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Lung Cancer Screening and Stigma: Do Smoking-related Differences in Perceived Lung Cancer Stigma Emerge Prior to Diagnosis?

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Abstract

Background: Most lung cancer patients report experiencing stigma (i.e., devaluation based on one's lung cancer diagnosis), which is associated with adverse health outcomes. Lung cancer is stigmatized due to its robust association with smoking and the perception of the disease as self-inflicted.

Purpose: Identifying sociodemographic and smoking-related correlates of perceived stigma among lung cancer screening-eligible adults (early in the cancer care trajectory) is needed to guide proactive psychosocial interventions to reduce stigma and improve health for patients newly diagnosed with lung cancer.

Methods: A national sample of lung cancer screening-eligible adults (N = 515; 64.9% female) completed questionnaires on sociodemographic information, smoking-related characteristics, and perceived smoking-related lung cancer stigma. Zero-order and multivariate relationships between sociodemographic variables, smoking-related characteristics, and stigma were evaluated using Pearson's correlations, t-tests, ANOVAs, and multivariable regression.

Results: The multivariable regression demonstrated that younger age (b = −0.05, $p = .047$) was associated significantly with higher stigma. Additionally, women (b = 0.63, $p = .015$), participants who reported Hispanic/Latino ethnicity (b = 1.07, $p = .049$), and those with a college degree or higher (all $p \leq .029$) reported significantly higher stigma, compared to men, those who did not report Hispanic/Latino ethnicity, and other education categories, respectively. None of the smoking-related characteristics were associated significantly with perceived stigma (all $p > .12$).

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The authors declare that they have no conflict of interest. There are no financial disclosures other than the ones provided above. All research was conducted in adherence with ethical standard of the responsible committee on human experimentation (institutional and national) and with Helsinki Declaration of 1975, as revised in 2000.

Conclusions: Sociodemographic variables (rather than smoking-related characteristics) significantly and uniquely differentiated lung cancer screening-eligible adults' perception of lung cancer stigma. Smoking-related differences in lung cancer stigma may emerge following rather than prior to diagnosis.

Keywords

smoking status; stigma; smoking history; lung cancer; screening

Lung cancer stigma (i.e., devaluation based on one's lung cancer diagnosis) is a prominent psychosocial concern of patients (Hamann et al., 2014). Lung cancer is stigmatized due to its robust association with smoking and the perception of the disease as self-inflicted (Hamann et al., 2014). Higher lung cancer stigma is associated significantly with higher depressive symptoms (Ostroff et al., 2019), anxiety (Williamson, Kwon, et al., 2020), more bothersome physical symptoms (Criswell et al., 2016), and declining quality of life (Williamson et al., 2018). Accordingly, researchers have highlighted the need for psychosocial interventions to reduce lung cancer stigma (Hamann et al., 2018), and one important step towards achieving this goal is to identify subgroups of patients who are at highest risk for experiencing high levels of stigma and could benefit most from psychosocial support. Identification of such patients early in the cancer care trajectory (e.g., at screening) could guide proactive interventions that prevent or mitigate the negative impact of stigma on health.

Although most studies have characterized the relationship between lung cancer stigma and health outcomes for those recently diagnosed (Ostroff et al., 2019) or undergoing oncologic treatment (Williamson et al., 2018), many patients retrospectively report experiences of stigma prior to their lung cancer diagnosis (Tod et al., 2008). Clinically, perceptions of stigma among adults at high risk for lung cancer are important to understand because higher stigma has been associated with a longer delay in seeking medical care after first noticing symptoms suggestive of lung cancer (Carter-Harris et al., 2014), and stigma is reported by patients as a barrier to screening (Carter-Harris et al., 2017). Patients also report anticipated stigma, including fears that their symptoms might not be taken seriously or that they would experience blame, which may contribute to diagnostic delay (Tod et al., 2008).

