

A Qualitative Cultural Sensitivity Assessment of the Breathe Easier Mobile Application for Lung Cancer Survivors and Their Families

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PURPOSE: To evaluate the cultural sensitivity of the Breathe Easier mobile health application for African American lung cancer survivors and their families. Breathe Easier is an intervention designed to teach strategies to combat symptoms related to lung cancer.

PARTICIPANTS & SETTING: 12 African American lung cancer survivors and their family members were recruited from an American College of Surgeons–approved cancer program in South Carolina.

METHODOLOGIC APPROACH: Participants completed in-depth interviews, which were guided by the Cultural Sensitivity Assessment Tool and the Cultural Sensitivity Checklist. Two researchers performed open and axial coding to conceptually organize the data.

FINDINGS: Multiple culturally relevant themes emerged, including benefits, concerns, and suggestions related to content literacy and inclusiveness, as well as acceptability of and motivations for using the mobile application. However, lung cancer survivors and their family members reported being more concerned about accessing accurate survivorship information.

IMPLICATIONS FOR NURSING: Attention to health literacy, eHealth literacy, and cultural sensitivity may enhance patient outcomes, and nurses can advocate for patients regarding these communication issues.

KEYWORDS cancer survivors; African Americans; mobile applications; culture; health communications
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Cultural sensitivity is the extent to which health information materials accommodate cultural, historical, environmental, social, and psychological factors or values (Barrera et al., 2013). Culture is a key driver of cancer outcomes because of its influence on values, attitudes, beliefs, and behaviors related to prevention, diagnosis, treatment, and survivorship (Kagawa-Singer et al., 2010). Previous research has shown that the cultural beliefs of African Americans may affect how and to what extent they participate in their lung cancer care (Jonnalagadda et al., 2012; Lin et al., 2014). According to Jonnalagadda et al. (2012), ethnic minorities, including African Americans, may have more fatalistic views and misconceptions about cancer than Caucasians, which can affect whether they receive timely and adequate treatment. Developing community-driven interventions that address the cultural beliefs and heritage of African Americans can improve their response to cancer communication interventions (Huang & Shen, 2016) and enhance patient–provider communication (Li et al., 2017). Culturally sensitive interventions are warranted for African American lung cancer survivors and their family members in particular because of their higher rate of lung cancer mortality (Siegel et al., 2019) and poorer survivorship outcomes (Bryant & Cerfolio, 2008; Chang et al., 2016).

Background

Lung cancer is the second most common and deadliest cancer in the United States, accounting for more than one-fourth of all cancer-related deaths (Siegel et al., 2019). However, African Americans experience the highest mortality (64%) and have lower five-year survival rates (18%) than Caucasians (54% mortality and

20% five-year survival rates, respectively) (American Cancer Society [ACS], 2019a; Siegel et al., 2019). This disparity may be attributed partly to later diagnosis, a lower likelihood of undergoing surgery following diagnosis, and longer time periods between diagnosis and treatment (ACS, 2019a; Holmes & Chen, 2018). Despite the high mortality associated with lung cancer, five-year survival rates have shown a steady increase for all individuals. The five-year survival rates for individuals diagnosed with localized, regional, or distal lung cancer from 2008 to 2014 were 56%, 30%, and 5%, respectively. These rates are markedly improved compared to survival rates from 1975 to 1990, which were 47% for localized lung cancer, 16% for regional lung cancer, and 2% for distal lung cancer. From 2009 to 2015, the average five-year survival rate for individuals diagnosed with localized lung cancer was 57%, and the average five-year survival rate for individuals whose cancer spread regionally or distantly was 31% and 5%, respectively (Jemal et al., 2017). According to the National Cancer Institute Surveillance, Epidemiology, and End Results Program (n.d.), about 540,000 lung cancer survivors live in the United States. A cancer survivor refers to “any person with a history of cancer, from the time of diagnosis through the remainder of their life” (ACS, 2019b, p. 1).

