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African-American Older Adults' Perceived Use of Technology for Hypertension Self-Management

Dr. Carolyn Harmon Still, PhD, MSM, AGPCNP-BC, CCRP [Assistant Professor],

Frances Payne Bolton School of Nursing, Case Western Reserve University, 2120 Cornell Road, Cleveland, OH 44106-4904, cwh11@case.edu

Dr. Lenette M. Jones, PhD, RN, ACNS-BC [Assistant Professor],

University of Michigan School of Nursing, Department of Health Behavior and Biological Sciences, 400 N. Ingalls, Room 2180, Ann Arbor, MI 48109, lenettew@umich.edu

Dr. Karen O. Moss, PhD, RN, CNL [Post-Doctoral Fellow],

Frances Payne Bolton School of Nursing, Case Western Reserve University, 2120 Cornell Road, Cleveland, OH 44106-4904, kxm519@case.edu

Mrs. Mary Variath, RN, MSN, PhD [Nursing Instructor], and

Frances Payne Bolton School of Nursing, Case Western Reserve University, 10900 Euclid Ave, Cleveland, OH 44106, mnv2@case.edu

Dr. Kathy D. Wright, PhD, RN, GCNS-BC, PMHCNS-BC [Assistant Professor]

Chief Diversity Officer, College of Nursing, The Ohio State University, 585 Neil Avenue, Columbus, OH 43210, wright.2104@osu.edu

Abstract

With the unprecedented growth of technology for disease prevention and management, little is known about the experience and adoption of such technology in African-American older adults with hypertension. A 90-minute focus group session was used to explore African American older adults' (n = 21) experiences with using technology (mobile devices and applications) for hypertension self-management. Participants were part of a larger mixed methods study, "Co-Created Intervention With African American Older Adults." Twenty participants reported owning smartphones and used this technology to communicate; seek, acquire, and share information; engage in entertainment; and organize and manage time. Participants expressed concerns about not being informed or trained sufficiently to integrate technology for hypertension self-management. There is a need to develop novel hypertension self-management interventions that integrate technology and training programs for this marginalized population that may help improve blood pressure control and address important clinical and public health priorities of uncontrolled hypertension.

Dr. Harmon Still is an Assistant Professor in the Frances Payne Bolton School of Nursing at Case Western Reserve University and will serve as corresponding author. cwh11@case.edu.

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Keywords

hypertension; self-management; technology use and adoption; health disparities

Introduction

The successful adoption of technology is becoming increasingly important for self-management of chronic diseases such as hypertension for older adults (Czaja et al., 2006). Hypertension is the most commonly diagnosed condition among persons 60 years and older in the U.S. (Benjamin et al., 2017; Nwankwo, Yoon, Burt, & Gu, 2013). African American older adults have a higher prevalence of hypertension and are more likely to suffer a higher burden of hypertension-related complications such as cardiovascular disease (e.g., ischemic heart disease, heart failure, stroke), kidney disease, and dementia compared to other U.S. populations (Benjamin et al., 2017; Nwankwo et al., 2013). Reasons for the lack of blood pressure control among African Americans are multifactorial (James et al., 2013). However, suboptimal adherence with antihypertensive medications and the lack of participation in lifestyle modifications (balanced diet, low salt intake, and regular physical activity), contribute significantly to this health disparity (Benjamin et al., 2017; James et al., 2013). Poor adherence to antihypertensive medications leads to loss of treatment efficacy, increased healthcare costs (~\$46 billion a year), and worse cardiovascular health outcomes (Benjamin et al., 2017; Nwankwo et al., 2013).