Theoretically, perceived smoking-related lung cancer stigma assessed prior to diagnosis is distinct from, and may precede, other facets of lung cancer stigma (e.g., internalized stigma). The Conceptual Model of Lung Cancer Stigma (Hamann et al., 2014) posits that perceived lung cancer stigma (e.g., from society) can later become internalized by the patient (after diagnosis), which is characterized by feelings of guilt, shame, and/or self-blame. Although stigma is experienced by the majority of lung cancer patients regardless of smoking history, the highest levels of stigma are reported by those who formerly smoked or currently smoke (Williamson, Kwon, et al., 2020) and the disease is stigmatized primarily due to its association with smoking (Hamann et al., 2014). However, it is unknown whether these smoking-related differences in lung cancer stigma emerge prior to or following diagnosis. Therefore, the goal of the current study was to test whether smoking–related and sociodemographic characteristics significantly differentiated perceptions of stigma in a national sample of lung cancer screening-eligible adults (prior to diagnosis). This study

may inform theoretical models of stigma and guide psychosocial interventions that reduce perceived stigma, prevent the internalization of stigma, and ultimately improve health for lung cancer patients.

Method

Participants

A national sample of participants was recruited using Facebook-targeted advertisement. Aligned with lung cancer screening eligibility criteria from the United States Preventive Services Task Force, participants were eligible to participate if they: 1) were between 55 and 80 years old; 2) reported a minimum of a 30 pack-year smoking history; 3) currently smoked or quit smoking within the past 15 years; and 4) were never diagnosed with lung cancer. Participants provided informed consent; all procedures were approved by the Institutional Review Board at Indiana University prior to participant recruitment. This study reports secondary analyses from a larger study on lung cancer screening; additional details on the sample and recruitment have been reported previously (Carter-Harris et al., 2019).

Procedure

Participants completed questionnaires on sociodemographic characteristics, smoking history, and perceived smoking-related lung cancer stigma via a secure web-based survey. Participants were compensated with a $15 gift card.

Measures

Participants reported age, gender, ethnicity, race, education, annual household income, marital status, and employment status. Participants reported either former or current smoking behavior, consistent with established guidelines. Participants reported number of years smoked, packs per day they regularly smoked, and the year they stopped smoking (if applicable). Pack years smoked was calculated by multiplying the number of packs of cigarettes smoked per day by the number of years smoked. Finally, number of years since last cigarette smoked was computed by calculating the difference (in years) between the year that the survey was administered and the year that participants stopped smoking; a score of “0” was entered for participants who currently smoked.

Perceived smoking-related lung cancer stigma was assessed using the five-item subscale of the Cataldo Lung Cancer Stigma Scale (Cataldo et al., 2011). Participants rated items (e.g., “Some people act as though it is a person’s fault they have lung cancer”, “Others assume that a person’s lung cancer was caused by smoking, even if he or she had stopped smoking years ago”) on a 4-point Likert response option scale based on their perceptions of how lung cancer is stigmatized (in general) due to its association with smoking; a sum score was computed (α = .71). This subscale is associated with poorer outcomes in lung cancer patients including higher depressive symptoms and lower quality of life (Cataldo et al., 2011).

Analytic Strategy

First, to evaluate zero-order relationships between sociodemographic variables, smoking-related characteristics, and perceived smoking-related lung cancer stigma, Pearson's correlations, t-tests, and ANOVAs were conducted as appropriate. Next, sociodemographic and smoking-related variables were entered simultaneously as predictors in a multivariable linear regression model to evaluate their unique contributions in explaining perceived smoking-related lung cancer stigma.

Results

Participants (N = 515; 64.9% female) were, on average, 61.41 years old (SD = 5.41). The majority of participants were currently smoking (n = 324, 62.9%), non-Hispanic (n = 486, 94.4%), White/Caucasian (n = 435, 84.5%), and not currently working for pay (n = 299, 58.1%). Participants most frequently reported agreement or strong agreement with stigma items (M = 13.80, SD = 2.66), although scores spanned the full possible range from 5–20 (see Electronic Supplementary Materials).

Women reported higher perceived stigma than men ($t(511) = -2.37$, $p = .018$), participants who identified as Hispanic/Latino (compared to those who did not identify as Hispanic/Latino) reported higher perceived stigma ($t(513) = -2.06$, $p = .040$), and stigma differed significantly by participants' education level ($F(3, 511) = 3.07$, $p = .027$). Pairwise comparisons using Fisher's Least Significant Difference test demonstrated that participants with a college degree or higher reported higher perceived stigma than all other groups (all $p < .03$).

