

RESEARCH ARTICLE

Smoking cessation treatment needs of lung cancer patients: Adaptation of a motivation and problem-solving (MAPS) intervention

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Abstract

Background: Lung cancer patients have unique experiences, such as heightened stigma and specific needs (e.g., pain and distress), that may influence motivation to quit smoking and receptivity to tobacco treatment.

Objective: We conducted formative research to inform the adaptation of a motivation and problem-solving (MAPS) treatment evaluated among cervical cancer survivors to address the needs of individuals with lung cancer.

Methods: We conducted 10 individual interviews with lung cancer patients who smoked. Interviews were recorded, transcribed, and analyzed using NVivo.

Results: Participants had a mean age of 66, most were women and non-Hispanic White. Participants had smoked for about 42 years, 80% smoked daily/almost daily, and 70% smoked ≤10 cigarettes per day. Most acknowledged smoking as a potential cause of their cancer and were motivated to quit. Exacerbation of cancer-related stressors, addiction, and stigma were identified as challenges to cessation. Topics of interest included the effect of smoking on cancer prognosis and treatment, pharmacotherapy side effects and interactions, trigger management, positive reinforcement, and social support. Wellness plan topics, such as stress management, finances, diet, and physical activity, were also endorsed. Minor revisions to the manual were made to address stigma and ensure the appropriateness of recommended strategies for patients with lung cancer.

Conclusion: Findings from the current formative investigation were highly consistent with our previous adaptation of MAPS for cervical cancer survivors. This overlap in tobacco treatment needs of two substantially different groups of cancer survivors suggests that MAPS may be appropriate across a broad spectrum of cancer types.

Keywords: Smoking; Smoking cessation; Lung cancer; Oncology; Survivorship

1. Introduction

Cigarette smoking is the primary cause of lung cancer and contributes to the vast majority of lung cancer-related deaths.¹ Continued smoking after a diagnosis of lung cancer has been associated with poor treatment outcomes and prognosis. For example, patients with lung cancer who smoke have a higher risk of cancer recurrence,² secondary cancers,^{2,3} and increased mortality.^{4,5} Persistent smoking after a lung cancer diagnosis has also been associated with increased pain and fatigue⁶ as well as lower quality of life.^{7,8} Conversely, quitting smoking after diagnosis can reduce cancer progression and improve survival.^{2,5,9-11} Thus, smoking cessation is critically important for patients with lung cancer. However, about half of lung cancer patients smoke at the time of diagnosis, and around 30% continue to smoke after diagnosis.¹² Research assessing the efficacy of smoking cessation interventions in the cancer patient population has been limited,¹³ and no randomized controlled trials (RCTs) conducted to date have specifically targeted patients with lung cancer.¹⁴

The motivation and problem-solving (MAPS) approach is a smoking cessation intervention that has demonstrated efficacy for motivating quit attempts, increasing smoking cessation, and preventing relapse in a variety of populations.¹⁵⁻¹⁷ MAPS dynamically integrates elements from motivational interviewing^{18,19} and social cognitive theory^{20,21} to address smoking cessation in a holistic and dynamic fashion, across all levels of readiness to quit. MAPS conceptualizes motivation as a fluid construct, such that treatment strategies are matched to an individual's motivation to quit smoking in the moment. Unlike most smoking cessation treatments, clients do not have to set a quit date in MAPS until they are ready. Individuals are offered six phone counseling sessions over an extended, 12-month period, which they can schedule at their convenience. Another important aspect of MAPS is that, in addition to smoking, it provides flexibility to address other life events and stressors (e.g., anxiety and financial concerns) through an individualized wellness plan. Thus, the treatment is personalized to each individual's smoking behavior and the context where it occurs.

More recently, MAPS was adapted to facilitate smoking cessation among cervical cancer survivors. In-depth individual interviews were conducted with 12 women diagnosed with cervical cancer who smoked to identify their needs and inform treatment adaptation.²² Findings confirmed that although most of the content addressed