Evidence supports that a reduction in blood pressure can decrease morbidity and mortality from hypertension-related complications (SHEP Cooperative Research Group, 1991; SPRINT Research Group et al., 2015). However, disparities persist in hypertension self-management practices, with the poorest self-management practices reported in African Americans (Whelton et al., 2016). Hypertension self-management, practices and behaviors such as medication adherence, blood pressure self-monitoring, and lifestyle modifications involving diet, exercise, and tobacco cessation are associated with significant improvements in achieving and sustaining blood pressure control and reducing cardiovascular risk (Benjamin et al., 2017; James et al., 2013). Interventions such as patient education (Johnson et al., 2011), patient motivation, support, reminders, drug packaging (Costa et al., 2015; Krousel-Wood, Hyre, Muntner, & Morisky, 2005), and simplification of dosing, combined with behavioral and educational interventions (Glaser, Richard, & Lussier, 2017), have demonstrated some improvements in hypertension management. Additionally, such interventions have been tested as combined multi-level complex interventions, while demonstrating little or no effect in blood pressure reduction, adherence to antihypertensive therapy, or sustained improvements in lifestyle modifications of diet, exercise, and smoking cessation (Costa et al., 2015; Krousel-Wood et al., 2005; Pavlik et al., 2015; Zomahoun et al., 2016). In addition, research focused on hypertension self-management often lacks a significant number of African American older adult participants. Therefore, research is needed to fully understand the reasons for suboptimal adherence to hypertension self-management and antihypertensive therapy, and implement appropriate interventions targeted at older African Americans.

Hypertension self-management interventions available on technology-enabled devices and apps have shown substantial efficacy in lifestyle modifications and blood pressure control (Band et al., 2017; Bobrow et al., 2016; Gibbons, 2011; Smith, 2014). Behavioral interventions that are comprised of web-based education (Wantland, Portillo, Holzemer, Slaughter, & McGhee, 2004), home blood pressure monitoring (Band et al., 2017), personalized mobile short message service (SMS messages) (Abdullah et al., 2016; Bobrow et al., 2016; Davidson et al., 2015), and nurse-support counseling (Bosworth et al., 2008), have all demonstrated efficacy as single intervention strategies to improve blood pressure control. However, such interventions are not sustained in the long term or delineated for individual situations, or include a significant number of African American older adults, leaving many unanswered questions about what is necessary to achieve and sustain blood pressure control in older African Americans.

As we shift to the digital age, the use of commercial technologies (e.g., mobile devices and applications) in health care for disease prevention and management is increasingly promising (Tomlinson et al., 2009). These technologies are integrated into all areas of life and are ideal to deliver interventions to African American hypertensive patients (Buis et al., 2017; Gee, Greenwood, Paterniti, Ward, & Miller, 2015; Pavlik et al., 2015). In general, technology use among older adults is increasing (Anderson & Perrin, 2016). Comparatively, individuals 70 years and older have decrease their use, possibly due to decreased sensorium (vision and dexterity) required to operate smartphones (Gell, Rosenberg, Demiris, LaCroix, & Patel, 2015) or the lack of digital literacy or digital engagement (Schreurs, Quan-Haase, Kim Martin, 2017). Moreover, there is a perception that African Americans, especially older adults, use less technology than their White counterparts (Choi & Dinitto, 2013), considering the limited nationally representative sample and data stratified by age and race (Gell, 2015; Nielsen, 2015; Smith, 2014). African American consumers, including African American older adults have embraced technology, and their smartphone use is 81%, compared to 74% of the total U.S. adult population (Nielsen, 2015; Smith, 2014). Data has also shown that on a monthly basis, African Americans, in general, spend close to 56 hours using apps or mobile Internet browsers on their smartphones (Nielsen, 2015). Therefore, there is an opportunity to use certain technology such as text messaging and mobile phones to facilitate African American older adults to self-manage their hypertension (Gibbons, 2011).

Limited knowledge exists about usage of and attitudes toward technology among African American older adults, especially for health benefits, and hypertension management in particular. There is an opportunity to use mobile devices as a first line for daily hypertension self-management support and technology integration to improve blood pressure control (Fallahzadeh, Aminikhangahi, Gibson, & Cook, 2016; Flodgren, Rachas, Farmer, Inzitari, & Shepperd, 2015; Gibbons, 2011; Tomlinson et al., 2009). With the unprecedented growth in technology use for disease management, the literature suggests that research should be explored from a theoretical perspective and include tailored patient-specific behavioral interventions that are technology-mediated and link to daily life (Abegaz, Shehab, Gebreyohannes, Bhagavathula, & Elnour, 2017; Solomon et al., 2015). According to the Mobile Health Technology Acceptance Model (Mo-HTAM), technology design in the presence of high perception of ease of use and usefulness will influence an individual to

accept and adopt a technology for health care (Mohamed, Tawfik, Al-Jumeily, & Norton, 2011). In order to reach and engage African American older adults to integrate technology for hypertension self-management, we aim to first identify their perceptions and experiences with technology use.