Zero-order relationships between other sociodemographic variables and stigma were not statistically significant (all $p > .08$). Stigma was not associated significantly with pack years smoked ($r = .02$, $p = .709$) or number of years since last cigarette ($r = -.01$, $p = .918$). Participants reported similar levels of stigma between smoking status groups ($t(513) = -1.53$, $p = .128$).

In the fully-adjusted multivariate model ($F(18, 492) = 1.84$, $p = .019$, $R^2 = .06$), female gender (b = 0.63, $p = .015$, 95% CI [0.12, 1.15]), younger age (b = −0.05, $p = .047$, 95% CI [−0.10, <−0.01]), Hispanic/Latino ethnicity (b = 1.07, $p = .049$, 95% CI [0.01, 2.14]), and having a college degree or higher level of education (compared to other categories; all $p \leq .029$) were associated significantly with higher perceived smoking-related lung cancer stigma (see Table 1). All other sociodemographic variables (i.e., race, income, marital status, employment status), smoking status, number of pack years smoked, and number of years since last cigarette smoked were not associated significantly with stigma.

Discussion

In a national sample of lung cancer screening-eligible adults, women, participants who reported Hispanic/Latino ethnicity, and those with a college degree or higher reported significantly higher perceived lung cancer stigma, compared to men, those who did not report Hispanic/Latino ethnicity, and other education categories, respectively. Additionally,

younger age was associated significantly with higher stigma. These results are generally consistent with the broader literature demonstrating that women, those who identify as Hispanic/Latino, and those who are younger report higher psychological distress and poorer health-related adjustment to cancer (see Williamson & Stanton, 2018). Lower socioeconomic status (SES), indicated by education, income, employment, or a combination of such factors, is reliably associated with poorer adjustment to cancer, including higher lung cancer stigma (Williamson, Ostroff, et al., 2020). Therefore, it is unclear why higher education was associated with *higher* perceived lung cancer stigma in the current study. One potential explanation is the established socioeconomic gap associated with smoking behavior (Barbeau et al., 2004). Among people who smoke, those of higher SES report experiencing a more anti-smoking social environment (Paul et al., 2010), which may lead to a higher perception of smoking-related lung cancer stigma. Future research should further interrogate relationships between various facets of SES (e.g., education, income, employment) and stigma in lung cancer screening eligible adults, with a particular attention to understanding the roles of social environments and norms on these relationships. Researchers should also consider applying a framework of intersectional stigma (e.g., Turan et al., 2019) to investigate how perceptions of lung cancer stigma may differentially relate to health and clinical care outcomes (or disparities) within various socioeconomic, racial, ethnic, and cultural contexts.

None of the smoking-related characteristics were associated significantly with perceived stigma, which underscores the pervasive nature of lung cancer stigma across smoking status groups (Criswell et al., 2016). Although previous research has demonstrated differences in perceived lung cancer stigma by smoking status (Williamson, Kwon, et al., 2020), it is possible that these differences emerge after diagnosis or among samples with a wider variability of smoking behavior (e.g., including those who quit smoking more than 15 years ago). The social and medical encounters for lung cancer patients likely contain more cues for stigma (e.g., frequent medical visits) than those experienced by screening-eligible adults, which may contribute to the difference in findings.

This study adds to the growing body of literature examining the complex relationship of stigma across the lung cancer care continuum, specifically among adults at high risk for lung cancer. These findings may inform theoretical perspectives on the development of lung cancer stigma across the cancer care continuum and support the need for longitudinal research to investigate the degree to which perceived stigma among screening-eligible adults is subsequently internalized post-diagnosis. Investigation of psychosocial factors (e.g., illness perceptions) and more nuanced smoking-related characteristics (e.g., number of quit attempts, motivation to quit [for those who currently smoke]) as correlates of stigma prior to diagnosis is warranted, given that the sociodemographic and smoking-related predictors included in the current study explained 6% of the variance in perceived smoking-related stigma.

