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Promoting Clinical Conversations about Lung Cancer Screening: Exploring the Role of Perceived Online Social Support

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Abstract

This study examines how the perceived availability of instrumental and emotional online social support is associated with patient-provider communication about lung cancer among adults and live with a COPD diagnosis. In April 2018, 575 adults completed an online survey after being recruited from a large southeastern academic medical center's broad research registry and website listing. Nearly half of the participants were 55-to-80 years old (41%), a current or former smoker who had quit smoking within the past 15 years (42%), and reported a smoking prevalence of 30 pack-years or more (PPY; 41%). A high degree of instrumental and emotional online social support was associated with a greater incidence of annual patient-provider conversations about screening. This combination of perceived support was especially useful for patients with COPD.

Keywords

Lung cancer; screening; patient-provider communication; social support; COPD

In response to the National Lung Screening Trial (NLST), the U.S. Preventive Services Task Force (USPSTF, 2013) recommends that eligible adults undergo an annual low-dose computed tomography (LDCT) scan to screen for lung cancer, a leading cause of cancer-related death in the United States (US; Dela Cruz et al., 2011). Adults are eligible for lung cancer screening if they are asymptomatic, 55–80 years old, a current or former smoker who has quit smoking within the past 15 years, and have a historical smoking prevalence of at least 30 pack-years (PPY; USPSTF, 2013). An LDCT scan, which uses a low amount of radiation to create detailed images of the lungs, is a gold standard technology to screen for lung cancer (Shieh & Bohnenkamp, 2017) and it has been efficacious in reducing mortality

among US adults by 20% (Pyenson et al., 2014). Despite its life-saving capabilities, published population-based surveillance data demonstrate that less than 15% of eligible adults are screened for lung cancer annually (Charkhchi et al., 2017; Richards et al., 2020). Rural adults are especially vulnerable to not utilizing this preventative service, which contributes to high prevalence and late stage diagnoses (Jenkins et al., 2018). Also, insufficient health insurance coverage is a typical barrier to screening (Zhao et al., 2018); however, in 2015, the Centers for Medicare and Medicaid Services (CMS, 2015) approved coverage of LDCT scans for adults meeting eligibility criteria. As a result, attention has shifted to better understand interpersonal factors that contribute to clinical conversations about lung cancer screening (Carter-Harris et al., 2018; Shen et al., 2016).

The Internet has revolutionized how patients navigate and engage with the healthcare system (Li et al., 2014; Smailhodzic et al., 2016; Tan & Goonawardene, 2017). Patients who use the Internet for social support report high self-efficacy to recognize and manage health conditions (Rains et al., 2015) and they feel empowered to engage in conversations with their healthcare providers (Oh & Lee, 2012; Smailhodzic et al., 2016). The Internet hosts an abundance of resources and programs to support patients as they learn and cope with lung cancer, including its risk factors, associated illnesses, and perceived stigma (Sedrak et al., 2016; Sutton et al., 2018; Taylor & Pagliari, 2019; Y. Zhao et al., 2019). As a result, there is positive association between the perceived availability of social support and treatment decision-making in lung cancer (Forsythe et al., 2014; Luszczynska et al., 2013). Unlike treatment decision-making, however, lung cancer screening is situated at an earlier point on the cancer care continuum, when patients are faced with a unique level of uncertainty about receiving a life-altering diagnosis, the risk of false positives, as well as exposure to unnecessary radiation (Schapira et al., 2016). As such, there is empirical value to examine how perceived availability of online social support may uniquely contribute to the incidence of clinical conversations about lung cancer screening.

Examining this phenomenon among patients with a pre-existing, tobacco-associated respiratory condition, such as Chronic Obstructive Pulmonary Disease (COPD), brings a unique perspective to the potential effect of perceived online support on clinical conversations about lung cancer. COPD, a progressive lower respiratory condition that affects adults over the age of 45 who have a history of smoking tobacco, is highly correlated with the incidence of lung cancer (Durham & Adcock, 2015). Nearly 25% of patients with moderate-to-severe COPD develop lung cancer, as compared to 6% of lifetime smokers with normal lung function (Young et al., 2009). Patients with COPD often feel stigmatized or judged for their condition, which hinders their comfort to communicate with healthcare providers and engage in preventive health behaviors (Johnson et al., 2007). Similar to lung cancer, social support has a positive effect on COPD self-management and associated health outcomes (Chen et al., 2017; Lenferink et al., 2018) and it is suggested to be protective against perceptions of stigma (Johnson et al., 2007). As patients with COPD increasingly use online communities for general health-related support (Apperson et al., 2019; Malanga et al., 2018), there is an imperative need to understand whether the availability of online social support contributes to clinical conversations about lung cancer screening uniquely among patients with and without COPD.