Mindfulness-Based Stress Reduction

Following treatment, which may involve surgery, chemotherapy, and/or radiation therapy, lung cancer survivors often experience side effects, such as dyspnea, fatigue, and pain, which can be exacerbated by stress and compromise quality of life (Poghosyan et al., 2013; Vijayvergia et al., 2015). Lung cancer can also influence the stress levels of family members who are intimately involved in the survivor's care (Tan et al., 2018). Unchecked, this stress can lead to negative consequences, like chronic illness, for family members (Oliveira et al., 2016).

To combat the symptoms of lung cancer, organizations such as the American College of Chest Physicians recommend the use of complementary therapy (Deng et al., 2013). These therapies include mindfulness-based stress reduction (MBSR), which was developed to manage pain and stress and has been shown to relieve symptoms related to lung cancer (Kabat-Zinn, 1982; Kabat-Zinn et al., 1985). The standard MBSR program consists of eight weeks of courses (2.5–3.5 hours in duration) and home activities (45 minutes per day) that include practices such as meditation, yoga, and breathing exercises (Santorelli, 2014). MBSR is a therapy that

is commonly used for improving health and quality of life in individuals with a range of mental and physical conditions, including cancer (Cillessen et al., 2019; de Vibe et al., 2017; Li & Bressington, 2019; Rush & Sharma, 2017). For lung cancer in particular, MBSR or similar mindfulness-based interventions have been understudied, but three previous studies have employed these interventions in patients with lung cancer. In a randomized controlled trial of 107 participants in the Netherlands, Schellekens et al. (2017) assessed whether lung cancer survivors and family members who received MBSR in addition to standard of care had lower psychological distress; secondary outcomes explored quality of life, relationship satisfaction, caregiver burden, mindfulness skills, self-compassion, rumination, and post-traumatic stress syndrome. Although survivors in the MBSR group showed significant improvement across all but two outcomes (relationship satisfaction and caregiver burden), family members in the MBSR group did not show significant differences in outcomes when compared to family members in the standard of care group (Schellekens et al., 2017). Schellekens et al. (2017) were the only research group to study the effectiveness of MBSR among lung cancer survivors and family members (i.e., dyads). A pilot study by Lehto et al. (2015) of 40 lung cancer survivors in the United States who received a modified MBSR intervention aimed to determine whether participants receiving the intervention had less symptom severity and interference and greater improvements in other health-related quality-of-life parameters, such as physical and social function, compared to those who received standard of care. Although the sample size was small, Lehto et al. (2015) found that survivors in the intervention group ($n = 20$) had moderate to meaningful differences on all outcomes when compared to the control group using linear mixed-effects models. Another pilot study by McDonnell, Gallerani, et al. (2019) assessed whether an MBSR intervention for 32 dyads of Caucasian and African American lung cancer survivors and their family members led to changes in dyspnea, fatigue, sleep quality, and perceived stress over time. The results from McDonnell, Gallerani, et al.'s (2019) study showed that survivors had significantly less dyspnea and perceived stress over time, and survivors and family members had improved fatigue and sleep scores from pre- to postintervention.

Mobile Health Interventions

According to Smith (2014a), African Americans are less likely to have access to a computer or Internet at

home compared to Caucasians, but they have almost equal access to smartphones (80% versus 82%, respectively); however, the adoption rate is only 55% among adults aged 65 years or older (Smith, 2014b). African Americans are more likely than Caucasians to use their smartphones for activities such as identifying health information (Anderson, 2015). Therefore, it has been posited that delivering interventions via mobile platforms could eliminate disparities in cancer survivorship and mediate barriers and access to care (e.g., transportation) and information (Gonzalez, 2018). Several mobile health (mHealth) interventions have been developed for improving disease education, chronic symptom management, and access to health care for a range of diseases, including cancer (Loh et al., 2018; Marcolino et al., 2018). mHealth interventions have been demonstrated to be acceptable and efficient for African Americans (James et al., 2016), but this population is not well represented across mHealth studies (James et al., 2017).

This study aimed to qualitatively assess the cultural sensitivity of a mobile application called Breathe Easier, which was designed to teach African American lung cancer survivors and their family members how to self-manage symptom burden and improve quality of life. The mobile application was developed to expand access to the Breathe Easier intervention so that it could be easily disseminated to lung cancer survivors and families across the country.