by MAPS was appropriate for cervical cancer survivors (e.g., enhancing cessation motivation and self-efficacy), there was a need to adapt the intervention to include the role of smoking in the etiology of cervical cancer as well as cancer treatment and prognosis. Content was also revised to better reflect the context of cancer survivorship. For example, smoking cessation treatment was updated to consider cancer status and treatment (e.g., active treatment vs. remission), and topics addressed in the wellness plan reflect the context of a cancer diagnosis (e.g., stress associated with a cancer diagnosis).²² The new adapted treatment was then tested in an RCT.²³ In this study, 202 individuals with a diagnosis of cervical intraepithelial neoplasia or cervical cancer were randomized to receive standard treatment (ST) (electronic connection to state quitline, self-help materials, and nicotine replacement therapy [NRT]) or ST plus six MAPS telephone counseling sessions delivered over 12 months. Results indicated that MAPS (vs. quitline) abstinence rates were greater at 12 months (26.4% vs. 11.9%, $p = 0.017$; odds ratio [OR] = 2.60, 95% CI [1.19–5.89]).²⁴ MAPS did not show a significant effect compared with ST at the final 18-month follow-up assessment (14.2% vs. 12.8%, $p = 0.79$; OR = 1.14; 95% CI [0.44–2.93]). However, secondary analyses revealed that high engagement with MAPS (i.e., ≥ 4 of 6 sessions) was associated with a nearly 13-fold increase in abstinence through 18 months (OR = 12.71, 95% CI [1.42–113.40], $p = 0.023$), and that the best predictor of high engagement was high early engagement (i.e., completion of ≥ 3 MAPS sessions within the first 3 months of the 12-month treatment period).²⁵

Lung cancer patients have unique experiences, such as heightened stigma^{26,27} and specific concerns and symptom profiles related to their diagnosis (e.g., fatigue and enhanced distress),²⁸ that could influence their motivation, challenges, and receptivity to MAPS treatment. Thus, to understand the lived experiences of lung cancer patients and to identify specific barriers, facilitators, and treatment perspectives that may differ from prior studies, the current study seeks to understand the smoking behaviors, attitudes, and specific needs with respect to quitting smoking among individuals with a lung cancer diagnosis to adapt MAPS for this patient population.

2. Materials and methods

2.1. Ethical considerations

Moffitt Cancer Center's Institutional Review Board (IRB) approved the study protocol (Pro00051032). Given the low

risk of our qualitative study, a waiver of written consent was granted by the IRB. Therefore, all participants provided verbal consent prior to participation.

2.2. Study design

This study used a qualitative interview design to understand smoking cessation treatment needs of individuals with lung cancer who smoke, and to utilize this information to adapt MAPS for this population. A qualitative approach was chosen to capture rich, contextualized accounts of participants' perspectives.

2.3. Participants

Participants were patients receiving care at Moffitt Cancer Center, in Tampa, Florida, with a diagnosis of lung cancer who met the following inclusion criteria: (i) age ≥ 18 ; (ii) endorsed current smoking (defined following National Cancer Institute [NCI]'s criteria as participants who reported smoking ≥ 100 lifetime cigarettes and at least one puff in the past 30 days);²⁹ (iii) able to read and write English; (iv) not currently enrolled in a smoking cessation program; (v) working phone; and (vi) ability to provide a valid home address. To minimize burden, patients with distant metastasis were excluded. Patients who were using tobacco cessation medications or who had contraindications for nicotine patch use unless under the supervision of a physician were also excluded. Additional exclusion criteria included having another household member enrolled in the study and participation in another clinical trial at Moffitt.

2.4. Procedures

2.4.1. Recruitment procedures

Potential participants were recruited from Moffitt's Thoracic Oncology Clinic. All interviews were conducted between June and October of 2021. Participants were identified using an electronic report that generated a list of patients with a diagnosis of lung cancer and a history of smoking. Using the electronic health record (EHR), we confirmed patients' smoking status, cancer diagnosis and stage, language proficiency, and home address. Once a potential participant was identified, they were contacted over the phone or at a medical appointment, and a brief description of the study was provided. Patients who expressed interest were then screened, and those who met the criteria were invited to participate. Following verbal consent, participants completed a baseline questionnaire.

2.4.2. In-depth interviews

After the baseline assessment, participants were scheduled to complete a 60 minutes interview. An interview guide was developed based on a previously used version for

adapting MAPS for patients with cervical cancer²² combined with the team's expertise in assessing smoking behavior in oncology. The semi-structured interview included the following topics: smoking history and past quitting experiences; lung cancer diagnosis and its impact on daily life; changes in smoking behavior following diagnosis; cessation motivation; benefits and barriers to smoking cessation; experiences of stigma; and suggestions for maximizing the intervention for individuals with lung cancer, including perceptions of and relevance of the wellness plan. Interviews were conducted in person or by phone to accommodate participants' preferences and lasted 30–60 minutes. Thematic saturation was assessed through regular meetings of the research team, during which emerging themes and interview content were discussed. As the information collected across interviews demonstrated substantial redundancy and thematic consistency, data collection was discontinued after completion of 10 interviews. Participants were compensated with a \$30 gift card after completing the interview.