This article details results of a research study conducted using a sample from the “Co-Created Intervention With African American Older Adults” study to manage stress associated with self-management of hypertension (Author, in press). The objectives of this current study were to use a qualitative approach to explore (1) African American older adults’ experiences with technology, mobile phone, and app usage; (2) to examine their perceived benefits of using health apps for hypertension; and (3) to formulate suggestions that would increase their intentions to use the technology for hypertension self-management.

Methods

This study explored African American older adults’ experiences with using technology (mobile devices and apps) for hypertension self-management. After Institutional Review Board (IRB) approval, participants provided signed informed consent to participate in this study.

Study Design

The design and rationale and primary results of the parent study, “Co-Created Intervention With African American Older Adults” study, have been fully described (Authors, in press). Briefly, in the parent study, we conducted two focus group sessions to describe stress and self-management behaviors in African American older adults ($N = 31$) with hypertension. Topics included feedback on health behaviors to co-create a self-management intervention with participants to cope with the stress of managing a chronic condition such as hypertension. Focus group participants also discussed mindfulness meditation, sleep hygiene, and the use of phone apps to manage stress. Participants were enrolled if they were (1) community-dwelling, (2) African American, (3) age 60 years or older, (4) diagnosed with hypertension, and (5) able to provide consent. A person was excluded if he or she had a diagnosis of severe cognitive impairment (Authors, in press).

Ninety-minute focus groups, in the parent study, were conducted in March and April of 2017 in a private meeting room at a local community center in the Midwest. The principal investigator and co-investigators have longstanding established partnerships and rapport with the community which provided the basis for commencing the research relationship. The focus group questions were semi-structured with key interview questions, including an interview question from an interview guide to frame the conversation (Authors, in press). All focus groups were assured of anonymity, and with permission, the focus groups were audio recorded and then transcribed verbatim using an IRB-approved vendor.

Data from the parent study focus groups were used to co-create an intervention, the “Team Learning to take Control” (TLC) series. This consisted of 4 weekly sessions: (1) TLC - Monitor Your Blood Pressure; (2) TLC - Communication; (3) TLC - Sleep and Pain; and (4) TLC - Healthy Eating and Learning Portions (HELP). Prior to taking part in the TLC series,

participants were re-consented, as required by the IRB. Herein, we discuss the first session, TLC - Monitor Your Blood Pressure. Focus group methodology was used to explore the range of the African American older adults' group experience with technology during the TLC - Monitor Your Blood Pressure session and will be discussed in further detail.

TLC-Monitor Your Blood Pressure

The TLC - Monitor Your Blood Pressure session was an interactive educational platform that focused on hypertension self-management. This session lasted 120 minutes and was led by a PhD-prepared nurse practitioner with previous qualitative research experience, who specialized in the management of hypertension. During the first half of the session, participants were presented information on causes, risk factors, symptoms, and health complications associated with uncontrolled hypertension. Next, key topics discussed included monitoring blood pressure and the treatment of hypertension with lifestyle modifications (e.g., diet, exercise) and adherence to prescribed antihypertensive drugs.

An important component of hypertension self-management is the learning engagement activity of home blood pressure monitoring. Prior to attending the TLC - Monitor Your Blood Pressure session, patients were instructed to bring in their home blood pressure monitors. All participants were properly trained on best practices for home blood pressure monitoring. This included the correct selection and positioning of the blood pressure cuff, appropriate positioning of the patient, and recognition of factors that may skew the measurement (James et al., 2014). Participants had the opportunity to demonstrate taking their blood pressure with their home blood pressure monitor to receive immediate feedback from the nurse researcher about their technique. Additionally, the home blood pressure monitors were calibrated by nurses and nurse practitioners. Lastly, participants were asked to track their blood pressure and food intake for a week and return at the next TLC session (Author, in press).