Methods

Participants and Setting

The Breathe Easier mobile application was adapted from an eight-week, dyadic (lung cancer survivor and family), in-person mindfulness-based intervention by the same name. Each week contains a combination of audio-directed breathing practices, meditations, and yoga exercises of varying levels, which are demonstrated using instructional text and images of African American and Caucasian adults aged 55 years or older performing various poses. Twelve African American lung cancer survivors and family members (six survivor-caregiver dyads) who had previously participated in the face-to-face intervention completed the current study. Interviews took place with each survivor and family member individually in a conference room at a local medical center in urban South Carolina. This study received institutional review board approval from the University of South Carolina in Columbia.

Methodologic Approach

Participants were invited to engage in audio-recorded interviews lasting 30–60 minutes about the cultural sensitivity of the Breathe Easier mobile application. Study details were provided to all participants immediately prior to their participation through a written informed consent document. Two of the authors answered participant questions and conducted the interviews. After any questions were addressed, participants signed the written consent document. The interview guide, which was based on the Cultural Sensitivity Checklist (Friedman & Hoffman-Goetz, 2006) and Cultural Sensitivity Assessment Tool (Guidry & Walker, 1999), focused specifically on assessing the Breathe Easier mobile application's content (e.g., whether it is easy to understand and culturally relevant for African Americans), images (e.g., how representative it is of African American survivors and families), and audio recordings (e.g., appropriateness for guiding African Americans through the intervention). In addition to informing the authors' conceptual orientation to cultural sensitivity, the Cultural Sensitivity Checklist and Cultural Sensitivity Assessment Tool have been used in previous research to assess the cultural sensitivity of printed, web-based, and mobile-based health media (Choi et al., 2018; Owens et al., 2018). To make the checklist and assessment specific to this study, the questions were adapted to fit the context of the Breathe Easier mobile application (see Figure 1).

Data Analysis

Audio-recorded interviews were professionally transcribed and uploaded to the qualitative data analysis software MAXQDA™, version 12.0. The interviews were reviewed by one individual on the research team and compared to the professional transcripts for accuracy. A grounded theory methodology, which uses a constant comparative method to categorize data into relevant themes and compare identified themes to previous discoveries in the existing literature (Strauss & Corbin, 1997), was used as a framework for the data analysis. Saturation was based on the point at which no new salient themes emerged following the assessment of the interviewers' expertise and written logs of some of the key points that were heard during the interviews (Saunders et al., 2018). Open coding was conducted by two raters from the research team to conceptually organize the data (Strauss & Corbin, 1997). During the open-coding process, semantic codes were assigned to sections of the interview transcripts and compared to ensure

consistency. The research team then discussed these codes until consensus about the definition of each code was reached and a comprehensive list of codes was finalized (Strauss & Corbin, 1997). The two raters then independently used the codebook to analyze the two longest interview transcripts. The research team then discussed areas of disagreement, updated the codebook, and independently recoded the same two transcripts. Following the second round of coding, MAXQDA, version 12.0, was used to calculate reliability between the two independent raters (Hallgren, 2012). For this study, the percentage of agreement was 83%, which is considered acceptable (Hruschka et al., 2004). After resolving coding discrepancies, one rater coded the remaining 10 transcripts independently. During the axial coding process, the rater identified relationships among codes that were suggestive of themes and these themes were then compared among interviews (Strauss & Corbin, 1997). After completing the coding process, the two raters discussed and

organized the final findings based on the themes that had emerged.

Findings

The study sample consisted of 12 African American lung cancer survivors ($n = 6$) and their family members ($n = 6$). Participant ages ranged from 29 to 73 years, with a mean age of 59 years ($SD = 12.5$). The following five major themes emerged from the data: (a) cultural sensitivity of content, (b) motivation for completing the intervention, (c) acceptability of mobile application, (d) quality of life, and (e) cancer versus culture. These themes are explicated in the following sections. Example quotes and suggestions for improvement from participants are presented in Figure 2. Although themes did not vary significantly between survivors and family members, quotes are denoted based on whether they were spoken by a survivor or a family member.

Cultural Sensitivity of Content

Overall, the most prominent theme was related to the cultural sensitivity of the Breathe Easier mobile application's audio and visual content. The following three subthemes emerged related to cultural sensitivity: content inclusivity (the extent to which the content was appropriate for most African Americans), content literacy (the extent to which the information can be comprehended by most African Americans), and researcher contact inclusivity (the extent to which the contacts were relevant for African Americans).

