Published in final edited form as:
Health Commun. 2022 August ; 37(9): 1123–1134. doi:10.1080/10410236.2021.1910166.

A Subjective Culture Approach to Cancer Prevention: Rural Black and White Adults' Perceptions of Using Virtual Health Assistants to Promote Colorectal Cancer Screening

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Abstract

In the US, Black adults are less likely than White adults to be screened for colorectal cancer (CRC). This study uses a subjective culture approach to describe and compare perceptions of a CRC screening intervention delivered via virtual health assistants (VHAs) among rural Black and White study participants. We analyzed 28 focus groups with Black ($n = 85$) and White ($n = 69$) adults aged 50–73. Participants, largely recruited through community engagement efforts, tested the VHA intervention on mobile phones provided by the research team. Moderated discussions were recorded, transcribed, and analyzed using thematic analysis. All groups preferred the VHA to be friendly. Other important cues included trustworthiness, authority, and expertise. Black participants expressed a preference for receiving information about their CRC risk from the VHA compared with White adults. Black participants also expressed the importance of sharing the intervention and the CRC screening messages with younger members of their networks, including family members who could benefit from screening messages before reaching the recommended age for screening. The key similarities and differences between Black and White adults' perceptions of the intervention that were identified in this study can help inform future efforts to develop effective communication strategies and reduce cancer screening inequities.

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Conflict of Interest: Authors report no conflicts of interest.

Keywords

colorectal cancer screening; race; virtual human technology; health inequities; digital intervention

On August 28, 2020, actor Chadwick Boseman died from colorectal cancer (CRC). Boseman was beloved for his moving portrayals of historical figures, such as Jackie Robinson and Thurgood Marshall, as well as his embodiment of the larger-than-life Marvel superhero Black Panther. The loss of this accomplished celebrity sparked mourning across society; it also sparked a collective dialogue about CRC.

Screening is important for prevention and early detection of CRC, which can reduce CRC incidence and mortality by 30% to 60% (Lin et al., 2016). Among the pervasive health inequities associated with CRC outcomes, it is clear that Black adults are less likely to be screened than White adults (May et al., 2020). The goal of the current study was to describe and compare perceptions of CRC screening among adults at average risk of CRC and to identify appropriate strategies and messages to facilitate guideline-concordant screening.

Racial Inequities in Colorectal Cancer Screening

Chadwick Boseman's death made the news because he was a celebrity. However, he is only one of the 70,000 Black adults in the US expected to die from CRC in 2020 (DeSantis et al., 2019). Improving guideline-concordant screening is particularly important for this community. In Florida, 69% of all adults follow screening guidelines, but screening rates among Non-Hispanic Black adults (67%) and Non-Hispanic White adults (74%) differ. CRC incidence rates and mortality rates also differ: Non-Hispanic Black men have a higher incidence of CRC than Non-Hispanic White men (48.9 vs. 41.3 per 100,000), and Non-Hispanic Black women have a higher incidence than Non-Hispanic White women (36.7 vs. 31.3 per 100,000). Mortality rates follow a similar pattern, with higher rates among Non-Hispanic Black men (20.6 vs. 15.5 per 100,000) and women (14.0 vs. 10.9 per 100,000).

Due to a constellation of factors, therefore, Black adults experience a greater burden of CRC. Yet when detected early CRC has a 5-year survival rate of 90%. The best way to reduce inequities is thus to promote regular screening. That means there is urgent need for a nuanced understanding of screening perceptions among diverse populations in order to develop and provide effective and culturally tailored health promotion messages regarding guideline-concordant CRC screening.

Theoretical Underpinnings: Critical Race Theory and Subjective Culture

Critical race theory (CRT; Ladson-Billings, 2013) centers race as a primary driver of understanding inequity. Interventions aiming to improve health equity, such as by developing culturally tailored approaches to reduce cancer inequities, must reposition race as central rather than peripheral (Resnicow et al., 1999). Five key CRT tenets map onto assumptions that can help guide development of culturally tailored health interventions: First, racism is a normal experience in US society, and racism should be assumed to shape Black patients' healthcare experiences. Second, many attempts to address racism are symbolic, and what is actually needed are practical solutions that add tangible value to Black communities. Third, race is a social construction, and health scholars should consider both the limits and the benefits of using race as a variable. Fourth, race is a product of other social forces, meaning that race operates in the context of multiple other identities, such as gender and social status. Fifth, interventions must include voice and counternarrative. This means that interventions should incorporate diverse perspectives through qualitative inquiry or storytelling to ensure that cultural narratives (which may differ both across and within cultures) are at the forefront.

