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Characteristics of Smoking Oncology Patients in a Community Cancer Center: A Study of Individual Differences

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CHARACTERISTICS OF SMOKING ONCOLOGY PATIENTS IN A COMMUNITY CANCER CENTER: A STUDY OF INDIVIDUAL DIFFERENCES

by

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Dedication

I would like to dedicate this dissertation to my children, Charlotte and Ryder. Through graduate school and predoctoral internship each of you has taught me to balance work and what is truly important in life – family. Thank you for helping me keep things in perspective and for all the joy you've given me along the way.

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Abstract

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Cigarette smoking can seriously impede cancer treatment and leads to poorer treatment response. Fortunately, even when patients have cancer, smoking cessation has significant benefits. However, there have not been many successful well-controlled studies assessing smoking cessation interventions in oncology settings. The present study aimed to expand upon the current literature by exploring sample characteristics and individual differences in this understudied population. Data were collected from 649 adult participants at a mid-South community-based cancer center. Three measures were developed and subjected to factor analysis to assess level of health literacy, perceived stigma, and oncology-related triggers in this sample. These variables were then used as the dependent variables for three separate General Linear Models to determine whether scale scores varied by ethnicity, gender, smoking level, and whether the participant was a cancer survivor or currently in treatment. Each measure demonstrated adequate internal consistency and produced a single factor. Females were more likely than males to experience more smoking triggers when faced with cancer symptoms or treatments. Caucasians were more likely than African Americans, and lower level smokers were more likely than heavy smokers, to have higher health literacy. No individual differences were found within perceived stigma scores. Several implications of this research should be acknowledged. First, each scale demonstrated strong internal consistency in an oncology patient sample, making them appropriate for use in future research and confirming their utility in a clinical setting. Second, women were more likely than men to experience increased triggers to smoke when faced with oncology-related stress. They may need more support from medical and

mental health staff to address cravings and to ensure their cigarette consumption does not increase. Third, smoking-related health literacy levels were high overall, indicating that patients are aware of the health consequences of smoking. However, these participants continued to smoke even though they realized that they are less likely to have successful treatment outcomes. Further, health literacy varied by both ethnicity and smoking level, but patients scored high on health literacy overall. This may indicate the need for motivational enhancement strategies to increase motivation to quit among African Americans and heavier smokers.

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Characteristics of Smoking Oncology Patients in a Community Cancer Center: A Study of Individual Differences

Cigarette smoking is the leading cause of preventable death and disease in the United States today with an estimated 480,000 people prematurely dying each year as a result of smoking (US Department of Health and Human Services [USDHHS], 2014). Tobacco-related health care expenditures in the U.S. total $289 billion in direct medical costs and lost productivity each year (Jamal et al., 2014). This is due, in part, to the high rates of smoking-attributable conditions such as chronic bronchitis, emphysema, heart attack, stroke, cancer, as well as various pulmonary and neurological diseases (USDHHS, 2014). Still, an estimated 42.1 million adults in the United States continue to smoke (Jamal et al., 2014). Given these high rates of smoking, more research is needed to decrease the health impact of smoking in the U.S., particularly among vulnerable populations.

The consequences of smoking in terms of cancer onset and progression are well documented. Smoking increases the risk of dying from cancer and is directly related to one out of every three cancer deaths in the United States (USDHHS 2014). Cigarette smoking damages virtually all organs of the body and reduces overall health (CDC, 2015). Smoking is associated with significant increases in the development of numerous forms of cancer, including bladder, blood, cervix, colorectal, esophagus, kidney and ureter, larynx, liver, oropharynx, pancreas, stomach, and trachea, bronchus, and lung cancers (USDHHS, 2014). Over 85% of the approximately 53,000 U.S. cases of head and neck cancer are associated with smoking. Over 90% of lung cancer cases are directly attributable to smoking and between 60% to 70% of cases for other smoking-related cancers (Burns, Garfinkle, & Samet, 1997). Smokers are also at higher risk of having metastatic disease at diagnosis (Kobrinsky, Klug, Hokanson, Sjolander, & Burd,

2003). Further, patients who smoke are at increased risk of developing a second malignancy at either the same or a different tumor site, regardless of whether or not they initially presented with a smoking-related malignancy (Gritz et al., 2006; Parsons, Daley, Begh, & Aveyard, 2010).

Cigarette smoking can seriously impede cancer treatment, as it leads to poorer treatment response. Smoking can reduce treatment effectiveness and worsen the side effects of treatment (Chen et al., 2007; Des Rochers, Dische, & Saunders, 1992; Geyer et al., 2010; Kawahara et al., 1998). Further, smoking cigarettes can lead to immunosuppression and have a negative impact on wound healing, which is of particular concern for surgical patients (USDHHS, 2010a; USDHHS, 2010b). The ability to heal is repressed in smokers due to vasoconstriction, inhibition of epithelization, and creation of cellular hypoxia caused by both carbon monoxide and nicotine (Gritz, Kristeller, & Burns, 1993; USDHHS, 2004). In head and neck cancer patients, surgical and long-term complications are much more likely to occur for patients who smoke (Wein, 2009). Additionally, smokers with acute myeloid leukemia who receive induction chemotherapy have an increased risk of developing severe pulmonary infection than those who do not smoke (26% vs 18%) (Chelghoum, 2002). Finally, patients who continue to smoke during radiation therapy have lower rates of both complete response to treatment (45% vs. 74%) and survival at 2 years post-treatment (39% vs 66%) (Kearney, Lee, Reilly, DeCamp, & Sugarbaker, 1994).

Fortunately, even when patients have cancer, smoking cessation has significant benefits. In patients with primary cancers, smoking cessation is associated with a decreased risk of a second malignancy and decreased mortality (Chen et al., 2007; Geyer et al., 2010; Kawahara et al., 1998). Further, the risks for developing mouth, throat, esophagus, and bladder cancers are lowered by 50% within 5 years of quitting smoking, and the risk of dying of lung cancer drops

by half 10 years after quitting (USDHHS, 2010b).

An estimated 68.8% of smokers overall would like to quit, and 4 out of 10 have made a quit attempt in the past year (CDC, 2011; USDHHS, 2014). Of those who relapse, nearly two thirds would like to make another quit attempt within 30 days (CDC, 2002). Oncology patients in particular are most likely to quit at diagnosis. Several studies suggest quit rates of over 50% for smokers with cancer during this timeframe (Day et al., 1994; Duffy et al., 2008; Spitz, Fueger, Chamberlain, Goepfert, & Newell, 1990), with one study reporting that newly diagnosed patients quit at rates five times higher than the general population (Bassett et al., 2012). It has been recommended that the diagnosis of cancer be used as a 'teachable moment' to increase motivation for quitting and increase cessation rates overall (Gritz et al., 2006).