Content inclusivity: The majority of participants believed that the content of Breathe Easier was appropriate for most African Americans. The audio recordings from African American and Caucasian individuals who guided participants through the weekly mindfulness exercises in the mobile application were perceived as appropriate for most participants. However, mindfulness-based practice was new to many participants as evidenced by one survivor who said, "There [are] Black people that, I'm sure, are into yoga and meditation, but the percentage is very small." Audio instructions for each exercise were accompanied by relaxing slow music, which was deemed to be less favorable for most participants because it made them too relaxed and put some participants to sleep. Three participants suggested changing the music, with one survivor saying, "I think the audio version needs to be changed because to sit there and meditate . . . you're going to sleep." When asked how the music should be changed, a second survivor responded, "You should have had some . . .

FIGURE 1. Sample Cultural Sensitivity Interview Guide

- Based on your preview of the mobile application's content (written and audio), which racial/ethnic group or groups was this material created for? Why? Can you provide examples?
- To what extent are the breathing exercises and other activities within the mobile application presented in a way that is understandable for most African Americans? Why or why not?
- Describe what motivated you to complete the in-person Breathe Easier intervention.
- To what extent do you feel that the mobile application content should include an African American contact person for additional information on activities associated with Breathe Easier? Why or why not?
- To what extent do you trust that the information provided through the Breathe Easier mobile application is going to improve your life or the life of your family member?
- To what extent are the physical features of individuals in the accompanying pictures typical of a male or female African American survivor or family member?
- To what extent are the voices of individuals used in the audio clips appropriate for guiding African Americans through the mobile application? Why or why not?

Note. Additional prompts and probes used for each question are not included; the full interview guide is available on request from O.L. Owens.

Note. Based on information from Friedman & Hoffman-Goetz, 2006; Guidry & Walker, 1999.

I don't know, some upbeat music. Maybe a little . . . some type of jazzercise." Images of African American and Caucasian individuals demonstrating seated yoga poses were also included in the mobile application and were perceived to be relatable to all participants.

Content literacy: The text within the mobile application was written in plain language so that participants of varying health literacy levels could understand. Participants perceived that the information could be understood by most African Americans, but they believed that some of the words that were included would not be as familiar. One family member told the interviewer "it all needs to be put in laymen terms," whereas another survivor said, "I can read this, and it tells me what to do, but I'm better hands-on with a picture or something." A second family member suggested that "more pictures would be a good idea."

Contact inclusivity: The contacts included for Breathe Easier were all Caucasian individuals (principal investigator and two research coordinators). Most participants agreed that providing an African American contact person would enhance its cultural sensitivity, but many participants stated that this feature would be more important to other African Americans than to themselves. Many participants reported that they did not care about the race of the contact person as long as they were able to gather information that could improve their or their family members' quality of life. For example, one family member said the following:

As the human race goes, possibly because someone of the same ethnic background might have . . . the African American may be more comfortable with another African American person. That's not always the case, but, in a lot of cases, it is.

Similarly, a survivor said, "That's not important . . . just as long as they have the knowledge." One suggestion made by a family member was to include contact information and testimonials from participants who had previously used the mobile application.

Motivation for Completing the Intervention

All participants reported being motivated to complete the in-person Breathe Easier intervention to learn techniques for managing symptoms and enhancing quality of life. One survivor said, "I wanted to learn more than what I know about opening up my breathing." Most quotes from family members demonstrated that they did not necessarily expect a personal benefit;

instead, they felt that they would learn additional information about the disease that could help survivors or that their attendance could motivate survivors to sustain participation. One family member said, "So, I came to learn basically what to do . . . how to take care of her." Another family member stated that "I wanted to see him get better."