Patient-Provider Communication about Lung Cancer Screening

Patient-provider communication about lung cancer screening is consistently low across most socio-demographics, including race, gender, income and education (Carter-Harris et al., 2016; Huo et al., 2019). National surveillance data of US adults who meet age-eligibility requirements for USPSTF-supported lung cancer screening demonstrate that providers are most likely to engage in conversations about screening with current tobacco smokers (Carter-Harris et al., 2016; Huo et al., 2019). This is problematic because lung cancer screening eligibility is also determined by historical prevalence of smoking tobacco (i.e., 30 PPY or more) among former and current smokers (USPSTF, 2013). And, while lung cancer and COPD commonly have a shared etiology of smoking tobacco (Lari et al., 2014), patients with COPD rarely disclose their symptoms, worries, or perceived risks of lung cancer to their providers (Ellis & Vandermeer, 2011). Monitoring trends of patient factors associated with patient-provider communication about lung cancer screening is important to inform approaches for implementing lung cancer screening programs (Carter-Harris et al., 2016), as patients typically adhere to cancer screening guidelines when they are recommended by a healthcare provider (Peterson et al., 2016).

Patient-provider communication is most effective in promoting lung cancer screening when patients and providers collectively come to the specific and deliberate decision to do so (Shieh & Bohnenkamp, 2017; USPSTF, 2013.; Shieh & Bohnenkamp, 2017). These consultations, which are accompanied by cessation counseling for current smokers, follow a shared decision-making procedure to meet USPSTF guidelines and to warrant health insurance reimbursements (USPSTF, 2013; Shieh & Bohnenkamp, 2017). Shared decision-making is “a process whereby clinicians collaboratively help patients reach evidence-informed and value-congruent medical decisions” (Grad et al., 2017). The following topics are covered during shared decision-making consultations: the harms and benefits of an LDCT scan, the potential overdiagnosis and false positive results, the importance of annual follow-up testing, as well as the total radiation exposure of the LDCT scan (USPSTF, 2013.; Shieh & Bohnenkamp, 2017). The quality of this process is dependent on whether or not the informational support provided to these patients is easy to understand and relevant to patient values and circumstances (Carter-Harris et al., 2017; Golden et al., 2020).

The Internet is a ripe resource for patients to prepare for and engage in follow-up inquiry about shared decision-making conversations. Various online tools, such as virtual social communities, allow patients to be more activated in their healthcare, offering additional resources to inform decision-making (e.g., information from reputable sites, testimonials from other patients about their healthcare experiences; Hu et al., 2012; Li et al., 2014). This is especially valuable for patients with COPD, who are increasingly using the Internet to obtain support about symptoms, self-management recommendations, and strategies to talk with a healthcare provider about their diagnosis (Apperson et al., 2019; Cook et al., 2019). As healthcare providers engage in shared decision-making conversations about lung cancer screening with their patients, it will be helpful for them to know if and how online support may influence patients’ values and decisions to be screened.

Online Social Support and Patient-Provider Communication about Lung Cancer

The availability of social support is associated with positive health behaviors (Wright, 2016), especially among patients with COPD who report that it reinforces smoking cessation efforts and improves their quality of life (Chen et al., 2017; Lenferink et al., 2018). Social support is defined as “verbal and non-verbal communication between recipients and providers that reduces uncertainty about the situation, the self, the other, or the relationship that functions to enhance a perception of personal control in one’s experience” (Albrecht & Adelman, 1987, p. 19). Online social support platforms, in particular, allow individuals to exchange information to facilitate, learn or to build impersonal or interpersonal relationships with other Internet users (Preece, 2001). The anonymity afforded by the Internet is especially invaluable for stigmatized conditions, such as lung cancer and COPD, because the user does not have to share their diagnostic identity with online others to obtain available support (Berger et al., 2005).