Many smokers quit on their own when faced with a cancer diagnosis. However, researchers are concerned about those who do not try to quit as well as those who try to quit but do not succeed. These 'diehard' smokers are often unable to quit even when faced with cancer. One 2009 study by Martinez and colleagues highlighted the difficulties in recruiting cancer patients into smoking cessation programs. Among smoking participants, 16% (N = 43) refused enrollment and 84% (N = 220) consented. Barriers that significantly impeded enrollment included medical contraindications (5.0%), not being interested in quitting (4.0%), participants not being reachable by telephone (4.0%), medication contraindications (1.0%), mortality (0.8%), transportation issues (0.7%), non-English speaker (0.7%), low-level smoking below the study cut off (0.3%), psychiatric history (0.1%) and 'other' (0.4%). Ethnicity, age, and gender were not associated with enrollment status. However, those with bladder, cervical, colorectal, kidney, lymphoma, and ovarian tumor sites had higher refusal rates than those presenting with head and neck, lung, breast, and prostate cancer patients. Those with more advanced disease were also

more likely to decline enrollment. Patients who enrolled tended to have smoked for prolonged periods (m = 38 years) and were highly dependent on nicotine.

Unfortunately, there have not been many successful well-controlled studies assessing smoking cessation interventions in oncology settings. Recently, Nayan et al. (2013) provided a thorough review of the smoking cessation intervention literature for 10 randomized controlled trials and three prospective cohort studies in smoking oncology populations. Interventions included nicotine replacement therapy (NRT), bupropion, varenicline, and counseling. The authors found that for both short-term and long-term follow-up studies, tobacco cessation interventions did not significantly affect quit rates regardless of intervention components used, except in the perioperative period. The authors hypothesized that some predictive factors may not have been detected due to small effect sizes. Recommendations for future interventions included using more intensive pharmacotherapy interventions in conjunction with counseling while collaborating with patients' healthcare team to coordinate care.

Since Nayan's 2013 review, the field has continued to struggle to develop effective smoking cessation programs for cancer patients. Ostroff and colleagues (2014) found no significant cessation rate differences at 6-month follow-up between participants who were treated with NRT and counseling when compared with participants receiving NRT, counseling, and scheduled reduced smoking training. Kehlet, Heeseman, Tonnesen, & Schroeder (2015) conducted a single-blind clinical trial that randomized cancer patients to a 6-week motivational and educational intervention condition or a standard care control condition. Though the study was underpowered due to recruitment difficulties, no statistically significant difference in cessation rates was observed between the two conditions at 6-week follow-up. More research is

needed to address potentially important factors for why cessation interventions in this population have not been effective.

Perceived Stigma

For optimal results, cessation interventions should be flexible and tailored to the individual. Gritz and colleagues (2006) noted that cancer-related issues must be considered, as smoking cessation approaches may need to be adapted to the physical limitations often experienced during the course of disease and treatment. The authors also emphasized the importance of attending to psychological factors and disease-related stress, which can hinder cessation. One important factor is the guilt, shame, and stigma that often surrounds cancer patients who smoke. Particularly for those with smoking-attributable cancers, patients may feel blamed and stigmatized for their disease, a situation that may delay medical treatment, cessation services, and seeking support from loved ones (Carter-Harris, 2015; Chapple, 2004; Marlow, Waller, & Wardle, 2015). It is therefore not surprising that social support has long been identified as an important factor that can influence smoking treatment outcomes (Cobb, Graham, Bock, Papandonatos, & Abrams, 2005). However, previous studies have lacked attention to these important psychosocial factors.

Oncology-Related Smoking Triggers.

Another difficulty in sustaining cessation may include stress-related and oncology-specific smoking triggers. Patients diagnosed with cancer often have elevated levels of distress, leading many long-term and heavy smokers to rely on smoking as a coping strategy and for mood regulation (McBride & Ostroff, 2003). The National Comprehensive Cancer Network has identified several periods of increased vulnerability and distress during the course of disease and treatment (Forsythe, 2013). Included are periods of symptom suspicion, medical and lab work

ups, determining the stage of cancer progression, diagnosis, awaiting treatment, change in treatment modality, the end of treatment, hospital discharge following treatment, the stresses of survivorship, follow-up visits and surveillance, treatment failure, recurrence/disease progression, advanced cancer, and end of life.

Cancer-related barriers must be addressed with smokers in order to successfully tailor smoking cessation programs to this vulnerable population. One common barrier is the loss of coping strategies for dealing with cravings and triggers. For example, a patient who is fatigued or immobile due to cancer treatment may have a difficult time escaping or avoiding a smoking trigger. Further, while pharmacologic treatment is often recommended for all patients making a quit attempt, participants with oral cancers may be unable to use oral forms of NRT (e.g., gum, lozenge, spray, or inhaler) (Gritz et al., 2006). To date no research exists on the role of distress as a contributor to smoking triggers in oncology patients.

Health Literacy

For some smokers, health literacy may be of particular importance. In order to instill change, it might be necessary to provide smokers with information so that they can make knowledgeable decisions about their smoking (Whyte, Watson, & McIntosh, 2006). In making the health consequences of smoking salient to smokers, increasing health literacy may encourage more thoughts about changing smoking behaviors, and further the progression toward cessation. In the largest randomized control trial of smoking cessation conducted in light smokers, it was observed that health education outperformed motivational interviewing in promoting cessation (Ahluwalia et al., 2006). As such, it may be that those who are at lower levels of motivation may benefit significantly from motivational interviewing, and those at higher levels of motivation to quit smoking will benefit more from increasing health literacy. Conversely, health literacy may

be more meaningful to lighter smokers who have lower levels of nicotine addiction and fewer perceived smoking risks.

The goal of the present study was to expand upon the current literature by exploring sample characteristics of this understudied population as well as individual differences in cancer and smoking health literacy, perceived stigma, and oncology-related triggers. Our aim was to determine the utility of several variables, including ethnicity (African Americans vs. Caucasians), gender, amount smoked by participants, and whether the participant was in current treatment or survivorship to predict perceived stigma, health literacy about smoking and cancer, and oncology-related smoking triggers.

Ethnicity is likely to be particularly important, as there are well-documented systematic differences in amount smoked, acceptability of smoking, and the effects of tobacco use across African Americans and Caucasians. Given that African Americans smoke fewer cigarettes (Trinidad et al., 2009), report less smoking-related perceived stigma (Stuber, Galea, & Link, 2008), and typically demonstrate lower levels of health literacy than Caucasians (Kutner, Greenburg, Jin, & Paulsen, 2006), we hypothesize that African Americans will report lower levels of oncology-related triggers, perceived stigma, and health literacy than Caucasians in an oncology population.