Quality of Life

All survivors and family members felt that participating in the Breathe Easier intervention and using the mobile application benefited the survivor physically. According to one survivor, "I can go up and down my stairs, sometimes two or three times without [oxygen], based on what I've learned through Breathe Easier." All family members agreed that Breathe Easier helped them to gain knowledge about how to assist the survivor, and about half reported that they had experienced personal benefits from incorporating the techniques in their own lives. For example, one family member said, "It has given me ways of exercising that I did not have previously. I didn't know I could do certain things, and now I know I can." Similarly, a second family member told the interviewer, "It helped me, too. I've got a lot of medical problems—that's another story—but it helped me, too." Because of the success of the Breathe Easier in-person intervention, many participants saw value in offering the Breathe Easier mobile application to lung cancer survivors and their families.

Acceptability of Mobile Application

When asked about the acceptability of the Breathe Easier mobile application, 10 participants reported that they were receptive to using the application; the remaining 2 participants were not sure whether they would adopt it for regular use. Regarding their perceptions about whether other African Americans would use the mobile application, six participants believed that others would use it, four participants were not sure, and two participants had no opinion. One survivor who had a positive perception said, "I think [other African Americans] would. They know it. They need to know it. They would." A family member said, "I think [other African Americans] will be delighted to use the [application]." A second family member suggested that the research team should consider providing slightly different information for survivors and family members:

You might have to have [application] 1 and 2.
Because [application] 1, I'm gonna use the app,

and I'm gonna be into it . . . and one of the family members might come along and say, "OK, what's so interesting about that?"

FIGURE 2. Cultural Sensitivity Interview Themes and Example Quotes

Cultural Sensitivity of Content

Content inclusivity

- "Actually . . . I didn't ever look at it as if it was created for any particular racial background or group because it's viable across the board."

Content literacy

- "I didn't have any difficulty understanding what was on the audio [recording] or in the booklet."
- "Yes, it was presented in a way [that was] understandable. They had pictures on how to do the exercises, and that was helpful because I'm better hands on than I am reading."
- "A visual demonstration of how it's done so that the person that's looking at the [application] or reading the [application] gets an idea of what they're doing."

Contact inclusivity

- "Well, right off the bat, always bring back home [to] the alumni . . . people that have gone through [it]. They have stories to tell. They have living testimonies."

Motivation for Completing the Intervention

- "I wanted to learn more than what I know about opening up my breathing."

Acceptance of Mobile Application

- "I think [other African Americans] will be delighted to use the [application]."
- "I would use it because it's so convenient. You can do it at home at a convenient time for yourself. That would be a big part."
- "Well, I probably would have waited a while before I even attempted to do the [application] because I'm old. Old people don't do good with [applications]."

Quality of Life

- "I plan to live a long life. I feel like the more exercise I can get to expand this one lung I have. . . . As a matter of fact, when I'm at home, I don't use my oxygen all the time. I can go up and down my stairs, sometimes two or three times without it, based on what I've learned through Breathe Easier."

Cancer Versus Culture

- "I guess what I'm trying to say is, sell the material for what the material can do for the person. You throw the race card in there, and I think you've just overstepped your boundaries, or you miss what this program is trying to do for a person."

The four participants who were unsure about whether other African Americans would use the mobile application expressed concern about users' eHealth literacy (i.e., the ability for an individual to gain health information from an electronic source), particularly if the users are older. One uncertain family member said the following:

I think it would be based on how savvy they are. Because I can easily say, "OK, like, a 65-year-old person can't do it, but maybe a 65-year-old person has an iPad and a computer, and maybe they play games. Maybe they do more than I do." So, I think it's just how savvy they are tech-wise.

Despite this concern, all participants thought using a mobile application would make Breathe Easier more accessible to a larger population of survivors and family members.

Cancer Versus Culture

Seven participants believed that the focus of the cultural sensitivity interview should be to ensure that lung cancer survivors are receiving information on survivorship in plain language. This concern was more important to participants than the cultural sensitivity of the mobile application's content. Some participants reported that they did not understand why race was important to the discussion if the overall goal was to help improve the lives of survivors. When asked about the appropriateness of the mobile application for African Americans, one family member said the following:

When I look at the picture, I look at people who are trying to improve their health. . . . I don't know whether it affects one group more than the other. When you have lung cancer, I just see that everybody is in the same boat.

A survivor also reiterated at several points during the interview that "[race is] not important . . . just as long as they have the knowledge."