This study uses a subjective culture approach to facilitate description and comparison of the complexities of racial identity and culture across and within groups. Subjective culture is defined as unique shared values, beliefs, and practices that can shape behavior and influence acceptance of health messages (Pasick et al., 1996). Subjective culture acknowledges that contextual factors shape access to and uptake of healthcare. It also enables scholars and practitioners to design health messages based on group members' cultural preferences.

Applying a Subjective Culture Approach to Cancer Screening Interventions

Many interventions address racial disparities in cancer screening in part by determining intervention effectiveness across different racial categories or identifying within-group predictors of screening. Subjective culture, of course, encompasses more than ethnic and racial identity. Oetzel and colleagues (2007) describe how examination of culture is generally lacking within cancer screening interventions, as well as how subjective culture can profoundly shape preferences for specific sources of screening information among minoritized groups. To achieve equity in cancer outcomes, it is vital to understand exactly how race and culture inform preferences for intervention content and delivery, as well the mechanisms that make interventions successful (or not) across and within racial groups.

Culture, Source Cues, and CRC Screening

Studies show that racial discordance in healthcare interactions—in which patient and provider perceive each other as belonging to a different race—reduces patient compliance with medical recommendations, lowers patients' perceptions of the quality of medical care, and reduces both communication satisfaction and perceptions of trust in providers among patients (LaVeist et al., 2003; Shen et al., 2018). Although we know that racial discordance is negatively associated with patient health outcomes, the ways that race is socially constructed as a source cue in healthcare interactions are poorly understood. Culture plays a role in teaching people how to identify and respond to certain cues related to the source of a message. Because some source cues may improve cognitive processing of cancer prevention information while other cues may hinder information processing (Claypool et al., 2012) the role of race as a source cue is a particularly important to explore.

Culture provides a foundation for connecting knowledge about the source of information, such as race, to perceptions of factors critical to a healthcare provider's credibility, such as authority, expertise, trustworthiness, and friendliness. The literature views authority cues as being transmitted by observable formal positions indicating particular education

(Metzger et al., 2003). Expertise cues are commonly connected to demonstrations of experience, credentials, or skill (O'Keefe, 2002). Friendliness cues are thought to influence message acceptability, as if people are subconsciously thinking, "People I like usually have correct opinions on issues" (Chaiken, 1987, p.4). Friendliness cues, therefore, are cues that demonstrate likability—an important component of social exchanges that induces a positive, emotional experience and can put receivers at ease, increasing their willingness to change attitudes and behaviors regarding cancer prevention (Whelehan et al., 2017). Meanwhile, trustworthiness cues are associated with perceptions of the message source being truthful, honest, or unbiased (Tseng & Fogg, 1999).

Source Cues Associated with Virtual Health Assistants

A key healthcare challenge is that while racial concordance between patient and provider promotes positive health outcomes, the US healthcare system doesn't have enough healthcare providers from minoritized populations to meet demand. Under these circumstances, there may be an opportunity for technology to support the delivery and reception of cancer screening interventions. Virtual human technology, and the use of virtual health assistants (VHAs) in particular, makes it possible for interdisciplinary teams to customize race-concordant virtual characters to deliver screening recommendations. Previous research has demonstrated that VHAs can be tailored to engender positive source cues that invoke feelings of trust among users and increase truthfulness of disclosures (Zhou et al., 2014). Today's VHAs have the ability to embody high-quality patient-provider communication practices, including elicitation of individual preferences and empowerment in the decision-making process, while promoting CRC screening options. The subjective culture and CRT frameworks make it clear that such VHAs must be co-developed with community members—in this case, Black men and women—to embody culturally sensitive CRC screening messages. Thus, we pose the following research questions:

1. How does race shape perceptions of the source of CRC screening messages.
2. How does race shape intentions to engage in CRC screening?