Given that men are more likely to evidence less health literacy about the consequences of smoking (Von Wagner, Knight, Steptoe, & Wardle, 2007), we hypothesized that men will also evidence less health literacy about cancer and smoking in an oncology setting than women. Because no research to date has examined gender effects on stigma and smoking in oncology or oncology-related triggers, even in a non-oncology setting, we are using this variable on an exploratory basis.

Lower level smokers are less likely to be exposed to smoking-related stigma (Castaldelli-Maia, Ventriglio, & Bhugra, 2016), report less health literacy and understanding about the hazards of smoking (Presson, Chassin, & Sherman, 2002), and are less addicted to nicotine than heavy smokers (Schane, Glantz, & Ling, 2009). Therefore, we hypothesized that lower level smokers will score lower than heavy smokers on perceived stigma, health literacy, and oncology-related triggers to smoke in an oncology population.

Finally, cancer status (currently in treatment vs. in remission/survivorship) will be assessed on an exploratory basis. Prior studies have looked at stigma in oncology samples within never smokers and ever smokers (Cho et al., 2013). However, current cancer patient smokers have not yet been directly compared to cancer survivors. We hypothesized that those currently in treatment will score higher on perceived stigma, health literacy, and oncology-related triggers due to the temporal proximity of a cancer diagnosis and cancer treatment when compared with cancer survivors.

Method

Overview of Procedures

Following approval by the University of Memphis Institutional Review Board, data were drawn from Oncology Knows to Quit (OK to Quit), a longitudinal study of cigarette use behaviors and perceptions in a sample of adult oncology patients who ranged in age from 18 to 85 (m = 57.9; SD = 11.50). Participants were recruited and consented into the study when they initially presented for cancer treatment at the West Cancer Center (WCC). The WCC is a university-affiliated community cancer center comprised of 14 sites that serve a diverse range of cancer patients in the Shelby County, TN, southeastern Arkansas, and northwestern Mississippi region. However, data were only collected at the Germantown, TN, WCC clinic.

All smoking patients that presented to WCC for cancer treatment answered a range of health and behavior questions at each visit for clinical purposes. Before patients responded to survey questions they were asked to consent electronically to their participation in the OK to Quit study. If a participant consented, they were given a range of survey items consisting of medical and quality of life items as well as history of smoking behaviors and perceptions about smoking. Smoking-related survey data remained confidential and were stored on an encrypted server. Survey data did not become part of the participant's medical record.

Participants

Adult individuals (18 or older) who were currently receiving treatment for cancer at WCC were eligible to participate based on the following inclusion criteria: 1) reported being a current smoker, having smoked at least one cigarette in the past 30 days; 2) were currently or had previously undergone adjuvant cancer treatment, treatment for cancer recurrence or metastatic disease, or treatment for blood cancer; 3) had gender data on file, and 4) reported Caucasian or African American ethnicity. Ethnicity was dichotomized due to small numbers of participants representing other ethnicities. The sample included 649 participants who were recruited at WCC from 10/1/2016 to 2/1/2017.

Measures and Coding of Items of Interest

Demographics. Demographic variables were obtained from patient medical records and included gender [male (0), female (1)], ethnicity [African American (0), Caucasian (1)], age, and marital status [single (0), married (1), divorced (2), widowed (3)]. Other ethnic groups outside of African Americans and Caucasians were not included in the present analyses due to insufficient representation within the current sample.

Medical data. Medical data were obtained from patient records and included cancer stage [Stage 0 (0), Stage I (1), Stage II (2), Stage III (3), Stage IV (4)] and treatments

administered [no treatment (0), chemotherapy (1), radiation (2), surgery (3), two treatment modalities (4), three treatment modalities (5)].

Smoking Status. Participants were asked to answer a number of items that described their current tobacco use and tobacco use history. They were categorized into those who were light and intermittent smokers (LITS) (0) and heavy smokers (1). Light smokers were defined as consuming from 1 cigarette per month up to 10 cigarettes per day, whereas heavy smokers consumed more than 10 cigarettes per day.

Perceived Stigma. Eight items from the Quality of Life in Neurological Disorders (Neuro-QOL – Stigma), Short Form were modified to measure participants' perceptions of self and publicly enacted negativity, prejudice, and discrimination as a result of cancer-related manifestations: "***Lately because I smoke and now have cancer or have had cancer in the past...***" (1) *Some people avoid me*; (2) *I feel left out of things*, (3) *People avoid looking at me;* (4) *I feel embarrassed;* (5) *Some people feel uncomfortable with me;* (6) *I feel embarrassed because of my physical limitations;* (7) *People are unkind to me;* (8) *Some people acted as though it was my fault I have this illness.* These items were each answered on a Likert scale that included the responses "never" (0), "rarely" (1), "sometimes" (2), "often" (3), and "always" (4).

Oncology-Related Smoking Triggers. Thirteen items were designed to measure participants' oncology-related smoking triggers during times of increased distress. Participants responded to this stem: ***"I have experienced more frequent or intense cigarette cravings than usual due to…"*** Triggers included (1) *Finding a suspicious symptom related to cancer*; (2) *Having a diagnostic workup related to cancer;* (3) *Finding out my cancer diagnosis;* (4) *Awaiting cancer treatment;* (5) *A change in my cancer treatment;* (6) *cancer treatment complications;* (7) *The end of cancer treatment;* (8) *Discharge from the hospital following*

cancer treatment, (9) *Transition to cancer survivorship*; (10) *Medical follow-ups after the end of cancer treatment;* (11) *Cancer treatment failure;* (12) *Cancer coming back/recurrence;* and (13) *Cancer getting worse/progressing.* These items were each answered on a Likert scale that included the responses "never" (0), "rarely" (1), "sometimes" (2), "often" (3), "always" (4), and "not applicable" (-99).

Health Literacy. Five items were designed to measure participants' health literacy about smoking and cancer: (1) *Smoking cigarettes is related to the development of cancer*; (2) *People with cancer who smoke are at higher risk of developing a second cancer than those who don't smoke;* (3) *Cigarette smoking can make cancer treatment not work as well;* (4) *Cigarette smoking can make the side effects of cancer treatment worse;* (5) *Quitting smoking doesn't really help a patient's health once a patient has advanced or metastatic cancer.* These items were each answered on a Likert scale that included the responses "very true" (0), "somewhat true" (1), "somewhat untrue" (2), and "very untrue" (3).

Approach to Analyses

Descriptive statistics (Table 1) were calculated for demographic, medical, and smoker characterization variables. Items on each of the three scales were then assessed for internal consistency using Cronbach's alpha, at which point it was determined whether alphas would improve if an item were removed from each of the scales. A factor analysis was then conducted to determine whether the items included for each of the three concepts of interest (Perceived Stigma, oncology-Related Smoking Triggers, and Health Literacy) were measuring one construct.