2.5. Measures

A brief questionnaire assessed sociodemographic and smoking characteristics after cancer using selected items ($n = 10$) from the Cancer Patient Tobacco Use Questionnaire (C-TUQ)³⁰ and the Fagerström Test for Nicotine Dependence (FTND).³¹ Information on the cancer type and stage was collected from the EHR. Sociodemographic variables, including age, race/ethnicity, biological sex, gender identity, marital status, sexual orientation, education, employment status, income, residency, and insurance type, were self-reported.

Regarding tobacco use, participants completed 10 items from the Cancer Patient Tobacco Use Questionnaire.³⁰ This is a questionnaire specifically developed to assess tobacco use among cancer patients.^{29,30} Meanwhile, the Fagerström Test for Nicotine Dependence is a standard and valid measure composed of six items to assess nicotine dependence.³¹

2.6. Data analysis

We used SPSS v26 (IBM, United States [US]) to summarize the sample characteristics using descriptive statistics. Interviews were audio-recorded, transcribed verbatim, and subsequently analyzed using NVivo software (Lumivero, US). Codebook development was based on that by MacQueen *et al.*³² Using the interview guide, an initial list of codes was developed by UM, with input from HWW and CCD. UM and HWW independently coded interview transcripts using NVivo and met weekly with CCD to resolve discrepancies and refine coding definitions. An intercoder agreement of $>80\%$ was

achieved after independently coding three transcripts. The final codebook was established by dropping unused codes, and the remaining transcripts were divided between the two coders. UM reviewed the final coding to ensure consistency. Questions and concerns regarding final coding were discussed collaboratively by the coding team. After all interviews were coded, HWW identified emerging themes with input from UM and CCD. Themes were used to guide the adaptation of the intervention.

3. Results

3.1. Participant characteristics

Participants comprised 10 lung cancer patients. They had a mean age of 66 (SD = 9.68), the majority were women (80%), non-Hispanic White (70%), and widowed or divorced (60%). The highest level of educational attainment was technical school or an associate's degree (50%), and a large proportion were retired (50%) and had an annual household income <\$30,000 (50%). The majority of participants (80%) had a diagnosis of non-small cell lung cancer, half were diagnosed at an early stage (I to IIIA), and the average time since diagnosis was 9 months (range 1–30 months). Participants had been smoking for an average of 42 years (SD = 9.68), and reported smoking daily or almost daily (80%). Half of the participants smoked within 30 minutes of waking, and 70% reported smoking ≤ 10 cigarettes per day (Table 1).

3.2. Key findings

Themes emerging from the interviews were organized to inform adaptation of the treatment manual: (i) Lung cancer diagnosis in the context of smoking; (ii) Navigating motivation, barriers, and facilitators to smoking cessation; and (iii) Key wellness plan areas for patients with lung cancer.

3.2.1. Lung cancer diagnosis in the context of smoking

Regarding the burden and stigma of lung cancer, participants reported that their lung cancer diagnosis impacted their routines, such as their ability to work or do daily activities:

It [lung cancer] knocked me out of work for almost eight months. And I can't think of any time since I was 15 years old that I had not worked for that long. So not getting up to go to work every day definitely took a toll on me. (Male, age 51)

Participants also commented that their diagnoses affected their families and friends with regard to caregiving responsibilities:

My children all came down and to help me, and

my youngest son stayed with me for six months. And took me to Moffitt. And then I have a girlfriend that came and stayed and helped me with housework and get meals and stuff because I was just tired. (Female, age 78)

Table 1. Participant characteristics (N = 10)

