma than patients diagnosed with non-smoking related cancers. Internalized stigma was associated with greater psychological distress overall and among patients with smoking related and non-smoking related cancers. These findings demonstrate that patients with smoking related cancers are at greater risk of negative feelings of blame and shame, but that internalized stigma is detrimental to psychosocial well being regardless of cancer type.

Our results suggest that greater levels of internalized stigma are experienced by current smokers who are diagnosed with lung and head and neck cancer and other smoking related cancers. This finding may be driven by widespread patient and public knowledge of the causal link between these two cancers and smoking. Multiple studies have demonstrated high levels of knowledge of the association between smoking and lung cancer risk, with over 90% of respondents linking the two, but there is significantly less awareness of the association between smoking and other cancers.[27,28] Knowledge of the association between smoking and head and neck cancer is not as high as lung cancer, but higher than for other smoking-related cancers, with 54.5% of respondents correctly identifying smoking as a risk factor for head and neck cancer.[29] In addition to smoking, knowledge of other risk factors such as human papilloma virus (HPV) might contribute to feelings of blame among head and neck cancer patients. For example, greater knowledge of the link between HPV and cervical cancer was associated with greater beliefs that a patient is at least partially responsible for a cervical cancer diagnosis.[6] HPV is detected in approximately 25% of all head and neck squamous cell carcinomas, and up to 90% of oropharyngeal cancers,[30] but data suggests that public knowledge is limited with less than 1% of survey respondents

aware of this association.[29] Lastly, while public knowledge of the link between smoking and other smoking-related cancers is less common, our results demonstrate that they have similar levels of internalized stigma as those with lung or head and neck cancers. One factor that may contribute to this is feedback and counseling received from their physicians. We've previously shown that clinicians are more likely to advise patients on smoking cessation when they are diagnosed with a smoking-related cancer versus a non smoking-related cancer.[31] This may be a pathway through which patients with other smoking-related cancers come to recognize that smoking contributed to their cancer diagnosis.

Given that knowledge of the link between smoking and these cancers may contribute to internalized stigma among patients with cancer, our findings have some implications for anti-smoking campaigns. Anti-smoking messages that emphasize cancer risk as a primary reason not to smoke, are important, but contribute to the stigmatization of smokers and can ultimately harm cancer patients that smoke,[32] as well as patients that did not smoke who are diagnosed with smoking-related cancer types. Graphic images and scare tactics may be effective at preventing smoking initiation and may encourage cessation in some current smokers, but can also backfire[33] leading to resistance to smoking cessation and negative perceptions of self.[1] To balance these factors, complementary campaigns can address the role of media and the tobacco industry in promoting smoking, making it clear that smoking is not solely driven by personal decision making, emphasize that smoking is a physical and behavioral addiction and not a personal moral failing, use person-first language (people who smoke vs. smokers), emphasize the positive benefits of quitting, and acknowledge that quitting is difficult and may take multiple tries but there are treatment strategies that can help.[32]

We found that higher levels of internalized stigma were associated with higher levels of depression, anxiety, and perceived stress. Multiple prior studies have linked cancer stigma and blame with negative mental health outcomes, and this has been observed across cancer sites including colorectal,[34] and prostate.[35] Among lung cancer patients, stigma has been linked to greater depressive symptoms,[10] anxiety, and lower quality of life.[36] Stigma and blame may negatively impact self-perception and identity through feelings of shame, straining relationships and leaving patients feeling ostracized. This study provides additional evidence that stigma and blame are important stressors for individuals with cancer and extends the existing literature by exploring associations among a greater variety of cancer types among patients that smoked.

4.1 | Study limitations

Study participants were all enrolled in a smoking cessation trial. Their willingness to participate in such a study may be associated with their experiences of internalized stigma. They may have been more likely to be advised to quit or made aware of the harmful effects of smoking on their cancer etiology and prognosis. It is possible that levels of internalized stigma, were higher in this population than among smokers not engaged in tobacco treatment. Alternatively, participants may have had lower levels of internalized stigma than nontreatment-seekers, as in general, stigma/shame lead to avoidant behaviors.[37] It is also plausible that non-smokers and former smokers diagnosed with smoking-related

cancers, who were not included in this study, may also experience high levels of internalized stigma ("guilt by association"). While we did not observe significant demographic variation in stigma levels, the study population was predominantly non-Hispanic (96%) and white (83%), which may limit the generalizability of findings. Additionally, we may have missed existing heterogeneity across cancer sites from the aggregation of multiple cancers necessary to deal with small subsample sizes. Our survey included only the five Internalized stigma items from the 24-item Measure of Stigma and Social Impact of Disease Scale.[15] We had limited information on other domains of perceived stigma and constrained disclosure which may also be associated with cancer type and psychological distress. These should be examined in future studies. Lastly, our survey did not directly query patients about what they believe caused their cancer which may have helped us better understand their experiences of internalized stigma. However, this information was collected on a subset of trial participants during qualitative interviews and can be examined in future analyses.