Two functional social support styles are most commonly available within online health-related communities, including instrumental (e.g., informational or tangible resources to support a behavior and address the concern in question) and emotional (e.g., resources to manage the affective elements of the concern in question) support (Rains et al., 2015). Instrumental support provides instructional value to facilitate behavior change or sustainment, whereas emotional support provides empathy and alleviates patients’ distress surrounding the burden and stigma of the condition (Cutrona & Russell, 1990; Rains et al., 2015). Rains and colleagues (2015) conducted a meta-analysis of online social support messages and found that instrumental and emotional social support are readily exchanged within online communities for chronic illnesses. Findings also demonstrated instrumental support was most commonly available for patients with controllable conditions, whereas emotional support was most common within online communities for patients with uncontrollable, life-threatening, and irreversible conditions. In the context of COPD, an irreversible and stigmatized condition that requires self-management behavior to control its progression, both instrumental and emotional support are commonly exchanged within online communities dedicated to COPD (Apperson et al., 2019).

A strong, positive association exists between the exchange of instrumental and emotional support, indicating that these support styles often occur simultaneously to supply instructional value while alleviating emotional distress about a situation (French et al., 2018; Shakespeare-Finch & Obst, 2011). For example, Morelli and colleagues (2015) found that instrumental support has a positive effect on provider and recipient well-being, but only when the provider also engages in emotional support. Researchers have argued that the degree instrumental and emotional support styles simultaneously occur may be due to the situational context (e.g., a source of conflict) and the type of support needed for its resolution (French et al., 2018). To further the theoretical understanding and practical application of perceived online social support, research is needed to examine how the independent and simultaneous effects of instrumental and emotional support result in health

promoting (or demoting) outcomes (e.g., patient-provider communication about lung cancer) across disease contexts (e.g., COPD vs. non-COPD patients).

Purpose

Online support is associated with how patients engage with their own health and navigate the healthcare system (Luszczynska et al., 2013; Wright, 2016). Social support, however, is not homogeneous, and research examining its dimensions and their relationship with the clinical conversations about lung cancer screening is lacking. This study explores how the availability of instrumental and emotional online support is associated with the incidence of patient-provider communication about lung cancer screening. A secondary aim is to examine how the relationships vary among patients with and without COPD.

METHODS

Sample and Procedures

In April 2018, 575 adults completed a 20-minute online survey available on Research Electronic Data Capture (REDCap) software. We recruited participants from two modalities hosted by a large, academic medical center in the southeastern US region. One was a broad consent research registry, which includes patients in a healthcare system who have consented to be contacted by researchers to participate in research studies for which they are eligible (Iafrate et al., 2017). We worked with data analysts to randomly sample 2,100 patients with ICD-10 codes J40-J47 in their electronic health record, indicating the presence of an acute or chronic obstructive respiratory condition. Eligible participants received an online survey link through their personal email address. To optimize inclusion and diversity in our sample, we also listed the details of the study on the university's clinical research listing webpage. The site is intended for research scientists to advertise studies that are currently recruiting participants. Institutional Review Board (IRB) approval was obtained prior to recruitment and electronic informed consent was obtained from participants before data collection.

Measures

Socio-demographic characteristics, including age, gender, race, and health insurance status, were measured with items adopted from the Health Information National Trends Survey (HINTS, n.d.). We also measured perceived rurality, which was based on a 5-pt Likert-type scale and not included in the HINTS: "To what extent would you describe your current location (where you live)," where 1 = urban/city and 5 = rural/small town. The primary dependent variable was a dichotomous (1 = yes; 0 = no) measure adopted from the HINTS (n.d.): "In the past year, have you talked with your doctor or other healthcare professional about having a test to check for lung cancer?"