Parameter	Mean (SD)/n (%)
Sociodemographic information	
Age (years)	65.7 (9.7)
Sex (women)	8 (80.0%)
Race/ethnicity (non-Hispanic White)	7 (70.0%)
Marital status (widowed)	3 (30.0%)
Education (high school or lower)	4 (40.0%)
Employment status (retired)	5 (50.0%)
Annual household income (<\$30,000)	6 (60.0%)
Clinical information	
Lung cancer type (non-small cell)	8 (80.0%)
Cancer stage (early I–IIIA)	5 (50.0%)
Time since diagnosis (range 1–30; months)	9.2 (8.4)
Undergoing active cancer treatment (yes)	7 (70.0%)
Smoking characteristics	
Years smoking (range 20–60; years)	42.3 (12.9)
Frequency of smoking (daily or almost daily)	8 (80.0%)
Cigarettes per day (range 2–30)	15.3 (8.8)
Time to first cigarette (within 30 min of waking)	5 (50.0%)

Some participants ($n = 3$) also mentioned that they felt stigmatized after the diagnosis:

But it's [smoking] embarrassing. Like, well, "Of course you've quit [smoking]." You know, "Why would you keep smoking if you have cancer? Really?" There's a stigma. (Female, age 59)

Regarding smoking and perceived responsibility for lung cancer, although some participants ($n = 4$) acknowledged that their lung cancer was caused by smoking, about half reported that their cancer resulted from a combination of smoking and other factors, such as family history or environmental factors (e.g., asbestos):

I think genetics has something to do with it, I really do. The cigarette didn't, cigarettes hasn't helped it. I'm quite sure that they probably had some type of contributing factor on it, but I don't think it was all the cigarettes. (Female, age 60)

Regarding the role of smoking in cancer treatment, participants reported that continuing to smoke after the cancer diagnosis was likely to impact their health, including increasing the likelihood of cancer recurrence ($n = 5$) and reducing treatment effectiveness ($n = 6$):

I'm scared it [lung cancer] will come back if I continue to smoke, and then it would be worse. (Female, age 59)

Yeah, I think about it, I think I, you know, I know I should really quit [smoking] because I don't want [the cancer] to come back or start one new [treatment]. Yeah. I don't know why, every night I go to bed, I say, well, not smoking tomorrow, I'm not smoking tomorrow. And then I do. (Female, age 78)

Regarding smoking cessation in the context of lung cancer, some participants reported having quit smoking in the past, and almost all ($n = 8$) had made a quit attempt after their lung cancer diagnoses but relapsed soon after quitting:

...when I first got my diagnosis, I quit for three days... I think it was just more, going through the chemo and radiation and everything, I just felt so drained and that I just didn't really want a cigarette because of how I felt. (Male, age 51)

Although about half of the participants had previous experience using smoking cessation pharmacotherapies ($n = 5$), most thought that quitting smoking was a matter of willpower and that they had to quit smoking cold turkey ($n = 7$):

I've always quit cold turkey. And I don't know if that's the best way to quit or not, but that's what I've done. Like this is it. (Female, age 78)

Well, I did quit when I found out I had the cancer. I stopped completely. Just cold turkey was like, that's it. You know, I can't do this. (Female, age 59)

3.2.2. Navigating motivation, barriers, and facilitators to smoking cessation

Regarding motivation to quit smoking in the context of cancer, the vast majority of participants ($n = 7$) were motivated to quit smoking. Participants commented on the financial benefits of quitting smoking ($n = 5$) and on the health benefits, including their cancer treatment outcomes

($n = 6$). Almost all participants ($n = 9$) mentioned how quitting smoking could improve their sense of taste or smell and their physical appearance (e.g., wrinkles):

Oh, I hate the smell. I absolutely hate the smell, the waste of money. It's dirty, and it makes you sick. You know, your body doesn't heal properly. (Female, age 59)

Regarding barriers to smoking cessation among individuals with lung cancer, participants frequently mentioned general stressors (e.g., finances) and stressors associated with their cancer diagnoses (e.g., multiple appointments) as barriers to quitting smoking ($n = 9$). Addiction, resulting from many years of smoking, was also a theme that emerged frequently ($n = 6$). For example, participants reported that smoking was a very ingrained habit and that there were multiple triggers (e.g., other smokers and meals) that interfered with their quit attempts ($n = 6$). A few participants ($n = 2$) also mentioned that stigma surrounding their smoking served as an additional source of stress, which negatively impacted their ability to quit:

Yeah, the extra stress for me [from the diagnosis] is a big one. And also, the judgment of people that, you know, if and when they do see you smoking, "Oh my God! Are you still smoking? Don't you have lung cancer?" (Female, age 59)