Discussion

To the authors' knowledge, this is the first study to use a community-driven approach to develop a mindfulness-based mobile application to promote self-management of lung cancer symptoms. Overall, participants found Breathe Easier to be culturally sensitive; however, some improvements were suggested, such as adding upbeat music that was

stylistically familiar. These findings were similar to those of Woods-Giscombé and Gaylord (2014), who discovered that connecting meditation to a target population's religious practices (e.g., prayer) and accommodating for cultural familiarity (e.g., meditative drumming) may influence intervention uptake. In addition, Jiang et al. (2013, 2016) found that an individual's preferred music genre mediated the effects of the music on stress reduction. In particular, preferred music that is higher in tempo can affect an individual's stress level in the same way as music that is slower in tempo. A meta-analysis by de Witte et al. (2019) indicated that songs that are 60–80 beats per minute yield larger effects than music with another or unspecified tempo regardless of genre; this tempo range includes a number of songs across various genres (e.g., classical, jazz, pop). Based on the studies by Jiang et al. (2013, 2016) and de Witte et al. (2019), attention to music style preferences within a given tempo range among a targeted population may be warranted for reducing stress levels among survivors and family members.

Many participants were highly motivated to complete the in-person Breathe Easier intervention because of their desire to help themselves or their loved one. Although most family members did not expect to experience personal benefits from Breathe Easier beyond learning additional strategies to help their survivor, many family members reported experiencing positive benefits during the eight-week intervention, such as stress reduction. These benefits are consistent with findings from two dyadic studies by Schellekens et al. (2017) and van den Hurk et al. (2015) of survivors and family members, which demonstrated that caregiver burden is reduced significantly when MBSR is added to standard of care for survivors and their family members.

Based on their reviews of the mobile application and outcomes from their experiences with the in-person intervention, a majority of participants reported being willing to adopt the application but were uncertain about widespread adoption. The common concern was related to the eHealth literacy of participants and, more specifically, older African Americans. eHealth literacy refers to “the ability to seek out, find, evaluate and appraise, integrate, and apply what is gained in electronic environments toward solving a problem” (Norman & Skinner, 2006, p. 2). Lower eHealth literacy is associated with poorer health outcomes (Norman & Skinner, 2006). Therefore, in addition to providing training prior to downloading and using the mobile application, it may be advantageous to employ

KNOWLEDGE TRANSLATION

- Oncology nurses need to maintain open communication during their interactions with survivors and family members to provide an opportunity for survivors to safely address their comprehension and comfort level without fear of judgment.
 - Culturally sensitive mobile health applications may be appropriate for delivering high-quality information on lung cancer in plain language to survivors and their family members.
 - Dyadic interventions not only are helpful for symptom reduction among survivors of lung cancer, but also have benefits for family members, such as stress reduction.
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a family-centered approach to mobile application implementation so that younger, more technically experienced participants can facilitate use of the application until the older adult is more comfortable. This upstream approach to instruction is similar to that of a previous dyadic study by Warren-Findlow et al. (2010), in which younger family members shared health information through intergenerational channels with older family members. Similarly, older family members passed information downstream to younger family members to improve their health knowledge (Warren-Findlow et al., 2010). In the current study, this downstream transfer of information from lung cancer survivors to younger family members about their experiences following treatment improved family members' understanding of the survivor's condition and needs, which were further substantiated through Breathe Easier. However, this family-centered approach may not be possible for isolated older adults.

Health literacy (i.e., content literacy) was also a commonly reported suggestion from survivors and family members as a way to enhance adoption of Breathe Easier. Health literacy can be applied to all health information, not just information disseminated through an electronic source (Nielsen-Bohlman et al., 2004). In particular, survivors and family members stressed that the research team should ensure that all language used during the intervention and in the application be in layman's terms. In previous studies, health literacy is presented as an important concern for African American lung cancer survivors and their family members (McDonnell, Owens, et al., 2019; Webb & McDonnell, 2018). Ideally, oncology nurses need to be aware of this concern and maintain a neutral stance in their interactions with survivors and family members, thereby giving them a chance to

safely express their level of comprehension and comfort with health literacy without fear of judgment. By using this approach, oncology nurses can avoid assuming an individual's level of health literacy.