Items from the Behavioral Risk Factor Surveillance Survey (BRFSS, 2020) were adopted to determine if participants met tobacco use behaviors outlined by the USPSTF for lung cancer screening eligibility. To assess smoking status, participants were asked to answer the following question: "How long has it been since you last smoked a cigarette, even one or two puffs?" Responses were collapsed to "current smoker" = 3, "former smoker, but smoked within the past 15 years" = 2, and "non-smoker" = 1. Individuals with response option 2 or 3

were within USPSTF guidelines for lung cancer screening. To assess 30 pack-year smoking status, participants were asked two open-ended questions: “How many years have you (or did) you smoked cigarettes?” and “On average, how many cigarettes do (or did) you usually smoke each day?” Pack-year history was calculated by: (number of cigarettes smoked per day*20 cigarettes per pack)/(number of years having smoked). Calculated responses were categorized to “smoked 30 PPY or more” = 3, “smoked less than 30 PPY” = 2, and “never smoked/quit 15+ years ago” = 1. Individuals with response option 3 were within USPSTF guidelines for lung cancer screening.

Two scales were adapted to measure the perceived availability of instrumental ($\alpha = .79$) and emotional ($\alpha = .91$) online health-related social support (Shakespeare-Finch & Obst, 2011). Perceived instrumental online support was operationalized as knowing someone on the Internet who provides a service, such as financial or information assistance, should they be unable to do so themselves. This scale comprised four items (e.g., “there is someone on the Internet who can help me get the health information I need when I am unable;” “there is someone on the Internet who would give me financial assistance for my healthcare”). Perceived emotional online support was operationalized as having someone on the Internet who can express positive emotions and build esteem about their health and condition. This scale comprised six items (e.g., “there is someone on the Internet that I can talk to about the pressures of my health;” “I feel that I have a social network on the Internet that values my health”). Both scales were anchored on a 5-point Likert-type scale (1 = not at all; 5 = always).

Data Analysis

The sample was summarized with frequency and descriptive statistics. A logistic regression model examined socio-demographic characteristics that were associated with the binary primary outcome. A multiple logistic regression model examined the association between having COPD and talking to a doctor about lung cancer in the past year. The model adjusted for potential confounders, including gender, age, race, education, income, rurality, insurance and smoking status. A second logistic regression model examined the association between the generated support variable and having talked to a doctor about lung cancer in the past year. Perceived online emotional and instrument support styles were highly correlated ($r = .86, p < .001$); therefore, we created a categorical variable labeled as 1 = low score on both emotional and instrumental support, 2 = low on emotional score and high on instrumental score, 3 = high on emotional score and low on instrumental score, and 4 = high score on both emotional and instrumental support. Each support style was dichotomized as “low” (2) and “high” (> 2). Finally, potential confounders (e.g., gender) were entered into a final model that examined the interaction between online support combinations and COPD status on talking to a doctor about lung cancer in the past year. SAS 9.4 (NC, Cary) was used to perform all the analysis.

RESULTS

Sample Characteristics

Table 1 shows that the *M* age was 55.14 years (*SD* = 12.62). Over half of the sample (51.80%) was male. Nearly 83% of participants were white, although nearly 20% identified as Hispanic. Most participants had a high socioeconomic status; over 80% reported at least some college education and over 50% earned at least \$50,000/year. More participants described their residence as urban/metropolitan (41.9%) than rural/small town (32.8%). Over half (70%) reported a COPD diagnosis. Half (53.5%) of the participants in the sample reported having talked to their doctor about lung cancer in the past year

On the 5-point Likert-type scale, responses for perceived availability of emotional online social support ranged from 1 to 5, where the average response was *M* = 2.60 (*SD* = 1.23) and the mode was 1 “not at all” for each item. Similarly, the responses for perceived availability of instrumental online social support ranged from 1 to 5, with an average response of *M* = 2.54 (*SD* = 1.14) and mode equal to 1 “not at all.”

Lung Cancer Communication by COPD Status, USPSTF, and Socio-Demographics

Table 2 shows the results of a statistically significant logistic regression model, examining the relationship between obtaining a COPD diagnosis and having discussed lung cancer screening in the past year with a doctor, adjusting for covariates. People who reported a COPD diagnosis had 8.30 times higher odds (95% confidence interval [CI] = 4.65–14.85) of having these discussions than people without a COPD diagnosis, controlling for USPSTF-based eligibility and socio-demographics. These odds were also high among participants outside of the 55 to 80 years old age criterion (odds ratio [OR] = 2.18; CI = 1.28–3.73). However, consistent with the USPSTF guidelines, current (OR = 3.90; CI = 1.46–10.43) and former (OR = 2.18; CI = 1.05–4.51) smokers had higher odds of conversing with a doctor about lung cancer screening than non-smokers. Surprisingly, smokers meeting the 30-PPY criterion had lower odds (OR = .23; CI = .09–.61). We examined these guideline criteria independent of one another because a post-hoc chi-squared analysis demonstrated that, among respondents meeting all USPSTF guideline criteria, 44% talked to their doctor in the past year about lung cancer as compared with 56.7% who did not meet USPSTF criteria (X^2 p = .09).