Lack of access to cessation pharmacotherapy was mentioned as an obstacle to quitting smoking for a few participants ($n = 2$). Notably, two participants also felt that it was too late to quit smoking:

But, you know, when I got the diagnosis, and it kind of made me go, "well, I already got lung cancer. So what more harm can I do? It's already there." But now that I'm getting, you know, good results with my treatment and everything else, the thing I've been waiting on is I've been waiting on the Chantix again, and waiting for my insurance to cover it is the only reason why I haven't got back on Chantix and started to quit again. (Male, age 51)

Regarding facilitators for smoking cessation among lung cancer patients, although the majority of participants were aware of the role smoking played in contributing to their cancer and how it could impact their treatment outcomes, more than half mentioned that some type of psychoeducation or smoking cessation classes or support group would be helpful ($n = 7$):

What would motivate [me] is, like maybe some information upon leaving the hospital or while

you're in treatment about what the probability of making your cancer worse, or recurring again due to smoking once you have it. (Female, age 59)

In general, participants reported that they were planning to quit smoking using "willpower" ($n = 4$). Some also indicated that they were open to trying a smoking cessation medication ($n = 4$). There were also concerns around using pharmacotherapy, such as side effects, or taking more medications in addition to their cancer treatments:

Well, I don't know what would be good for me and what wouldn't be good for me as far as medications go, because of the lung situation. You know, so I mean, it's just, you know, you have to weigh the pros and cons, and I would try to really talk to the doctors and find out their feedback on what they would feel like would be the best way for me to approach it. You know, in their opinion, because their opinion matters, because they're the ones treating me. So if they have something in mind that they think that would be beneficial to me, you know, instead of me trying to figure it out myself, that would be one of the biggest hurdles to get over right there. (Female, age 60)

3.2.3. Key motivation and problem-solving (maps) wellness plan areas for patients with lung cancer

Overall, participants expressed interest in addressing general concerns in a wellness plan that included the following topics: stress management, social support, behavioral and cognitive coping skills, physical activity, diet, hobbies, cancer treatment, finances, sleep, setting a quit date, and successfully quitting smoking.

Physical activity and diet were the most popular topics, as most participants were interested in learning how to exercise ($n = 6$) and keep a healthy diet ($n = 5$) in light of their diagnosis:

So not just dieting for weight loss, but like healthy eating habits and how to get to meeting certain goals and things of that nature. (Female, age 59)

[Physical activity] is a big deal. Yes, because a lot of people [are] diagnosed with lung cancer or any type of breathing issue, even asthma, emphysema, [or] COPD. That is one of the main things that they lose is their ability to be physical and to do a lot of things because I'm limited on what I can do and what I can't do, because of the breathing. And I feel like if I wasn't smoking, I would probably breathe a lot better. (Female, age 60)

About half of the participants expressed interest in

discussing hobbies as part of their wellness plan goals ($n = 4$), either to help distract them from smoking urges or to enrich their quality of life:

I think we all need hobbies. And it's very funny with being retired and getting older, I don't have a hobby anymore. You know, I had a lot of hobbies before. But I think that's something that I've been thinking about lately, that I needed to find a hobby. (Female, age 78)

Participants were interested in learning about stress management strategies to better cope with lung cancer complexities ($n = 4$). Some were also interested in learning behavioral and/or cognitive coping strategies for managing cravings ($n = 4$):

Stress management would have to be part of it because, not just because tobacco itself is a tool or a crutch for stress management in itself, but withdrawing that crutch, along with the effects of withdrawal from the addiction, is going to cause even more [stress]. So, by all means, stress management would have to be a big part of it. (Female, age 68)

Regarding psychoeducation on smoking and lung cancer, specifically related to cancer treatment, some participants reported that education about the course of their treatment and gaining an understanding of the consequences of continued smoking on treatment would help alleviate some of their cancer-related stress ($n = 4$):

Maybe some information upon leaving the hospital or while you're in treatment about what the probability of making your cancer worse is, or recurring again due to smoking. (Female, age 59)

Finances were another important topic that participants indicated that they would like to cover during MAPS sessions ($n = 4$). For example, participants stated that focusing on the amount of money spent on cigarettes would be worthwhile during MAPS counseling sessions. More broadly, participants reported that financial burden and poor credit were sources of stress that they wanted to discuss and receive support for:

Yeah, probably finances. That's, I get into that, and I keep trying to get my credit score higher. (Female, age 78)

Related to social support, participants reported wanting assistance with asking how to get help from others and relying on family and friends for encouragement ($n = 3$):

Well, it's very hard for me to ask anybody for support. I'm the one that does the support. (Female, age 78)

... when my friend was here helping me, and she would say something about me smoking, then that would kind of like tick me off, and then I would want one [cigarette]... so I said, don't mention cigarettes to me, you know, because that, that's making me want one [cigarette]. (Female, age 78)

Finally, two participants mentioned sleep as a wellness plan topic. More specifically, one participant mentioned sleep disturbances associated with her cancer:

Because of the tumor, I can't lay flat. And because if I lay flat, it cuts off my airway and I can't breathe. And sleeping sitting up is taking some adjustment. (Female, age 68)

3.3. Summary of findings and the adaptation of motivation and problem-solving (maps) intervention

The interview findings indicated substantial overlap between the needs of lung cancer patients and those of cervical cancer survivors.²² Participants were motivated to quit smoking and expressed interest in learning about the effect of smoking on cancer prognosis and treatment, how to manage smoking triggers, as well as the role of social support and positive reinforcement. Therefore, we retained the session structure and most of the content covered by MAPS. Specifically, all sessions start with setting the agenda, discussing the participant's smoking behavior and challenges/achievements since the previous session. The counselor then reviews the participant's perceived importance, confidence, and readiness to quit, and, if needed, uses decisional balance to increase motivation to quit. Finally, participants and counselors discuss other goals selected from the wellness plan. In light of the significant burden imposed by lung cancer and interruptions to daily functioning that emerged during the interviews, a lung cancer survivorship module was added that contains specific information on lung cancer (e.g., demographics, types, and prevalence). Given that participants expressed an overarching interest in learning more about the impact of smoking on their cancer prognosis and treatment outcomes, we expanded a section explaining the benefits of quitting smoking post cancer diagnosis and updated the information on the use of NRT and other smoking cessation pharmacotherapies. Minor revisions were made to the treatment manual to address the heightened stigma reported by participants. For example, we added guidance for counselors to recognize potential hesitation from participants to discuss their smoking behavior and to identify feelings associated with the belief that it is "too late" to quit smoking. The vast majority of content covered in the wellness plan was appropriate for lung cancer

survivors, and only minor edits were made to the manual to ensure the information was accurate and safe for this population (e.g., confirming the safety of deep breathing techniques for stress reduction, dietary guidance in the context of cancer-related weight loss, and the use of NRT).

4. Discussion

Smoking is the major cause of lung cancer and is responsible for over 80% of lung cancer cases.³³ Given that lung cancer can be perceived as a self-inflicted disease that has been caused by a lifestyle choice, patients with lung cancer often express feelings of blame and guilt.³⁴ Additionally, individuals with a diagnosis of lung cancer have specific needs related to physical and emotional symptoms (e.g., pain and emotional distress) from diagnosis through survivorship that may impact their smoking cessation process.³⁵ Although smoking cessation trials with cancer survivors have included patients with lung cancer, no RCT to date has focused exclusively on addressing the needs of lung cancer survivors.¹⁴ Thus, the purpose of the present study was to identify the unique needs of individuals living with lung cancer who smoke to inform the adaptation of MAPS, an evidence-based smoking cessation intervention that has demonstrated efficacy among cervical cancer survivors who smoke.²⁴

Similar to our prior study with cervical cancer survivors,²² our results revealed that most participants had previous experience with smoking cessation and were motivated to quit. However, cancer-related stressors and nicotine addiction were mentioned as barriers to quitting smoking. Overall, participants were interested in receiving information on the effects of smoking on their cancer prognoses and treatments, as well as how smoking cessation pharmacotherapies could interact with cancer treatments. Participants were also interested in learning how to manage smoking triggers, along with positive reinforcement and social support. Finally, suggested topics for the wellness plan included coping skills, hobbies, stress management, finances, diet, and physical activity.