A factor analysis requires that two assumptions be met. First, the data set must have a suitable sample size. The present study met both generally accepted recommendations for

Table 1

Participant Characteristics

Characteristic		*n*	%
Ethnicity			
	African American	157	24.2
	Caucasian	486	74.9
	Missing	6	0.9
Gender			
	Male	218	33.6
	Female	431	66.4
	Missing	0	0.0
Marital Status			
	Single	142	21.9
	Married	327	50.4
	Divorced	111	17.1
	Widowed	61	9.4
	Missing	8	1.2
Smoking level			
	Light and Intermittent	307	47.3
	Heavy	243	37.4
	Missing	99	15.3
Patient classification			
	Currently in Treatment	408	62.9
	In Survivorship	241	37.1
	Missing	0	0.0

Table 1 (Continued)

Characteristic		*n*	%
Cancer Stage			
	0	55	8.5
	I	134	20.6
	II	104	16.0
	III	103	15.9
	IV	132	20.3
	Missing	121	18.6
Treatments Administered			
	Chemotherapy	106	16.9
	Radiation	13	2
	Surgery	119	18.3
	Two Modalities	183	28.1
	Three Modalities	90	13.9
	No Treatment	118	18.2
	Missing	20	3.1

Note. (N = 649).

sample size, including having at least 300 participants and having a 10 to 1 ratio of cases to number of items being factor analyzed (Pallant, 2010). Second, the strength of intercorrelations among items must be adequate, which is evident when correlations matrix coefficients are greater than .30 (Pallant, 2010). To assess the factorability of the data the Kaiser-Meyer-Olkin measure of sampling adequacy, which ranges from 0 to 1, should be at least 0.6. Further, Bartlett's Test of Sphericity should be significant ($p < .05$) to be considered appropriate. In determining the number of factors to extract, the theoretical model underlying the composition of the measures was considered. In addition, Cattell's scree test (Cattell, 1966) was used to plot

each of the eigenvalues of the factors. The plot was then inspected to find the point at which the shape of the line changed direction and became horizontal. All factors above this 'elbow' were retained, as these factors explain the most variance in the dataset (Pallant, 2010). Factor extraction was not performed, as each scale only produced a single factor (Tabachnick and Fidell, 2007). As such, all questions within a concept of interest were averaged to obtain an overall score scale. These variables were then used as the dependent variable for further analyses.

Due to the data not meeting the assumption of independence for Generalized Estimating Equations, three separate General Linear Models were utilized. We determined whether scores on perceived stigma, oncology-related smoking triggers, and health literacy varied by each independent variable. Independent variables used to predict scores on these three scales included ethnicity (African American vs. Caucasian), gender (male vs. female), smoking level (LITS vs. heavy smokers), and cancer status (currently in treatment vs. in survivorship). Means and standard deviations are reported in Table 2.

Table 2

Means and Standard Deviations Among Dependent and Independent Variables

			N	Mean	Std. Deviation
PSS	Gender	Male	186	.414	.556
		Female	364	.447	.574
	Ethnicity	African American	138	.454	.623
		Caucasian	407	.433	.551
	Smoking	LITS	275	.403	.551
	Status	Heavy	213	.491	.596
	Cancer	In treatment	352	.412	.566
	Status	In survivorship	198	.479	.570
OHLS	Gender	Male	162	2.243	.697
		Female	301	2.363	.625
	Ethnicity	African American	118	2.228	.653
		Caucasian	341	2.358	.649
	Smoking	LITS	233	2.385	.626
	Status	Heavy	181	2.249	.653
	Cancer	In treatment	300	2.267	.682
	Status	In survivorship	163	2.421	.586
ORSTS	Gender	Male	126	.629	.867
		Female	215	1.039	1.065
	Ethnicity	African American	79	.826	.896
		Caucasian	257	.918	1.053
	Smoking	LITS	166	.846	1.000
	Status	Heavy	145	.943	1.052
	Cancer	In treatment	226	.911	1.054
	Status	In survivorship	115	.841	.933

Main effects of each independent variable were explored. Interaction effects were not tested at this time, as the benefits of conducting these exploratory analyses were not seen as outweighing the subsequent loss of power and ability to detect main effects. Correlations between all dependent variables and all independent variables included in analyses can be found in Table 3.

Results

Scale Construction

Perceived Stigma of Smoking Scale - Oncology. We began by conducting analyses to determine whether the eight questions regarding the perceived stigma of smoking measured a single construct. All eight questions produced a Cronbach's alpha of 0.87. Removing any single scale item would not result in an increased alpha; therefore, all eight items in the scale were retained.

Prior to performing the factor analysis, the suitability of the data were assessed. Inspection of the correlation matrix revealed that all coefficients were above 0.3. The Kaiser-Meyer-Olkin value obtained (0.88) exceeded the recommended value of 0.60 and Bartlett's Test of Sphericity reached statistical significance ($p < .001$), suggesting that the correlation matrix was appropriate for factor analysis. The eight items were subjected to factor analysis using principle axis factoring.

Table 3

Correlations Between Gender, Ethnicity, Smoking Level, Cancer Status, Perceived Stigma, Oncology-Related Smoking Triggers, and Health Literacy

		Gender	Ethnicity	LITS vs Heavy	Cancer Status	PSS	OHLS	ORSTS
Gender	Pearson Correlation	1	.061	-.113**	.203**	.028	.088	.195**
	Sig. (2-tailed)		.121	.008	.000	.516	.058	.000
	N	649	643	550	649	550	463	341
Ethnicity	Pearson Correlation	.061	1	.118**	.067	-.015	.087	.039
	Sig. (2-tailed)	.121		.006	.092	.721	.062	.482
	N	643	643	546	643	545	459	336
LITS vs Heavy	Pearson Correlation	-.113**	.118**	1	-.063	.076	-.105*	.047
	Sig. (2-tailed)	.008	.006		.137	.093	.032	.407
	N	550	546	550	550	488	414	311
Cancer Status	Pearson Correlation	.203**	.067	-.063	1	.057	.113*	-.033
	Sig. (2-tailed)	.000	.092	.137		.184	.015	.547
	N	649	643	550	649	550	463	341
PSS	Pearson Correlation	.028	-.015	.076	.057	1	-.091	.448**
	Sig. (2-tailed)	.516	.721	.093	.184		.056	.000
	N	550	545	488	550	550	446	338

Table 3 (Continued)

		Gender	Ethnicity	LITS vs Heavy	Cancer Status	PSS	OHLS	ORSTS
OHLS	Pearson Correlation	.088	.087	-.105*	.113*	-.091	1	-.034
	Sig. (2-tailed)	.058	.062	.032	.015	.056		.552
	N	463	459	414	463	446	463	301
ORSTS	Pearson Correlation	.195**	.039	.047	-.033	.448**	-.034	1
	Sig. (2-tailed)	.000	.482	.407	.547	.000	.552	
	N	341	336	311	341	338	301	341

Note. *$p < .05$ (2-tailed). **$p < .05$ (2-tailed).