Controlling for COPD status and USPSTF guideline eligibility, men had 3.10 higher odds of talking to their healthcare provider than women. There was also a statistically significant difference in the odds of these conversations among participants depending on their level of rurality; those reporting a 2 on the 5-pt Likert-type scale (i.e., indicating less rurality) had a 2.31 greater odds of talking to a healthcare provider about lung cancer than those reporting a 1 on the scale (i.e., indicating most rural). Race, socioeconomic status, and health insurance status were not associated with an increased likelihood of discussing lung cancer screening with a doctor.

Lung Cancer Communication by Online Social Support

Table 3 shows the results of the logistic regression model, examining the relationship between perceived online social support and having talked to a doctor about lung cancer in the past year, controlling for covariates. Compared with low perceived instrumental and emotional support, only participants with high instrumental and emotional support had the greatest odds of having these conversations (OR = 4.65; CI = 2.38–9.08); rather, the independent effect of high instrumental or emotional support did not significantly contribute. Adjusting for the effect of all combinations of perceived online support, having a COPD status (OR = 5.17; CI = 2.82–9.48) and being a current smoker (OR = 3.18; CI = 1.15–8.81) or male (OR, 2.64; CI = 1.60–4.38) increased the odds of having talked to a doctor about lung cancer. Once online support was added to the model, age and rurality were no longer statistically significant covariates.

Table 4 demonstrates that the relationship between the perceived availability of online social support and having talked to a doctor about lung cancer screening in the past year varies according to COPD status. In controlling for gender, participants with COPD who had perceived high online instrumental and emotional support reported 9.09 greater odds in having had these conversations, compared with those who perceived their online support as “low.” A high degree of perceived instrumental but low degree of emotional support had a marginally significant increase in odds ($p = .05$), whereas the opposite (i.e., high emotional support, low instrumental support) was not statistically significant.

DISCUSSION

Over half (53%) of the participants in this study reported having talked to their healthcare provider about lung cancer in the past year, which is considerably higher than what has been reported in prior research (Carter-Harris et al. 2016; Huo et al. 2019). Current and former smokers, and participants reporting less than a 30 pack-year (PPY) smoking prevalence, being outside of the 55–80 years old eligibility age-range, and identifying as male had greater odds of talking to a healthcare provider in the past year about lung cancer screening. The perceived availability of online social support was positively associated with clinical conversations about lung cancer screening, especially among adults with COPD. Findings have implications for the perceived availability of online instrumental and emotional support to combat gender inequities in lung cancer communication, as well as motivating high-risk adults to engage in and supplement clinical conversations about lung cancer screening.

Principal Findings

Participants with any history of smoking tobacco and reporting less than a 30 pack-year (PPY) smoking tobacco prevalence had high odds of talking with their healthcare provider about lung cancer screening in the past year. This is unique to prior research examining US population-based surveillance data, which found that being a current smoker increases the likelihood of having talked to a healthcare provider about lung cancer in the past year (Carter-Harris et al., 2016; Huo et al., 2019). Once controlling for the perceived availability of online instrumental and emotional support, however, results demonstrated that identifying as a current smoker, male, and living with COPD increased the odds of these clinical

conversations in the past year. This indicates that the perceived availability of online social support has a significant association with patient-provider communication about lung cancer screening according to smoking status and pack-year prevalence. Future research is needed to understand the nuances of available online social support according to smoking status and prevalence, including how its availability uniquely informs the occurrence of clinical conversations about lung cancer screening.