Methods

This study was part of a larger clinical trial aiming to promote CRC screening among rural adults in the United States. The current analysis reports on data collected during the preclinical trial deployment phase, which engaged community members in an iterative process of informing message development and adaptations of a digital intervention using principles of user-centered design. User-centered design emphasizes iterative development that seeks continual feedback from the target audience throughout the development process (McCurdie et al., 2012).

Focus group discussions were used to elicit study participants' perceptions of a CRC intervention (Meet ALEX) and of the VHA that delivered the content. Focus groups were stratified by gender. Most focus groups were also stratified by race; however, due to the community-engaged nature of the research, some groups included both Black and White participants. In total, 28 audio and video recorded focus groups, each moderated by a trained research coordinator matched to participants based on race and gender, were conducted between January 2017 and November 2018.

Participants

To be eligible for the study, participants had to be between 50 and 73 years of age, self-identify their primary race as Black or White, and be proficient in English. We analyzed focus group data from 154 Black ($n = 85$) and White ($n = 69$) adults living in rural North Florida at the time of the study, including Black women ($n = 53$), Black men ($n = 32$), White men ($n = 26$), and White women ($n = 43$). Participants' average age was 63 ($SD = 6.7$) years. Most were unmarried with some level of college education (Table 1).

Procedures

Following IRB approval from University of Florida (IRB201601642), we used a purposive participant recruitment strategy. While the most successful recruitment efforts were done in person, we utilized a number of strategies, including recruitment via farm share programs, senior centers, a university-affiliated research registry, flyers placed in clinics and churches, and word of mouth.

Each focus group contained 2 to 8 participants, and each participant provided written informed consent before providing feedback. Each group responded to a single iteration of the evolving intervention prototype. Over the course of the study period, the prototypes progressed from printed representations of VHA characters with professionally recorded voice scripts to a fully interactive prototype intervention delivered by a race- and gender-matched VHA via an app housed on its own secure server and preloaded on Samsung JX7 smartphones. Sterilized headphones were provided to each participant so they could interact privately with the app. Focus group discussions were recorded and transcribed verbatim using a paid transcription service; transcripts were managed with NVivo 12 Pro (QSR International Ltd., 2018). Paper questionnaires were used to collect participant characteristics and health behaviors, with the data entered manually into Qualtrics by researchers immediately following each focus group.

Data Analysis and Prototype Development

We used a team science approach (described elsewhere) to develop and test evolving versions of the intervention (Griffin et al., 2019). The team consisted of computer scientists, health communication scholars, medical researchers, and a community advisory board. To facilitate comparative analysis of Black and White participant feedback, we adapted an existing codebook developed during a previous examination of VHA credibility cues. The codebook was updated to capture CRC prevention behaviors and intentions discussed during the focus groups. Training of the coding team consisted of two coders coding 20% of the transcripts and calculating inter-rater reliability (IRR) using the NVivo comparison query function. The team's IRR was found to have a Kappa statistic above 0.8, indicating acceptable agreement. The primary coder then coded all remaining transcripts for source cues (i.e., perceptions of the VHA as source) and for behavioral intentions related to CRC prevention.

This paper assesses four of the multiple source cues that have been identified as contributing to VHA credibility (Vilaro et al., 2020). These cues were selected by researchers in advance based on prior research and because they represent source characteristics that seem likely to be perceived differently among groups with different experiences of healthcare interactions. We also coded for three distinct behavioral intentions among participants.

We used the case classification and crosstabs functions of NVivo 12 Pro to facilitate comparisons of coded data by race and gender. A constant comparison approach was used to iteratively review participant comments coded to each theme for similarities and differences across groups. Comparisons were made by identifying predominant themes within a group and comparing them against the predominant themes in another. When gender differences were identified in addition to racial differences, these were noted and are also described in the results. Otherwise, differences and similarities are described based on nuances between the comments of Black and White participants.

Results

Source Perceptions

Our first research question describes and compares Black and White adults' perceptions of the race-concordant VHA that was communicating the CRC screening messages. Four source cues were explored: (a) authority, (b) expertise, (c) friendliness, and (d) trustworthiness. All the focus groups perceived all four cues as important characteristics of a VHA delivering cancer prevention messages. In addition, the data also revealed nuanced and distinct preferences associated with racial and gender identity (Table 2).