Factor analysis revealed the presence of one component with an eigenvalue exceeding one, explaining 53.40% of the variance. An inspection of the scree plot revealed a clear break after the first component. Using Catell's scree test, we decided to retain one component. Thus, we averaged scores across the eight items to obtain an overall measure score. Factor loadings can be found in Table 4.

Table 4

Factor Loadings for Items on the Perceived Stigma of Smoking Scale - Oncology

	Factor 1
People feel uncomfortable with me because I smoke with cancer	.823
Feeling left out of things because I smoke with cancer	.783
People avoid looking because I smoke with cancer	.709
Avoided by people because I smoke with cancer	.684
Embarrassed of physical limitations because I smoke with cancer	.648
People are unkind to me because I smoke with cancer	.640
Feeling embarrassed because I smoke with cancer	.593
People acted as if illness was my fault because I smoke with cancer	.571

The resulting measure, known as the Perceived Stigma of Smoking Scale – Oncology (PSSS-O), could range from 0 to 4, with high scores indicating the belief that one experiences a consistently high amount of stigma due to their oncology patient and smoking status. Those scoring at the low end of the scale, in contrast, tend to perceive low levels of stigma due to their oncology patient and smoking status.

Oncology-Related Smoking Triggers Scale. Analyses were then conducted to determine whether the thirteen questions regarding oncology related triggers were measuring a single construct. All thirteen questions produced a Cronbach's alpha of 0.94. Removing any single scale item would not result in an increased alpha, therefore all thirteen items in the scale were retained.

Prior to performing the factor analysis, the suitability of the data were assessed. Inspection of the correlation matrix revealed that all coefficients were above 0.3. The Kaiser-Meyer-Olkin value obtained (0.83) exceeded the recommended value of 0.60 and Bartlett's Test of Sphericity reached statistical significance ($p < .001$), suggesting that the correlation matrix was appropriate for factor analysis. The thirteen items were subjected to factor analysis using principle axis factoring.

Factor analysis revealed the presence of two components with an eigenvalue exceeding one, with the first explaining 62.26% of the variance and the second explaining 8.46% of the variance. An inspection of the scree plot revealed a clear break after the first component. Using Catell's scree test, we decided to retain one component. Thus, scores across the thirteen items were averaged to obtain an overall measure score. Factor loadings can be found in Table 5.

Table 5

Factor Loadings for Items on the Smoking-Related Oncology Triggers Scale

	Factor 1	Factor 2
Cigarette cravings due to transition to cancer survivorship	.864	
Cigarette cravings due to the end of treatment	.825	-.362
Cigarette cravings due to discharge from hospital	.821	
Cigarette cravings due to treatment complications	.808	.310
Cigarette cravings due to medical follow-ups	.797	
Cigarette cravings due to a change in treatment	.790	
Cigarette cravings due to awaiting treatment	.788	
Cigarette cravings due to treatment failure	.759	
Cigarette cravings due to cancer progressing	.756	
Cigarette cravings due to diagnostic workup	.744	-.305
Cigarette cravings due to finding out diagnosis	.740	
Cigarette cravings due to a suspicious symptom	.725	.449
Cigarette cravings due to cancer recurrence	.593	.400

The resulting measure, known as the Oncology-Related Smoking Triggers Scale (ORSTS), could range from 0 to 4, with high scores indicating the belief that one experiences high levels of smoking triggers due to cancer symptoms and treatment. Those scoring at the low end of the scale, in contrast, tend to perceive low levels of smoking triggers due to cancer symptoms and treatment.

Smoking Health Literacy Scale – Oncology. Finally, analyses were conducted to determine whether the five questions regarding the health literacy of smoking oncology patients and those in survivorship were measuring a single construct. All five questions produced a Cronbach's alpha of 0.68. However, when one item ("*Quitting smoking doesn't really help a patient's health once a patient has advanced or metastatic cancer*") was removed, alpha increased to 0.83. Because the last item correlated less than 0.30 with the remaining items, and alpha increased when it was deleted, only the first four items in the scale were retained.

Prior to performing the factor analysis, the suitability of the data were assessed. Inspection of the correlation matrix revealed that all coefficients were above 0.3. The Kaiser-Meyer-Olkin value obtained (0.73) exceeded the recommended value of .60 and Bartlett's Test of Sphericity reached statistical significance ($p < .001$), suggesting that the correlation matrix was appropriate for factor analysis. The four remaining items were subjected to factor analysis using principle axis factoring.

Factor analysis revealed the presence of one component with an eigenvalue exceeding one, explaining 65.19% of the variance. An inspection of the scree plot revealed a clear break after the first component. Using Catell's scree test, we decided to retain one component. Thus, we averaged scores across the four items to obtain an overall measure. Factor loadings can be found in Table 6.

Table 6

Factor Loadings for Items on the Oncology Health Literacy Scale

	Factor 1
Smoking makes cancer treatment not work as well	.839
Smoking makes side effects of treatment worse	.777
Smokers at higher risk of second cancer	.730
Cigarettes related to development of cancer	.580

The resulting measure, known as the Smoking Health Literacy Scale – Oncology (SHLS-O), could range from 0 to 3, with high scores indicating a high level of health literacy in terms of smoking-related outcomes for cancer patients. Those scoring at the low end of the scale, in contrast, evidenced a low level of health literacy in terms of smoking-related outcomes for cancer patients.

Individual Differences in Perceived Stigma

A General Linear Model was utilized to determine whether the perceived stigma scores would vary by the amount a person smoked (LITS vs. heavy smokers), race (Caucasian vs. African American), gender (male vs. female), and oncology patient status (currently in treatment vs. survivorship). Toward this end, perceived stigma scores served as the dependent variable whereas patient characteristics were used as independent variables. Results indicated that among the main effects of gender, ethnicity, smoking level, and oncology patient status, no main effect was found to be statistically significant (Table 7).

Table 7

The Utility of Gender, Ethnicity, Smoking Level, and Cancer Status in Predicting Perceived Stigma of Smoking Among Oncology Patients

	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1.541	4	.385	1.174	0.321	0.01
Intercept	11.715	1	11.715	35.712	.000	.069
Gender	.254	1	.254	.775	0.379	.002
LITS vs Heavy	1.098	1	1.098	3.348	0.068	.007
Ethnicity	.072	1	.072	.218	0.641	.000
Current vs Survivor	.251	1	.251	.764	0.383	.002
Error	157.456	480	.328			
Total	254.163	485				
Corrected Total	158.997	484				

Note. All p-values were non-significant.

Individual Differences in Oncology-Related Smoking Triggers

Oncology-related smoking trigger scores were then subjected to a General Linear Model to determine if they varied by the amount a person smoked (LITS vs. heavy smokers), race (Caucasian vs. African American), gender (male vs. female), and oncology patient status (currently in treatment vs. survivorship). Toward this end, oncology-related smoking trigger scores served as the dependent variable while patient characteristics were used as independent variables.