4.2 | Clinical implications

Our findings suggest that internalized stigma is commonly experienced by cancer patients who smoke at the time of diagnosis, particularly those diagnosed with lung and head and neck and other smoking-related cancers. Improving patient-provider communication could help reduce stigma, given that almost half of lung cancer patients report feeling stigmatized by their medical providers.[38] Clinicians should assess smoking and promote smoking cessation in all patients without judgment or blame and with empathy as smoking cessation is beneficial regardless of cancer type.[39] A focus on smoking not as the cause of their cancer, but on the benefits of quitting for their lives going forward may help. Additionally, clinicians should assess internalized stigma and other manifestations of stigma in all newly diagnosed patients, and refer for appropriate psychosocial services. Cognitive behavioral therapy may reduce internalized stigma and stigma-related mental health consequences.[40] Lastly, given the link between stigma and psychological distress and potential use of smoking as a stress coping mechanism, it is important to address stigma in smoking cessation interventions for cancer patients.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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TABLE 1

Participant characteristics overall and according to cancer type

	Total *N* = 293	**Non smoking-related cancer[a] *N* = 117**	**Lung or head and neck cancer *N* = 114**	**Other smoking-related cancer[b] *N* = 62**
Age - mean (SD)	58.3 (9.5)	55.8 (9.1)	60.1 (9.5)	59.2 (9.3)
Age started smoking - mean (SD)	16.7 (4.6)	17.9 (5.8)	15.7 (2.9)	16.3 (4.1)
Alcoholic drinks per week - mean (SD)	3.8 (6.8)	4.3 (6.7)	4.1 (7.6)	2.3 (5.2)
Cigarettes per day - mean (SD)	14.1 (9.9)	12.7 (7.7)	14.8 (11.6)	15.5 (10.3)
Quit self-efficacy - mean (SD)	5.5 (2.3)	5.4 (2.3)	5.8 (2.4)	4.9 (1.9)
Perceived benefits of quitting - mean (SD)	8.7 (1.8)	8.2 (2.1)	9.2 (1.3)	8.5 (1.8)
Motivation to quit - mean (SD)	5.9 (1.8)	5.7 (1.7)	6.4 (1.7)	5.3 (1.8)
Smoking urges in past 24 h - mean (SD)	2.6 (1.3)	2.7 (1.3)	2.4 (1.3)	2.7 (1.3)
Partner quitting support - mean (SD)	2.1 (2.6)	2.2 (2.7)	1.8 (2.2)	2.4 (2.9)
Female - *n*(%)	164 (56.0)	84 (71.8)	59 (51.8)	21 (33.9)
Race - *n*(%)				
White	256 (87.4)	95 (81.2)	103 (90.4)	58 (93.6)
Black or African-American	30 (10.2)	16 (13.7)	10 (8.8)	4 (6.5)
Other race or unknown	7 (2.4)	6 (5.1)	1 (0.88)	0 (0.0)
Hispanic/Latino - *n*(%)	11 (3.8)	4 (3.5)	5 (4.4)	2 (3.3)
Educational attainment - *n*(%)				
Less than high school	20 (6.8)	6 (5.1)	9 (7.9)	5 (8.1)
High school diploma/GED	70 (23.9)	20 (28.6)	36 (31.6)	14 (22.6)
Some college or vocational school	121 (41.3)	51 (43.6)	44 (38.6)	26 (41.9)
College graduate or greater	82 (28.0)	40 (34.2)	25 (21.9)	17 (27.4)
Marital status - *n*(%)				
Never married	38 (13.1)	13 (11.1)	13 (11.6)	12 (19.4)