After completing the interactive educational component of this TLC session, we explored African American older adults' experiences with various types of technology (e.g., mobile phones and apps, and/or short message system [SMS] text reminder) for long-term management of hypertension. The second half of the TLC - Monitor Your Blood Pressure session was designed to include a focus group discussion. A semi-structured group session is an appropriate approach to gather explorative information in defined area of interest (Krueger & Casey, 2009), in particular, from African American older adults with hypertension underrepresented in technology research (Gibbons, 2011). Open-ended questions were planned to elicit participants' responses regarding their preference of technology and the factors that cause barriers to the acceptance of a technology-enabled intervention. Specifically, initial explorative questions were general, for example, "Tell me about your experience with using technology?" and "Can you tell me about barriers that may prevent you from using technology to help manage hypertension?" Responses to the technology questions were audio recorded and analyzed. In addition, field notes were recorded by a research assistant and included observations such as emotions or comfort and discomfort relevant to the discussion.

Data Analyses

Data were collected during one focus group session to explore African American older adults' experiences with technology. The research team is comprised of four PhD nurse scientists with established collaborative practice and research relationships. The focus group transcript was verified and manually coded (using paper, pen, and highlighters) by lead author. Open coding and analysis, guided by conventional content analysis (Hsieh and Shannon, 2005) was employed. An acronym and brief definition was assigned to each code. Two co-investigators, independently coded the transcripts in accordance with the defined acronyms. The three researchers then compared and reconciled the codes for consistency. The raw data from the transcript was imported into the qualitative management software, Dedoose Version 7.0.23 (Los Angeles, CA, 2016). Data from similar codes were clustered into categories. Similar categories were then grouped into four themes. The Dedoose software allowed the researcher to understand what is meaningful in the qualitative data and capture key themes/concepts in a different platform, as well as a visual perspective of the data. Themes identified were discussed among the research team, and consensus was reached through an iterative process. Summaries were written of findings within each of the themes.

Results

Twenty-one participants attended the TLC - Monitor Your Blood Pressure session. The ages of the 21 participants ranged from 62 to 91 years, with a mean age of 72. The majority of the study participants were women (n=20) and all participants reported owning a cell phone or a smartphone. In addition to having hypertension, participants reported having more than one chronic condition. Other chronic conditions reported were diabetes, arthritis, and high cholesterol. Although this TLC session focused on hypertension management, with a special interest in the use of technology for hypertension management, participants were keen to discuss other ways that they use technology for managing their health. The four themes that emerge from the data were: (1) User experience and engagement with technology, (2) Communication, (3) Integrating technology for managing health, and (4) Nonacceptance of technology.

User Experience and Engagement With Technology

A primary goal of this study was to understand African American older adults' experiences with technology. Participants reported that their use of technology was limited to their mobile phones or smartphones. Within this theme, a variety of comments and views were expressed in terms of how mobile devices were utilized. It was also notable that most themes indicated consensus of the group that mobile or smartphones serve four major functions: (1) communication with family and friends, including texting; (2) information seeking, acquisition, and sharing data; (3) entertainment (e.g., photos, playing games); and (4) organization (e.g., calendar, time management). For example, when asked to describe whether they use their mobile or smart phones for anything else, the group all said "yes," and others went on further to explain, "I do everything [with my phone]," and "Yeah, I look up directions [on mobile phone]." Two participants' technology engagement involved using mobile phones as personal assistant/reminder to keep track of grocery lists and

appointments. Thus, the prevalence of technology experiences among the participants extended to the use of mobile and smartphones.