Participants outside of the USPSTF age guidelines were also more likely to have discussed lung cancer screening with their healthcare provider in the past year. According to USPSTF guidelines, this is problematic because nearly half of the participants in this study were between the ages of 18–54. However, from a health promotion and communication perspective, this hosts an opportune time to educate younger, at-risk patients about lung cancer and prepare them for meeting in-guideline screening recommendations once they reach 55 years old. Once controlling for the perceived availability of online social support, however, we found that age was no longer a statistically significant factor associated with clinical conversations about lung cancer screening. Younger adults have a greater capacity to navigate and obtain online support (Paige et al., 2019); therefore, online support-based interventions may be especially useful in preparing high-risk adults to engage with their healthcare provider about lung cancer screening conversations and decisions in the future.

Although gender is not a lung cancer screening eligibility criterion according to the USPSTF guidelines, women in this study had lower odds of having talked to their healthcare provider about lung cancer in the past year. This finding conflicts with prior research reporting on the secondary analyses of national US surveillance data, which has yet to detect gender differences in the annual incidence or prevalence of patient-provider communication about lung cancer (Carter-Harris et al., 2016; Huo et al., 2019). Women are 32% less likely than men to be aware of lung cancer screening eligibility (Warner & Lathan, 2019). Given that nearly 70% of our sample had a COPD diagnosis, this finding highlights a critical need to further pursue research about gender inequities in lung cancer communication among this high-risk population.

Although USPSTF guidelines were not consistently associated with clinical conversations about lung cancer screening, findings demonstrated that they were common among patients with a COPD diagnosis. This is an extremely positive finding, as COPD is a risk factor for lung cancer, independent of age, sex and tobacco use history (Young et al., 2009). To our knowledge, this is the first study to report a statistic for the proportion of patients with COPD who have talked about lung cancer with their healthcare provider in the past year.

In addition to the socio-demographic predictors of patient-provider communication about lung cancer screening in the past year, this study found that the co-occurrence, or the interaction, between a high degree of perceived online instrumental and emotional support was associated with greater odds of these conversations. A subsequent moderation analysis found that this interaction effect was only statistically significant among participants reporting a COPD diagnosis. Of further interest was the positive, yet marginally significant effect of having a high degree of perceived instrumental support (but low perceived emotional support) on patient-provider communication about lung cancer. Patients with

COPD may be talking to their doctors more often about lung cancer, but the quality of their preparative or subsequent available online support is unknown. Reputable online health communities exist for patients who are at-risk, living with, or caring for another person with COPD (e.g., COPD360social by COPD Foundation). While there is evidence that both instrumental and emotional support are available within online communities, such as Facebook (Apperson et al., 2019), the content of these messages and their capacity to help patients with COPD navigate clinical conversations about lung cancer is less known. Offering theory- and support-driven online education to describe the biopsychosocial effects of lung cancer in COPD and how to best navigate clinical conversations about its screening may continue to enhance the perceived availability of online support while disseminating targeted and useful information.

Limitations

This was a cross-sectional study that included adults from a southeastern US university-based research registry and research listing webpage; therefore, we cannot guarantee that our sample is nationally representative of US adults nor can we infer causation between the variables. Moreover, instrumental support in this study was limited to tangible information resources whereas emotional support was defined as esteem- or efficacy-building support. Because the aim of this study was to provide exploratory evidence for the perceived availability of instrumental and emotional online social support on patient-provider communication, we did not consider the nuances of the source of available support (e.g., provider vs. patient) or the channel in which it is available (e.g., social media community vs. healthcare organization's website). Research is needed to examine whether available online support from a healthcare provider or a peer has a stronger translational effect to offline, clinical conversation contexts.

Practice Implications and Conclusion

Results have important implications for using available online social support to alleviate gender inequities in patient-provider communication about lung cancer screening, and ultimately late stage diagnosis of respiratory ailments like lung cancer and COPD (Mamary et al. 2018). Strategic online support-based messages intended for high-risk women may contribute as a remedy. Messages that combat the stigma associated with smoking behaviors among women would be exceptionally useful in encouraging clinical conversations about lung cancer risk. Another effort is “bundling” cancer screening messages, or providing lung cancer screening education at the point of other cancer screening that are common and widely accepted among women (López et al., 2019). In crafting these messages, attention must be paid to gender discordant dyads of patients and providers, given evidence that male and female healthcare providers have different practice styles that influence the incidence of conversations related to preventive services (Bertakis, 2009).