Results indicated that among the main effects of gender, ethnicity, smoking level, and oncology patient status, only the effect of gender was statistically significant, F (1, 303) = 13.44, p = <.001 (Table 8). Females (m = 1.04) were more likely than males (m = 0.62) to experience increased levels of smoking triggers when faced with oncology-related symptoms or treatment.

Table 8

The Utility of Gender, Ethnicity, Smoking Level, and Cancer Status in Predicting Smoking-Related Oncology Triggers Among Oncology Patients

	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	17.74	4	4.435	4.394	.002	.055
Intercept	8.912	1	8.912	8.831	.003	.028
Gender	13.443	1	13.443	13.32	.000*	.042
LITS vs Heavy	.796	1	.796	.789	.375	.003
Ethnicity	.945	1	.945	.937	.334	.003
Current vs Survivor	3.313	1	3.313	3.283	.071	.011
Error	305.803	303	1.009			
Total	571.24	308				
Corrected Total	323.543	307				

Note. *p < .001.

Individual Differences in Smoking Health Literacy in Oncology

Finally, SHLS-O scores were subjected to a General Linear Model to determine if they varied by the amount a person smoked (LITS vs. heavy smokers), race (Caucasian vs. African American), gender (male vs. female), and oncology patient status (currently in treatment vs. survivorship). Toward this end, SHLS-O scores served as the dependent variable while patient characteristics were used as independent variables.

Results indicated that of the four effects entered, the effects of smoking status, F (1, 406) = 4.97, p = .026, and ethnicity, F (1, 406) = 6.47, p = .011, were statistically significant (Table 9). Caucasian oncology patients (m = 2.36) were more likely than African American oncology patients (m = 2.23) to experience higher levels of health literacy in terms of smoking-related outcomes. Further, light and intermittent smoking oncology patients (m = 2.39) were more likely than heavy smoking oncology patients (m = 2.25) to be more health literate in terms of smoking-related outcomes. Participants who were in survivorship (m = 2.43) were more likely than those currently in treatment (m = 2.27) to experience higher levels of health literacy, though this trend did not reach statistical significance (p = .054).

Table 9

The Utility of Gender, Ethnicity, Smoking Level, and Cancer Status in Predicting Smoking-Related Health Literacy Among Oncology Patients

	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	6.558	4	1.64	4.146	.003	.039
Intercept	335.573	1	335.573	848.488	.000	.676
Gender	.126	1	.126	.318	.573	.001
LITS vs Heavy	1.964	1	1.964	4.967	.026*	.012
Ethnicity	2.558	1	2.558	6.468	.011*	.016
Current vs Survivor	1.477	1	1.477	3.734	.054	.009
Error	160.571	406	.395			
Total	2395.472	411				
Corrected Total	167.129	410				

Note. $*p < .05$.

Discussion

To date little research has been directed toward smoking oncology patients and survivors, who are often medically fragile and an understudied population. Learning more about the risk and protective factors for these patients is an important first step for prevention and intervention, and this was a primary aim of this study. Toward this end, we created three scales to better measure smoking perceptions and behaviors in this population.

Individual Differences in Perceived Stigma. First was the PSSS-O, an eight-item measure rated on a four-point Likert scale that was developed as a modified version of the

Neuro-QOL (Stigma) Short Form. Each item measured the perception of stigma by participants as a result of both being a smoker and a current or former cancer patient. Items focused on dimensions such as social aspects of stigma (e.g., being avoided by people, blame from others, social distance) and internalization (e.g., being embarrassed, feeling left out). The PSSS-O is scored so that high values represent a patient's belief that s/he is experiencing stigma because of being both a smoker and a cancer patient. Subsequent analyses revealed that the scale demonstrated strong internal consistency and yielded a single factor. Thus, participants were consistent in their responses, and the scale measured a single construct. The strong internal consistency of PSSS-O scale items aligns with prior research on the Neuro-QOL, which has demonstrated high internal consistency (0.85-0.97) across a range of medically ill populations (Cella et al., 2012).

We then explored whether individual differences emerged in the measurement of stigma. Specifically, we used gender, race, how much a participant smoked, and oncology status to predict PSSS-O scores. Our results identified no statistically significant main effects among gender, ethnicity, smoking level, or oncology patient status. Surprisingly, participants demonstrated low scores on perceived stigma overall. Thus, oncology patients who smoked seemed to experience little stigma, suggesting that friends and family may choose not to address a cancer patient's tobacco use. Further, social supports may not recognize the deleterious effects on smokers once they have already been diagnosed with cancer or once they are in remission. Given that smokers tend to create social systems that include other smokers, our participants were more likely to have family or social contacts that were smokers themselves. For this reason, friends and/or family members of oncology patients may be unlikely to point out that tobacco use could further damage patients' health. Although there is some evidence that stigma can lead

to reductions in smoking, there may also be negative consequences of it. For example, oncology patients subjected to criticism of their smoking might experience more difficulty quitting caused by delays in seeking cessation treatment, loss of self-efficacy for quitting, defensiveness, and increased stress (Evans-Polce, Castaldelli-Maia, Schomerus, & Evans-Lacko, 2015). Perhaps lower levels of perceived stigma are protective for overall mental health in this population, despite serving as a risk factor for continued smoking. Alternatively, there may be a different explanation for the low scores demonstrated by this sample. Perceived stigma may be an emotionally difficult experience for patients, making them less likely to accurately report this problem.

Regardless of patient characteristics, participants evidenced similar levels of perceived stigma. This finding indicates that the stigma scale developed for this study is stable across multiple oncology patient characteristics, including gender, ethnicity, smoking level, and oncology status. Therefore, the scale can likely be used in future research across a range of participants varying on these constructs.

Individual Differences in Oncology-Related Smoking Triggers. The second scale established to better understand smoking behaviors in an oncology sample was the ORSTS. These items were developed in response to clinical information gathered from oncology patients, who often disclosed in smoking cessation appointments that they experienced increased cravings and triggers when facing cancer-related stress. Each of the 13 items was rated on a four-point Likert scale. Items measured the level of cigarette cravings experienced by participants during times of increased distress that were related to being a cancer patient, and focused on facets such as symptoms, workups, diagnosis, treatment, and survivorship. The ORSTS is scored so that high values represent more frequent or intense cigarette cravings when navigating the various

aspects of oncology. Subsequent analyses revealed strong internal consistency and yielded a single factor.