Authority—All participants wanted the VHA to represent a medical authority. Participants suggested that the VHA should have a formal position or appearance that indicates authority: "You should go with the most authority you can realistically bring" (White man [WM], Participant ID 96 [P96]). However, there were subtle differences between conversations in Black and White focus groups.

First, Black participants openly endorsed the authority of the VHA as a medical expert, with comments suggesting this perception was desirable and acceptable: "She looked like a doctor" (Black woman [BW], P34, P43, P45). Also: "His voice was knowledgeable and patient, um, kind of, has some authority … but he wasn't judgmental. I had a positive response to it, yeah" (Black man [BM], P17). Benefits of the VHA being a medical authority included expanded access to information. For example:

> They have all that information just readily [available], as opposed to a doctor that may not think of something … I would definitely go for that 'cuz I like all that information coming in … basically be an expert authority on different things. (BW, P10)

The VHA's position as a medical authority was signaled by clothing: "She dressed—because her appearance, you knew that she was, like, a doctor or a nurse" (BW, P30). Even when they acknowledged that additional consultation with a traditional medical authority might be warranted, overall, Black participants recognized the VHA as an authority.

In contrast, White participants described the VHA as a supplemental or alternative authority that should not be relied on more than one's own doctor. They said, for example, "I'd like to have it linked to the doctor. I'd like to have the doctor be copied on what I'm finding out through this thing" (WM, P96). White participants' comments suggested that the VHA might not meet their needs as patients and that they did not see the VHA as a doctor; they often referenced a different category of health professional, such as a nurse, or explicitly stated the VHA was not a doctor. White participants also described the VHA's authority in terms of how connected it was to the traditional healthcare system (e.g., their real medical doctor) and specifically how it could facilitate communication with their own real-life doctor. For example, one participant commented,

> That would give you some credibility, that the doctor believes it … 'cause so many times when you're in with the doctor, you're rushed. But if you had time to go through some stuff [with the VHA] and then get with your doctor, you could maybe ask some more educated questions. (WM, P97)

White men in particular were less likely to describe the VHA as an authority, saying, "He's not an authority. He's an authority on the subject, but he's not an authority as a doctor or a nurse or a policeman or something. He is helping us to make a decision" (WM, P95).

Expertise—Expertise is a construct closely related to authority. While both source cues are influenced by perceptions of credentials and training, expertise includes perceptions of skill. Our study participants used various cues to evaluate skill and technical expertise, including perceptions of the VHA's age, clothing, and years of training and the quality of the external sources informing the intervention. Participants also described the type of technical skills a VHA should possess, including diverse communication skills and an ability to serve as a second opinion. All participants indicated that the VHA should be a knowledgeable expert and appear professional.

Among Black participants, looking professional was described as an important component of expertise: "I want them to look like they think they know something" (BW, P5). Black women, in particular, frequently described the VHA as a professional. Professionalism, by its formal definition, denotes positive perceptions of "technical skill or competence related to a specific trade or profession" (Merriam-Webster, n.d.). Appearing skillful and fulfilling visual expectations of professionalism were important cues that signaled expertise. Perceptions of the VHA's clothes were a cue for expertise and professionalism among Black men and all woman. Clothes provided cues to the type of expertise, such as nurse, doctor, patient advocate, or medical assistant, and participants discussed how different types of medical professionals have different years of training and thus different skills and levels of expertise. Age seemed to evoke similar conceptualizations of expertise across all groups. Overall, Black men engaged in very little discussion of the VHA's expertise, in terms of frequency of comments, with only two Black men touching on the topic.

Participants also discussed having a broad knowledge base about individualized patient needs and a connection to a diverse medical community as components of expertise. Black women, White women, and White men all mentioned listening and communication as a type of expertise that the VHA was able to provide: "At least [the virtual person] heard you, and she's gonna answer you … you're putting out that information. Then you're getting feedback" (BW, P9). The communicative role of expertise was also described as the ability to understand a diversity of patient needs and make patients feel heard. This included desires for the VHA to have an "alternative medicine" background indicative of a broader education, to be able to engage in empathetic listening, and to be able to provide the "right answer" to patients. Nobody wanted the "canned" answer, which was linked to perceptions of low expertise and inability to meet patient needs.