In addition to its insightful practical implications, the results of this study expand upon the theoretical understanding of why the perceived availability of instrumental and emotional online support is associated with a greater incidence of clinical conversations about lung cancer. Drawing from principles of the Transactional Model of Stress and Coping (Lazarus and Folkman 1984), a threatening situation is a function of the interaction of personal and

environmental factors, where an individual's ability to adapt or overcome the situation is dependent on their availability of cognitive and social resources. Therefore, there is a theoretical and practical explanation why patients with COPD, who are already at an extremely high risk for lung cancer, are more likely than their non-COPD counterparts to engage in these clinic-based conversations. This explanation is: Patients with COPD who talk to their doctor about lung cancer believe they have informational and emotional resources available on the Internet to help them overcome stress associated with the interaction, news about their risk, and facing a potential diagnosis of lung cancer. Consistent with findings by Morelli and colleagues (2015), these patients may believe they have online support that will provide information and genuine empathy surrounding their situation. An important next step in this research is to understand when the availability of instrumental and emotional online social support is most valuable to patients, so that efforts can be optimized in supplementing resources before and/or after patient-provider conversations about lung cancer. Moreover, there is a need to better understand if online instrumental and emotional support uniquely influences clinical communication about lung cancer screening when it is offered by diverse sources (e.g., providers, peers, caregivers).

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Table 1.Characteristics of the sample ($N = 575$)

Predictor	Result
Socio-Demographics	
Age in years, $M(SD)$	55.14 (12.62)
18–54	325 (56.5)
55–80	237 (41.2)
81–92	13 (2.3)
Gender, $n(\%)$	
Female	256 (44.50)
Male	298 (51.80)
Missing	21 (3.70)
Race, $n(\%)$	
White	474 (82.4)
Black/African American	54 (9.4)
Asian American	12 (2.1)
Native American	13 (2.3)
Other/Multi-Racial	19 (3.3)
Missing	1 (.7)
Ethnicity, $n(\%)$	
Hispanic	108 (18.8)
Non-Hispanic	433 (75.3)
Missing	34 (5.9)
Income, $n(\%)$	
\$24,999 or less	70 (12.2)
\$25K–\$34,999	60 (10.4)
\$35K–\$49,999	124 (21.6)
\$50K–\$74,999	147 (25.6)
\$75K or more	156 (27.1)
Missing	18 (3.1)
Education, $n(\%)$	
Less than High School	37 (12.7)
High School or Equivalent	66 (11.5)
College 1–3 Years	180 (31.3)
College 4 or More Years	288 (50.1)
Missing	4 (.7)
Active Health Insurance Status, $n(\%)$	512 (89)
Self-Reported COPD Factors	
COPD Diagnosis, $n(\%)$	407 (70.8)
Smoking Status, $n(\%)$	
Current	75 (13)
Former, Quit Within 15 Years	167 (29)

Predictor	Result
Former, Quit more than 15 Years Ago	123 (21.4)
Never Smoked	208 (36.2)
Missing	2 (.3)
30 Pack-Year Smoking History	
Below 30 Pack-Year	237 (41.2)
Above 30 Pack Year	85 (14.8)
Non-Smoker	208 (36.2)
Missing	45 (7.9)

Table 2.

Regression for talking to a doctor about lung cancer screening in the past year

Predictor Variables	OR	95% CI	
		LL	UL
COPD Status			
Not Diagnosed	1		
Diagnosed	8.30***	4.65	14.83
Age (in years)			
Within USPSTF Criteria (55–80)	1		
Outside USPSTF Criteria (<55 or >80)	2.18**	1.28	3.73
Smoking Status			
Never Smoked/Quit 15+ years ago	1		
Current	3.90**	1.46	10.43
Former, Quit < 15 years	2.18*	1.05	4.51
Cigarette Pack Per Year (PPY)			
Never Smoked/Quit 15+ years ago	1		
Less than 30 PPY	0.71	0.36	1.43
More than 30 PPY	0.23**	0.09	0.61
Gender			
Female			
Male	3.10***	1.91	5.04
Race			
White	1		
Black/AA	1.81	0.70	4.69
Asian	1.40	0.22	9.08
Native American	1.48	0.24	9.20
Other	0.75	0.16	3.51
Education			
College 4+ years degree	1		
College 1–3 years	0.56	0.24	1.34
High school or GED	1.13	0.64	1.98
9 – 11 years of education	1.07	0.33	3.51
Less than 9 years of education	2.79	0.06	127.73
Annual Income			
\$75K or More	1		
\$50K - \$74,999	1.81	0.94	3.48
\$35K - \$49,999	1.59	0.79	3.19
\$25K - \$34,999	0.92	0.40	2.12
Less than \$24,999	0.85	0.37	1.96
Perceived Rurality			
Rural/Small Town	1		