Communication

Technology is pervasive and extremely important as it has changed the way we communicate with one another. The conceptualization of communicating with technology is the loosely defined collection of the devices or gadgets (e.g., iPads, smartphones, and computers) to interact and/or share information with others. Participants often reported that their exposure to technology comprised of using mobile phones to communicate with their family and close social support networks. The most frequent expression of using technology as means to communicate was the use of a social media platform. One participant said, I play games...OK, I'll be honest I google [holding up a mobile phone] and I Face Chat." Statements about other ways in which mobile phones help with communication extended to using the Internet, e-mail, and text messaging via mobile phones as a way to communicate with family and friends. Another participant said, "I just talk [on the phone]." Adoption of modern technology as a means to communicate, connect, and socially interact was visible among this group of participants.

Integrating Technology for Managing Health

Increasingly used in healthcare, mHealth technology was embraced as a means to support general health and self-management. This theme emphasized the connection between integrating various technology to self-manage health. Four participants reported being highly interactive, using their smartphones for health and self-management of their chronic disease. For example, one participant said she use her smartphone to help manage her diabetes:

"Well, it [mobile technology] helps me with my numbers [hemoglobin A1c] with my diabetes, because I used to take four pills a day—and now I just take one pill a day. I used to weigh 252 pounds, so it helped me a lot."

In particular, participants also described how they engaged with technology to improve their health by tracking their self-care activities. For example, a participant recounted how she used an app to track and monitor her diet and physical activity for hypertension self-management:

Well, it [using mobile phone apps] was okay for me because I like monitoring my paces that I take ... also, what I eat, then it would calculate it in there. So it was good for me ... My doctor let me use it to see how I liked it. I liked it, but I wouldn't do it all the time.

This theme also highlighted participants' engagement in the care activities on their mobile device and the use of health information and technology. An example is the use of an electronic medical record (EHR) portal for individual health data and services using a mobile phone: "I use MyChart [an online health management tool]. That's how I communicate with my doctor. And that's on your phone too."

Participants in this theme embraced integrating technology to manage their health as they described using mHealth to support health behaviors essential to their health. Specifically,

participants mentioned they receive and share information with their healthcare provider about their health. In contrast, one participant used a mobile app to help manage taking medications for a chronic condition, but found it somewhat difficult due to the technical and logistic challenges involved. One participant said, "I had my daughter put the app [health management app] on my phone, and the thing [mobile phone] was beeping and I didn't know why, and [I] couldn't turn it off [notice to take medication] ... I'm not tech-savvy." Of note, this participant offered insight that relevant education and training are needed to fully adopt and use technology to manage one's health.

Nonacceptance of Technology

Some participants preferred not to use technology to manage their health, or to use mobile technology in general. For example, one participant said, "The phone is for me to talk on, and that's that. Technology is fine, but it just ain't for me." Another participant expressed similar views:

What drives me crazy with the Internet is when you want to do something, [you need] the password ... and I have to think of a password for every time. I don't need it. I mean, it's not comfortable for me...

In general, participants preferred nontechnology methods for managing their health. One participant said, "I like writing lists. I don't do the thing [write list] online. ... I'm comfortable in my own world. I don't feel left out." While another participant said, "Just give me the little med [medication] cups [pill boxes] and I'll just take my little seven-day (pointing to the medications)." While another participant said, "The old-fashioned way, pencil and a piece of paper." African American older adults with hypertension in this sample reported having only limited use or adoption of technology.

Discussion

Participants in the TLC - Monitor Your Blood Pressure session were African American older adults with hypertension. Many discussed various experiences with technology with limited use for managing their health. Our study results suggest that older African Americans have embraced mobile phone technology, but its use is mainly restricted to social media or as a platform to communicate. Although technology has the potential to assist in managing one's health, many African American older adults with hypertension are not exposed to or prefer not to engage with technology. In addition, a few participants used mobile phone technology beyond communication. Concerns primarily centered on the reluctance of African American older adults to engage with newer technologies was evident in this study. Participants provided insights that future investigations should educate and train African American older adults about various technology platforms to manage their health.