An unexpected finding of this study was that more than half of the participants were confused by the research team's efforts to assess the cultural sensitivity of Breathe Easier. Although the purpose of this study was to determine whether Breathe Easier met the cultural needs of African Americans, participants did not understand why race was important to the conversation when Breathe Easier was primarily focused on helping all lung cancer survivors and their family members. Race was perceived by some participants to be irrelevant to the assessment if the true desire of the research team was to improve symptom burden among everyone, particularly if race did not factor into the biologic benefits that participants would receive. Being a lung cancer survivor or a family member of a survivor was the most important cultural identifier despite some survivors and family members agreeing that certain inclusions (e.g., an African American contact person) would be important for other African Americans. Although this finding differs from previous research, which suggested that race/ethnicity is the strongest cultural identifier, it does validate the multifaceted nature of culture, suggesting that an individual's priority of their main cultural identifier (race versus disease state) can be situation dependent (Kagawa-Singer et al., 2010). Kagawa-Singer (2012) suggested that limiting culture to discrete and narrow identifiers (e.g., race) instead of broad but well-defined systems limits researchers' ability to identify facets of culture that are important to a given health disparity. To strengthen understanding of how culture affects cancer survivorship decisions, future research should rely on multiple integrated system theories that take into account the relationship among individuals, their culture, and their social and physical environment (Kagawa-Singer, 2012). In addition, future research can rely on individuals from the target population. Using community-based participatory processes, researchers can define what culture means to the target population and incorporate these priority areas when developing interventions and operationalized measures (Israel et al., 2010; Kagawa-Singer, 2012).

The relatively small sample in this study consisted of self-selected African American men and women from a southern U.S. state; therefore, findings cannot be generalized to individuals from other states and different racial/ethnic backgrounds. However, this study

provides guidance on how nurses and other health-care professionals can assess cultural sensitivity. The findings from the current study can also inform the development of culturally sensitive interventions.

Implications for Nursing

Greater attention is needed to implement culturally based integrated approaches that meet the survivorship needs of African American lung cancer survivors and their families. Oncology nurses and their inter-professional colleagues can more fully appreciate the impact of culture on the meaning and experience of cancer. Being aware of one's own biases, attitudes, or behaviors that may elicit negative reactions when interacting with survivors who do not share the same cultural background is essential. Assessing structures in clinical settings that support or hinder culturally competent practice is a useful strategy. For example, oncology nurses could advocate for more comprehensive sociocultural histories to inform more open communication about the survivor's perspective, cultural beliefs, and preferences. Cultural assessment models (e.g., ecologic model using seven levels of cultural assessment) exist to support restructuring elicited information (Kagawa-Singer et al., 2010). In research settings, involving African American lung cancer survivors and their families in the development and evaluation of interventions can help to determine which inclusions are relevant for enhancing clinical trial participation and desired outcomes.

Conclusion

mHealth interventions are considered a viable option to enhance some aspects of cancer care management. However, healthcare providers may have difficulty locating effective, evidence-based, plain-language, and culturally sensitive mobile applications, particularly for lung cancer survivors and their family members (Owens et al., 2018). Because limited evaluation tools are available to assist healthcare providers in this process, mobile application developers should use existing tools to evaluate health literacy, eHealth literacy, and cultural sensitivity to inform mobile application designs. Many scales are available to assess these concepts, including the Short Assessment of Health Literacy–Spanish and English, Rapid Estimate of Adult Literacy in Medicine–Short Form, Test of Functional Health Literacy Scale, Newest Vital Sign, eHealth Literacy Scale, Cultural Sensitivity Checklist, and Cultural Sensitivity Assessment Tool (Arozullah et al., 2007; Friedman & Hoffman-Goetz, 2006; Guidry & Walker,

1999; Lee et al., 2010; Norman & Skinner, 2006; Osborn et al., 2007; Parker et al., 1995). Survivors and family members should also be involved throughout the design process to determine which features are most important to them and to what extent application developers should consider cultural sensitivity. Based on the findings of the current study, focusing too intently on cultural sensitivity factors can become distracting for some participants. Future research should make every effort to develop and test culturally sensitive interventions that target hard-to-reach and vulnerable populations of lung cancer survivors and their family members.

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