	Total *N* = 293	Non smoking-related cancer[a] *N* = 117	Lung or head and neck cancer *N* = 114	Other smoking-related cancer[b] *N* = 62
Married or living as married	162 (55.7)	59 (50.4)	66 (58.9)	37 (59.7)
Widowed, divorced or separated	91 (31.3)	45 (38.5)	33 (29.5)	13 (21.0)
Stage - *n*(%)				
In-situ	17 (6.2)	10 (8.9)	2 (1.9)	5 (8.6)
I	83 (30.1)	36 (31.9)	28 (26.7)	19 (32.8)
II	67 (24.3)	34 (30.1)	21 (20.0)	12 (20.7)
III	51(18.5)	17 (15.0)	26 (24.8)	8 (13.8)
IV	50 (18.1)	8 (7.1)	28 (26.7)	14 (24.1)
Other	8 (1.9)	8 (7.1)	0 (0.0)	0 (0.0)
Comorbid smoking-related disease - *n*(%)[c]	143 (48.8)	44 (37.6)	68 (59.7)	31 (50.0)
Cancer site - *n*(%)				
Lung	84 (28.7)	0 (0.0)	84 (73.7)	0 (0.0)
Head and neck	30 (10.2)	0 (0.0)	30 (26.3)	0 (0.0)
Esophageal	7 (2.4)	0 (0.0)	0 (0.0)	7 (11.3)
Bladder	18 (6.1)	0 (0.0)	0 (0.0)	18 (29.0)
Colorectal	8 (2.7)	0 (0.0)	0 (0.0)	8 (12.9)
Breast	75 (25.6)	75 (64.1)	0 (0.0)	0 (0.0)
Prostate	23 (7.9)	23 (19.7)	0 (0.0)	0 (0.0)
Other	19 (6.5)	19 (16.2)	0 (0.0)	25 (40.3)

[a]Non-Smoking-related cancers include prostate, testicular, penile, breast, lymphoma, melanoma, or non-cervical gynecological.

[b]Smoking-related cancers include esophageal, bladder, kidney, liver, pancreatic, colorectal, anal, small intestinal, gastric, or cervical.

[c]Comorbid smoking-related diseases include emphysema/chronic obstructive pulmonary disease, stroke, hypertension, and myocardial infarction.

TABLE 2

Mean levels of internalized stigma according to cancer type

	Lung or head and neck	*p*-value[d]	Other smoking-related cancer[b]	*p*-value[e]	Non smoking-related cancer[c]	*p*-value[f]
Unadjusted	11.6 (10.8, 12.3)	<0.0001	10.8 (9.8, 11.7)	0.16	9.2 (8.5, 9.9)	0.009
Multivariable adjusted[a]	11.5 (10.8, 12.2)	<0.0001	10.7 (9.8, 11.7)	0.20	9.3 (8.6, 10.0)	0.03

[a]Estimates are adjusted for age (in years), sex (male or female), alcohol intake (number of drinks per week), age started smoking (in years), perceived support score, types of support score, benefits of quitting score, quality of interactions with oncology care team score.

[b]Other smoking-related cancer includes esophageal, bladder, kidney, liver, pancreatic, colorectal, anal, small intestinal, gastric, or cervical.

[c]Non-Smoking-related cancer includes prostate, testicular, penile, breast, lymphoma, melanoma, or non-cervical gynecological.

[d]*p*-value compares mean level of internalized stigma between lung or head and neck versus non-smoking related cancer.

[e]*p*-value compares mean level of internalized stigma between other smoking related cancer versus lung or head and neck.

[f]*p*-value compares mean level of internalized stigma between non-smoking related cancer versus other smoking related cancer.

TABLE 3

Association of internalized stigma with psychological distress, overall and according to smoking related cancer status

	Depression		Anxiety		Perceived stress	
	Unadjusted B(SE)[a]	Multivariable-adjusted[a] B(SE)[a]	Unadjusted B(SE)[a]	Multivariable-adjusted[a] B(SE)[a]	Unadjusted B(SE)[a]	Multivariable-adjusted[a] B(SE)[a]
Total sample	0.46 (0.09)***	0.36 (0.09)***	0.31 (0.09)***	0.24 (0.09)*	0.16 (0.04)***	0.13 (0.04)**
Non-smoking related cancers	0.42 (0.13)**	0.36 (0.14)*	0.23 (0.14)	0.19 (0.15)	0.19 (0.06)*	0.11 (0.07)
Smoking related cancers	0.43 (0.12)***	0.40 (0.13)**	0.33 (0.12)**	0.29 (0.13)*	0.14 (0.05)**	0.14 (0.05)*

[a]Estimates are adjusted for: age (in years), education (less than high school, high school diploma/GED, some college or vocational school, college graduate or greater), race (white, black or African-American, other race or missing), cancer site (lung, head and neck, other smoking-related cancer, breast, prostate, or other non-smoking related cancer), early stage diagnosis (yes or no), alcohol intake (number of alcoholic drinks per week), cigarette smoking (number cigarettes per day) perceived support score, types of support score, benefits of quitting score.

[b]B - unstandardized beta coefficient; SE – standard error.

*$p < 0.05$,

**$p \leq 0.01$,

***$p \leq 0.001$.