A notable limitation is that time since last cigarette smoked was computed in units of years and a more granular approach (e.g., number of days or weeks) would provide more information that would potentially allow for nuanced differences to emerge, particularly among participants who quit smoking recently. The sampling strategy of recruiting

screening-eligible adults limited the range of smoking-related characteristics observed in the current study. Additionally, although findings are generalizable to those at highest risk for lung cancer and meet the screening criteria of the United States Preventive Services Task Force, the use of Facebook-targeted recruitment has limitations in that all participants have internet access and use Facebook. Strengths of this study include the use of a large, national sample of adults at high risk for lung cancer and the presentation of both univariate and multivariate relationships.

In conclusion, these findings suggest that sociodemographic variables rather than smoking-related characteristics significantly and uniquely differentiated lung cancer screening-eligible adults' perception of stigma. This study advances theoretical understandings of lung cancer stigma (Hamann et al., 2014) by identifying women, those who identify as Hispanic/Latino, those with a college degree or higher, and those of younger age as subgroups of lung cancer screening-eligible adults who may be at risk for high levels of lung cancer stigma post-diagnosis. Regarding implications for practice, these findings may guide proactive psychosocial interventions early in the cancer care trajectory to prevent, reduce, and/or mitigate the impact of stigma on health-related adjustment to lung cancer.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Perceived smoking-related lung cancer stigma regressed on sociodemographic and smoking-related characteristics

Independent Variable	*b*	*SE*	*t*	*p*	95% CI
Intercept	**16.46**	**1.57**	**10.50**	**<.001**	**[13.38, 19.54]**
Age (in years)	**−0.05**	**0.02**	**−1.99**	**.047**	**[−0.10, <−0.01]**
Gender					
Male (referent)	--	--	--	--	--
Female	**0.63**	**0.26**	**2.43**	**.015**	**[0.12, 1.15]**
Other	−1.25	1.90	−0.66	.511	[−4.96, 2.48]
Ethnicity					
Not Hispanic or Latino (referent)	--	--	--	--	--
Hispanic or Latino	**1.07**	**0.54**	**1.98**	**.049**	**[0.01, 2.14]**
Race					
White or Caucasian (referent)	--	--	--	--	--
Black or African American	−0.09	0.40	−0.22	.829	[−0.87, 0.70]
Other race	−1.23	0.74	−1.67	.096	[−2.68, 0.22]
More than one race	−0.01	0.76	−0.01	.989	[−1.51, 1.49]
Education					
College degree or higher (referent)	--	--	--	--	--
Some college	**−1.20**	**0.51**	**−2.37**	**.018**	**[−2.20, −0.21]**
High school graduate	**−0.74**	**0.33**	**−2.23**	**.026**	**[−1.40, −0.09]**
Some high school	**−0.68**	**0.31**	**−2.18**	**.029**	**[−1.30, −0.07]**
Annual household income					
Less than $25,000 (referent)	--	--	--	--	--
$25,000 – $50,000	−0.21	0.30	−0.69	.489	[−0.79, 0.38]
More than $50,000	0.08	0.39	0.22	.827	[−0.67, 0.84]
Marital status					
Not married (referent)	--	--	--	--	--
Married or living as married	0.16	0.27	0.59	.557	[−0.37, 0.69]
Employment Status					
Not working for pay (referent)	--	--	--	--	--
Working part time	−0.09	0.34	−0.27	.790	[−0.76, 0.58]
Working full time	−0.39	0.33	−1.20	.230	[−1.03, 0.25]
Smoking status					
Formerly smoked (referent)	--	--	--	--	--
Currently smoked	0.49	0.32	1.55	.122	[−0.13, 1.12]
Number of pack years smoked	<0.01	<0.01	0.84	.403	[−0.01, 0.01]
Number of years since last cigarette smoked	0.04	0.04	0.90	.367	[−0.04, 0.11]

Note: N = 511. Perceived smoking-related lung cancer stigma was entered as the dependent variable. b = unstandardized regression coefficient estimate. z = z-score test statistic.

SE = standard error. CI = confidence interval. Bolded statistics indicate regression coefficients significant at $p < .05$.