Analyses were conducted to determine whether gender, race, how much a participant smoked, and oncology status related to ORSTS scores. Our results identified one main effect of gender, but no statistically significant main effects among ethnicity, smoking level, or oncology patient status. Participants experienced low levels of perceived oncology-related triggers overall, but females were more likely than males to report increased triggers when faced with oncology-related stressors. Due to these results, future research and analyses using the ORSTS to predict outcomes could partial out the variability related to gender. As oncology-related smoking trigger scores have been shown to be affected by gender, this approach would allow for a more powerful test.

Ng & Jeffery (2003) found that both men and women increase their level of smoking during times of increased perceived stress. However, women evidence more cigarette cravings, physiological arousal, and stress with greater negative emotions in response to stressful situations (Saladin et al., 2012). Consistent with the literature women in the current study experienced more smoking triggers in response to cancer-related situations, potentially indicating a need for increased coping skills and support. However, it was unclear whether the higher level of triggers reported by women in the present study actually led to more smoking behaviors as a result of increased triggers.

Individual Differences in Smoking Health Literacy in Oncology. The third scale established to better understand smoking behaviors in an oncology sample was the SHLS-O, with four items rated on a three-point Likert scale. Each item measured the level of health literacy reported by participants about smoking and cancer. Items focused on aspects of health

as related to smoking such as the development of cancer and treatment outcomes. The SHLS-O is scored so that high values represent high levels of knowledge about the health consequences of smoking as related to cancer. Subsequent analyses revealed strong internal consistency and yielded a single factor.

Further analysis revealed that individual differences emerged in how adults responded to the SHLS-O. Specifically, we used gender, race, how much a participant smoked, and oncology status to predict SHLS-O scores. Our results identified the statistically significant main effects of ethnicity and smoking level. Consistent with our hypotheses, Caucasian oncology patients (*m* = 2.36) were more likely than African American oncology patients to experience higher levels of health literacy in terms of smoking-related outcomes. Contrary to our hypothesis, light and intermittent smoking oncology patients had higher levels of health literacy than heavily smoking oncology patients. There were no significant main effects of gender or patient status (in treatment versus in survivorship).

Health literacy is an especially important construct when considering a sample of medically fragile oncology patients, as lack of health literacy has been demonstrated to be an independent risk factor for relapse of smoking (Stewart et al., 2014). Fortunately, participants in this sample experienced high levels of health literacy overall about the health consequences of smoking and cancer. Perhaps this finding reflects providers and staff educating patients about their health, including a focus on how smoking impacts treatment outcomes. Patients may also have had prior knowledge about the risks of smoking and cancer due to public health messages. However, it is not surprising that Caucasians evidenced higher levels of health literacy than African Americans given previous research. African Americans have been shown to have lower levels of health literacy about smoking (Stewart et al., 2013), even when controlling for SES

factors (Braveman et al., 2005). As such, health literacy may play an important role in ethnic disparities in terms of health outcomes (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011).

Further, LITS had a higher level of health literacy than heavy smokers. These results are surprising given previous research showing that lower-level smokers may underestimate the negative consequences of smoking (Farrell, Robinson, & Ali, 2015). However, the sample of older adult oncology patients in the present study differed considerably from the community sample of young adults utilized by Farrell and colleagues. It is possible that many LITS in the current study were former heavy smokers who utilized health information about smoking and cancer to decrease their use, thus shifting them from heavy smoking to light or intermittent smoking. LITS may have less motivation to quit even when knowledgeable about health consequences and may benefit from motivational interviewing strategies (Ahluwalia et al., 2006).

Despite its novelty, this study has several limitations. First, participants were drawn from an urban, mid-South area and results may not be generalizable to other populations. In addition, further research is needed on the PSSS-O, ORSTS, and SHLS-O. Future directions should include estimates of their test-retest reliabilities and performance with other samples of oncology patients. Further, this correlational study cannot provide information about causality for significant main effects. Participants for this study were also self-selected, which may have affected the results (e.g., those who felt the most stigma about their smoking did not participate due to the desire to avoid further guilt and shame). Finally, participants may have underreported their level of perceived stigma and smoking triggers due to the testing environment. Answering sensitive questions in their physician's office may have influenced patients to be less forthcoming than if they had been asked in a research setting.

Several implications of this research should be acknowledged. First, each scale demonstrated strong internal consistency in an oncology patient sample, making them appropriate for use in future research as well as confirming their utility in a clinical setting. Second, cancer patients experienced low levels of stigma overall about their smoking behaviors, which may result in better mental health but also less internal and external pressure to quit. Third, women were more likely than men to experience increased triggers to smoke when faced with oncology-related stress. They may need more support from medical and mental health staff to address cravings and to ensure their cigarette consumption does not increase. Fourth, smoking-related health literacy levels were high overall, indicating that patients are aware of the health consequences of smoking. However, these participants continued to smoke even though they realized that they are less likely to have successful treatment outcomes. Further, health literacy varied by both ethnicity and smoking level, but patients scored high on health literacy overall. This may indicate the need for motivational enhancement strategies to increase motivation to quit among African Americans and heavier smokers. Finally, whether or not a patient was currently receiving treatment or in survivorship did not predict scores on any of the three scales.

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Appendix A

All Participants

Have you ever smoked a cigarette, even once?
- ❍ Yes (1)
- ❍ No (0)

Have you smoked a cigarette in the past 30 days?
- ❍ Yes (1)
- ❍ No (0)

Quitters

How long ago did you quit smoking cigarettes?
- ❍ Less than 6 months ago (0)
- ❍ 6 months - less than 1 year ago (1)
- ❍ 1 - 5 years ago (2)
- ❍ 6 - 10 years ago (3)
- ❍ 11 - 15 years ago (4)
- ❍ 16 - 20 years ago (5)
- ❍ 21 - 25 years ago (6)
- ❍ 26 - 30 years ago (7)
- ❍ More than 30 years ago (8)

How long did you smoke cigarettes before you quit?
- ❍ Less than 6 months ago (0)
- ❍ 6 months - less than 1 year ago (1)
- ❍ 1 - 5 years ago (2)
- ❍ 6 - 10 years ago (3)
- ❍ 11 - 15 years ago (4)
- ❍ 16 - 20 years ago (5)
- ❍ 21 - 25 years ago (6)
- ❍ 26 - 30 years ago (7)
- ❍ More than 30 years ago (8)

How many times did you try to quit before you quit smoking cigarettes for good?
- ❍ 0 (0)
- ❍ 1 - 5 (1)
- ❍ 6 - 10 (2)
- ❍ 11 - 15 (3)
- ❍ 16 or more (4)

Select all methods of quitting that you have previously used:
- ❍ Nicotine patch (0)
- ❍ Nicotine gum (1)
- ❍ Nicotine inhaler (2)
- ❍ Nicotine nasal spray (3)
- ❍ Stopping immediately/cold turkey (4)
- ❍ Slowly cutting back (5)
- ❍ Electronic cigarettes (6)
- ❍ Zyban (Bupropion, Wellbutrin) (7)
- ❍ Varenicline (Chantix) (8)
- ❍ Behavioral counseling (9)