Unlike individuals with other cancer types (e.g., cervical cancer),^{22,36} participants in our study were aware that smoking is a major risk factor for lung cancer and recognized it as a possible contributor to their diagnosis. Many participants reported feeling stigmatized because of their smoking. This finding is consistent with previous studies, which have found that patients with lung cancer who smoke are especially vulnerable to experiencing feelings of shame and guilt and highlighted the importance of psychosocial support to manage stigma.^{26,27}

Similar to studies with patients with other cancer types,³⁷ participants mentioned stressors related to

the cancer diagnosis as significant barriers to quitting smoking, as well as the addiction after many years of smoking and the cost of smoking cessation medications. Specifically, participants were concerned about possible side effects of smoking cessation pharmacotherapy and its interactions with cancer treatments, as found in a recent study with other populations of cancer survivors.³⁸ Despite the availability of multiple smoking cessation medications and their supported use by cancer patients,^{1,39} usage among oncology patients who smoke is unacceptably low (~14%).⁴⁰ Therefore, it is key to inform patients about smoking cessation pharmacotherapy and address potential concerns.

Regarding the MAPS wellness plan, results were in line with what we learned from our previous study with cervical cancer survivors.²² Specifically, participants expressed interest in learning more about nutrition and physical activity, as well as developing new hobbies. This also aligns with the potential teachable moment of a cancer diagnosis, when many individuals reexamine their lives and may be more inclined to make positive behavioral changes.^{41,42} As with patients with other cancer types,^{22,37} participants also wanted to learn more about their disease and suggested receiving psychoeducation to understand how smoking could improve their cancer outcomes in the context of a lung cancer diagnosis. Finances and complexities associated with cancer treatment, such as managing multiple appointments, health insurance, and transportation, were also mentioned by some participants. Of note, access to healthcare, food insecurity, and housing are important social determinants of health that can significantly impact the cancer care continuum, including survivorship.⁴³⁻⁴⁵ Finally, learning cognitive and behavioral coping skills was another area of interest, which may be important given emerging work showing that stress regulation, cognitive control, and neurological mechanisms impact smoking behavior and cessation outcomes.⁴⁶⁻⁴⁸

Lung cancer patients represent a vulnerable population that is willing to quit smoking, but who are significantly stigmatized. This has important implications for practice, underscoring the need for nonjudgmental, consistent assessment of tobacco use among cancer patients and delivery of evidence-based cessation treatments when appropriate. Our findings also showed that lung cancer patients appear to share similar smoking cessation treatment needs and concerns to those of individuals diagnosed with other cancer types.^{22,37} In adapting MAPS for cervical and lung cancer patients—two demographically and clinically distinct groups of survivors—we found a significant overlap in emerging needs. These findings suggest that MAPS may be applicable to oncology

populations and, given its inherent flexibility, may reduce the need for extensive adaptation, though this should be confirmed in future studies. Specifically, future research should investigate the efficacy of MAPS among lung cancer patients and the larger cancer survivor population.

The results of this study should be interpreted in the context of some limitations. First, participants were recruited at a large NCI-designated comprehensive cancer center in Florida. Therefore, the findings may not be representative of the lung cancer patient population more broadly. Second, although our interviews reached theoretical saturation, the sample size was modest and was overrepresented by women. Third, the average time since diagnosis was 9 months, so most participants were undergoing cancer treatment when they enrolled in the study. This may further limit the generalizability of our findings, given the known differences between cancer survivors receiving treatment versus those who are in remission or maintenance therapies.⁴⁹ Fourth, although we stressed that smoking cessation was not a requirement to participate in this study, participants who were more motivated to quit or experienced less stigma were more likely to consent and complete the study procedures. Finally, all study procedures and interviews were conducted in English. Therefore, we may not have captured the needs and concerns of individuals with lung cancer who smoke and speak languages other than English.

5. Conclusion

The MAPS approach is characterized by its flexible nature, focusing on each individual's needs and meeting patients where they are. Therefore, with minor modifications, it seemed to be suitable to treat smoking cessation among lung cancer survivors. The variety of wellness areas that MAPS offers also seemed to cover the general needs of patients with lung cancer who smoke. Given the formative research conducted with two different populations of cancer survivors (lung and cervical cancers) and the significant overlap in their needs and interests, MAPS seems to be appropriate to address smoking cessation among individuals across a broad spectrum of cancer types.

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Conflict of interest

The authors declare no conflicts of interest.

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Ethics approval and consent to participate

The Advarra Institutional Review Board approved the study protocol (Pro00051032). All participants provided verbal consent prior to participation.

Consent for publication

No identifying information is presented in this publication; hence, consent for publication was not required.

Availability of data

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

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