Predictor Variables	OR	95% CI	
		LL	UL
Rurality 2	2.31 *	1.09	4.92
Rurality 3	1.45	0.70	3.01
Rurality 4	1.14	0.51	2.56
Urban/city	0.98	0.39	2.50
Health Insurance Status			
Has Insurance	1		
No Insurance	0.88	0.33	2.31

Note. OR = Odds Ratio; 95% CI LL = Lower Level and UL = Upper Level

*
 $p < .05$

**
 $p < .01$

 $p < .001$

Table 3.

Logistic regression models for online support and lung cancer screening conversations

Predictor Variables	OR	95% CI	
		LL	UL
COPD Status			
Not Diagnosed	1		
Diagnosed	5.17***	2.82	9.45
Perceived Online Support			
Low Instrumental and Emotional Support	1		
High Instrumental/Low Emotional Support	2.15	0.81	5.70
Low Instrumental/High Emotional Support	1.67	0.72	3.85
High Instrumental and Emotional Support	4.65***	2.38	9.08
Age (in years)			
Within USPSTF Criteria (55–80)	1		
Outside USPSTF Criteria (<55 or >80)	1.57	0.87	2.82
Smoking Status			
Never Smoked/Quit 15+ years ago	1		
Current	3.18*	1.15	8.81
Former, Quit < 15 years	1.67	0.79	3.53
Cigarette Pack Per Year (PPY)			
Never Smoked/Quit 15+ years ago	1		
Less than 30 PPY	0.85	0.42	1.74
More than 30 PPY	0.44	0.16	1.17
Gender			
Female	1		
Male	2.64***	1.60	4.38
Race			
White	1		
Black/AA	1.48	0.54	4.01
Asian	1.95	0.29	13.26
Native American	1.74	0.25	12.01
Other	1.06	0.22	5.25
Education			
College 4+ years degree	1		
College 1–3 years	0.67	0.27	1.63
High school or GED	1.09	0.61	1.97
9 – 11 years of education	0.93	0.27	3.21
Less than 9 years of education	3.37	0.12	91.58
Annual Income			
\$75K or More	1		
\$50K - \$74,999	1.50	0.75	3.03

Predictor Variables	OR	95% CI	
		LL	UL
\$35K - \$49,999	1.10	0.52	2.34
\$25K - \$34,999	0.69	0.28	1.71
Less than \$24,999	0.79	0.34	1.85
Perceived Rurality			
Rural/Small Town	1		
Rurality 2	2.03	0.94	4.41
Rurality 3	1.32	0.62	2.78
Rurality 4	1.18	0.51	2.75
Urban/city	0.87	0.34	2.28
Health Insurance Status			
Has Insurance	1		
No Insurance	0.90	0.33	2.46

Note. OR = Odds Ratio; 95% CI LL = Lower Level and UL = Upper Level

*
 $p < .05$

**
 $p < .01$

 $p < .001$

Table 4.

Regression for online support and lung cancer screening conversations by COPD

		95% CI	
COPD Status and Online Support	OR	LL	UL
<i>Not Diagnosed with COPD and Online Support</i>			
Low Instrumental and Emotional Support	1		
High Instrumental/Low Emotional Support	0.35	0.04	3.36
Low Instrumental/High Emotional Support	1.13	0.27	4.76
High Instrumental and Emotional Support	2.17	0.56	8.46
<i>Diagnosed with COPD and Online Support</i>			
Low Instrumental and Emotional Support	1		
High Instrumental/Low Emotional Support	2.75 ^a	0.98	7.7
Low Instrumental/High Emotional Support	1.89	0.77	4.64
High Instrumental and Emotional Support	9.09 ^{***}	4.53	18.25

Note. OR = Odds Ratio; 95% CI LL = Lower Level and UL = Upper Level; Gender is the covariate

 $p < .001$

^a
 $p = .05$