Cancer was my main reason for quitting
- ❍ Very true (0)
- ❍ Somewhat true (1)
- ❍ Somewhat untrue (2)
- ❍ Very untrue (3)

Smokers

In the past 30 days how many cigarettes did you smoke?
- ❍ More than 40 per day (0)
- ❍ 21 - 40 per day (1)
- ❍ 11 - 20 per day (2)
- ❍ 1 - 10 per day (3)
- ❍ 1 - 6 per week (4)
- ❍ 1 - 3 per month (5)

How long have you been smoking cigarettes?
- ❍ 6 months - < 1 year (0)
- ❍ 1 – 5 years (1)
- ❍ 6 – 10 years (2)
- ❍ 11 – 15 years (3)
- ❍ 16 – 20 years (4)
- ❍ 21 – 25 years (5)
- ❍ 26 – 30 years (6)
- ❍ >30 years (7)

Do you live with any other smokers?
- ❍ I don’t live with any other smokers (0)
- ❍ My spouse (1)
- ❍ My child/children (2)
- ❍ Another family member (3)
- ❍ Other (4)

Are you currently thinking about quitting cigarettes?
- ❍ Yes, within the next 30 days (0)
- ❍ Yes, within the next 6 months (1)
- ❍ No, not thinking of quitting (2)

How many times have you tried quitting cigarettes for at least 24 hours?
- ❍ 0 (0)
- ❍ 1 - 5 (1)
- ❍ 6 - 10 (2)
- ❍ 11 - 15 (3)
- ❍ 16 or more (4)

Select all methods of quitting that you have previously used:Nicotine patch (0)

- ❍ Nicotine gum (1)
- ❍ Nicotine inhaler (2)
- ❍ Nicotine nasal spray (3)
- ❍ Stopping immediately/cold turkey (4)
- ❍ Slowly cutting back (5)
- ❍ Electronic cigarettes (6)
- ❍ Zyban (Bupropion, Wellbutrin) (7)
- ❍ Varenicline (Chantix) (8)
- ❍ Behavioral counseling (9)

How soon after waking do you smoke your first cigarette?
- ❍ Within 5 minutes (0)
- ❍ 5– 30 minutes (1)
- ❍ 31-60 minutes (2)
- ❍ More than 60 minutes (3)

Do you find it difficult to refrain from smoking in places where it is forbidden? E.g. Church, library, the movies, on an airplane, etc.
- ❍ Yes (1)
- ❍ No (0)

Which cigarette would you most hate to give up?
- ❍ The first one of the day (0)
- ❍ Any other (1)

Do you smoke more frequently in the morning?
- ❍ Yes (1)
- ❍ No (0)

Do you smoke even if you are sick in bed most of the day?
- ❍ Yes (1)
- ❍ No (0)

Lately because I **smoke** and now have/had cancer...
Some people avoid me
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)

Lately because I **smoke** and now have/had cancer...
I feel left out of things
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)

Lately because I **smoke** and now have/had cancer...
People avoid looking at me
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)

Lately because I **smoke** and now have/had cancer...
I feel embarrassed
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)

Lately because I **smoke** and now have/had cancer...
Some people feel uncomfortable with me
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)

Lately because I **smoke** and now have/had cancer...
I feel embarrassed because of my physical limitations
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)

Lately because I **smoke** and now have/had cancer...
People are unkind to me
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)

Lately because I **smoke** and now have/had cancer...
Some people acted as though it was my fault I have this illness
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)

I have experienced more cigarette cravings than usual due to…
Finding a suspicious symptom related to cancer
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
Having a diagnostic workup related to cancer
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
Finding out my cancer diagnosis
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
Awaiting cancer treatment
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
A change in my cancer treatment
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
Cancer treatment complications
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
The end of cancer treatment
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
Discharge from the hospital following cancer treatment
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
Transition to cancer survivorship
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
Medical follow-ups after the end of cancer treatment
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
Cancer treatment failure
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
Cancer coming back/recurrence
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

I have experienced more cigarette cravings than usual due to…
Cancer getting worse/progressing
- ❍ Never (0)
- ❍ Rarely (1)
- ❍ Sometimes (2)
- ❍ Often (3)
- ❍ Always (4)
- ❍ Not applicable (-99)

Has your primary oncologist ever talked to you about smoking?
- ❍ No (0)
- ❍ Yes (1)

Smoking cigarettes is related to the development of cancer
- ❍ Very true (0)
- ❍ Somewhat true (1)
- ❍ Somewhat untrue (2)
- ❍ Very untrue (3)

People with cancer who smoke are at higher risk of developing a second cancer than those who don't smoke
- ❍ Very true (0)
- ❍ Somewhat true (1)
- ❍ Somewhat untrue (2)
- ❍ Very untrue (3)

Cigarette smoking can make cancer treatment not work as well
- ❍ Very true (0)
- ❍ Somewhat true (1)
- ❍ Somewhat untrue (2)
- ❍ Very untrue (3)

Cigarette smoking can make the side effects of cancer treatment worse
- ❍ Very true (0)
- ❍ Somewhat true (1)
- ❍ Somewhat untrue (2)
- ❍ Very untrue (3)

Quitting smoking doesn't really help a patient's health once a patient has advanced or metastatic cancer
- ❍ Very true (0)
- ❍ Somewhat true (1)
- ❍ Somewhat untrue (2)
- ❍ Very untrue (3)

Patients who get help with quitting are much more likely to stop using nicotine and tobacco altogether. To support your health we offer these services free of charge to all of our patients. How would you like to receive support?

- ❍ I would like to be contacted to schedule an in person appointment (0)
- ❍ By telephone (1)
- ❍ By mail (2)
- ❍ I would not like to be contacted (3)

Appendix B

Institutional Review Board
Office of Sponsored Programs
University of Memphis
315 Admin Bldg
Memphis, TN 38152-3370

May 26, 2017

PI Name: Amy Farrell
Co-Investigators:
Advisor and/or Co-PI: Leslie Robinson
Submission Type: Initial
Title: Characteristics of Smoking Oncology Patients in a Community Cancer Center: A Study of Individual Differences
IRB ID **:** #PRO-FY2017-45

Expedited Approval: May 26, 2017
Expiration: May 26, 2018

Approval of this project is given with the following obligations:

1. This IRB approval has an expiration date, an approved renewal must be in effect to continue the project prior to that date. If approval is not obtained, the human consent form(s) and recruiting material(s) are no longer valid and any research activities involving human subjects must stop.

2. When the project is finished or terminated, a completion form must be submitted.

3. No change may be made in the approved protocol without prior board approval.

Thank you,
James P. Whelan, Ph.D.
Institutional Review Board Chair
The University of Memphis.