According to our results, the participants' use of technology and engagement included various platforms of social media via smartphones. A common misconception is that African American older adults do not use technology, when in fact, trends in certain technology (i.e., mobile or smartphone ownership) are changing. Although national data regarding technology utilization among African American are limited, a recent study by the Pew Research Center found that 77% of African Americans (age 65 years and older) own mobile

phones with 18% owning smartphones, equally comparable to White (Smith, 2014). In the same study, 45% of African American older adults are Internet users compared to 63% of White older adults (Smith, 2014). In contrast, data from the National Health and Aging Trends Study (NHATS) examine a diverse sample of Medicare beneficiaries 65 years and older (8% African American) found that older adults, in general, use of technology increased overtime and that greater usage of technology for health was observed among individuals taking medications and those individuals with multiple comorbidities (Gell et al., 2015). Hence, adoption of technology has implications beyond means of communication for older adults and opportunities to help address healthcare disparities. In one study by Buis and colleagues (2017), they explored using mobile technology (text messaging) to support medication adherence to antihypertensive medications among middle age African Americans from primary care (n=58) and emergency department (n=65) settings. While these results demonstrate non-significant improvements in blood pressure, this research has laid the ground work and demonstrated feasibility for future research using mobile technology as support for hypertension self-management in African Americans older adults 65 years of age.

The adoption of technology is a complex issue that may be influenced by a number of factors, such as age, education, race, socioeconomic status, general knowledge and attitudes towards the particular technology, and computer self-efficacy (Choi & DiNitto, 2013; Czaja et al., 2006; Wagner, Hassanein, & Head, 2010). For these reasons, digital disparities exist among minority populations in terms of adoption and utilization of technology to manage their health and chronic conditions such as hypertension (Czaja et al., 2006; Gibbons, 2011). Other factors include the perceived benefits of technology use, access, and safety and security concerns (Gibbons, 2011). However, the participants in this study did not express safety or security concerns with regards to using technology. In addition, research has suggested that older adults report less comfort and confidence with regards to using technology, which in part, drives ones' anxiety related to using technology and their lack of interest (Czaja, 2006; Gibbons, 2011). These findings also demonstrate a very important factor that may impede the ability of African American older adults from utilizing technology in the context of managing their health; that is, the lack of knowledge of or exposure to such technology (e.g., mHealth technology and apps). Importantly, participants in this study expressed concerns about not being informed or trained sufficiently to integrate technology for hypertension self-management (Choi & DiNitto, 2013; Gibbons, 2011).

Notably, subsequent studies suggest that individuals who take part in higher levels of engagement and interactivity with technology (e.g., use of social networking, emails, directions, downloading apps) are ideal to engage in technology-enabled interventions to promote behavioral change and self-management, including individuals 50 years and older (Gibbons, 2011; Smith, 2014). Specifically, the Internet, email, and text messaging might be viable mediums to facilitate African American older adults to manage their health (Gibbons, 2011). Thus, there is a need to develop novel hypertension self-management interventions that integrate technology and training programs for this marginalized population that may help to improve hypertension self-management and blood pressure control. These implications could address important clinical and public health priorities of uncontrolled hypertension.

Study Limitations and Strengths

This qualitative exploration provided an understanding of whether technology could be integrated for behavior change and self-management of hypertension in this group. However, there were a few limitations. The focus group participants were a convenience sample comprised of predominantly females from one geographical location. It may have also been of benefit to have captured the male participants' perspectives using one-to-one, semi-structured interviews. Because the participants were part of a larger mixed methods study, existing demographic data (age, gender, and ethnicity) did not allow for further data interpretation with socioeconomic status (education and income). While qualitative analysis is a creative process, another limitation is that this qualitative inquiry consisted of one focus group as part of an intervention study which did not allow for data saturation. Despite these limitations, the strength of the study is the knowledge and insight gained from the findings add valuable data to the limited existing literature on this important disparity. This work, though incremental, also provides evidence to support use of technology for health promotion towards improving self-management behaviors for African Americans with chronic conditions such as hypertension.

Conclusion

Hypertension self-management practices, adherence to antihypertensive drugs, and lifestyle modification have been shown to be associated with improved blood pressure control and better cardiovascular outcomes. Opportunities to integrate technology to promote behavioral change and self-management in African American older adults with hypertension are warranted. Relevant education and training are needed to address digital disparities that exist among minority populations in the terms of adoption and utilization of technology to manage their health and chronic conditions.

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