Participants across groups perceived the VHA as a valuable point of access to a second medical opinion. We interpreted this as a point of expertise for the VHA, given participant comments acknowledging that human expertise can be fallible and that the VHA could offer an alternative opinion to help fill a knowledge or access gap. In this way the VHA supplemented access to the expertise and knowledge of a real doctor. Black women, in particular, expanded on this concept. For example: "It's good to have different viewpoints of things, and different doctors have different feelings about procedures or what you should do next or how you should do it" (BW, P6).

Only among White participants did we hear comments linking the VHA's expertise to perceptions that information was from an external source. White participants perceived the VHA as an expert due to it being informed by the medical profession broadly or by evidence-based research specifically: "I would enjoy it—because the virtual human is backed by the research and profession, it's not just a website from some test mode, testimony?" (White woman [WW], P88). White participants' comments relied heavily on evaluating external sources, whereas Black participants did not use external sources as a way to appraise the VHA's expertise. In addition, only White men suggested that visual evidence of the VHA's expertise was needed: "If I can see his diploma, I will be like, where did he go to school for this?" (WM, P3), or "Some authorship of [university name] in the background would help" (WM, P84).

Friendliness—Participants wanted the VHA to be a friendly, understanding, caring entity to interact with. All groups desired to see the VHA as a "friend." The only identifiable difference in how groups discussed perceptions of friendliness was that the groups of Black women and White women, but not the men, critiqued aspects of the early VHA prototypes by identifying cues that hindered perceptions of friendliness. Sample comments include: "She forgot to say thank you"; "She looks angry like she doesn't want to be here"; and suggesting that the VHA looked "stressed" or "harsh" or like she had an "attitude." These critiques informed modifications to improve perceptions of friendliness in later prototypes.

The focus group participants wanted the VHA to project real concern when communicating CRC risk and prevention options. Voice attributes such as speed of speech, persuasive intent, and warmth of voice influenced participants' perceptions of friendliness. Appearing calm, smiling, and having an open and inviting face were described as likable, with all groups mentioning that they wanted the VHA to smile. Men described the VHA as "cool" and wanted the VHA to be a friend who could provide tangible guidance in a considerate way:

> I like—I like that virtual human also long as they just like maybe the GPS system. They're gonna make sure you're right. … And so that virtual human could be good if he's gonna make sure you stay on the path. (BM, P104)

Trustworthiness—The extent to which participants perceived the VHA as trustworthy was revealed by comments on the VHA's ability to be a reliable, truthful, fair, or unbiased source of information. While all participants demonstrated a capacity to trust the VHA, the comments indicated variations in perceptions of trust between Black and White adults.

For all participants, the local context influenced perceptions of trust. Both Black and White participants indicated that the intervention and VHA should appear affiliated with the local university hospital or a known reliable source, and that this affiliation conveyed trustworthiness. This finding was indicative of the location of the study activities in a place where the local hospital maintains a largely positive reputation within the community. Differences were seen in that White participants said they preferred the intervention to come directly from their own doctor: "He or she has to say, 'You need to look at this'" (WW, P11). Black adults did not explicitly state a need for the VHA to come from their own doctor as an essential component of trust.

Black adults (both men and women) discussed trust in terms of their perception of the VHA's voice and appearance and the extent to which the VHA could meet patient needs. This indicated that trust could be communicated through linguistic characteristics that cued competency: "I trusted what he said; it sounded real convincing to me" (BM, P14). When the voice sounded scripted, participants described this as reducing trust. Black men specifically perceived the VHA as trustworthy when they felt it could alleviate fear and uncertainty or "help me out." If the VHA was honest, logical, and could help them learn and "normalize fears and concerns," it was considered trustworthy. Homophily-the tendency to from connections with people who share similar characteristics-may also have been important for Black men when it came to trust: "Like I say, bein' as that he was a brother-doctor look, it was more acceptable to listen to it opposed to another type" (BM, P150). Also: "I like the aspect that he was a brother" (BM, P152). Another way appearance seemed to play a role in trust was when participants described the VHA as generally looking like a trustworthy person. Black men thought people would be more truthful with the VHA than with a real doctor. Black women described the VHA appearing knowledgeable as influencing trust.

For White men, a variety of things lowered trust, including typos within the intervention, perceptions that the VHA was misrepresenting itself as a human person, concerns about the intrusiveness of the app, and uncertainty about how much personal information the VHA could access. White men discussed a desire to interact with the VHA while remaining anonymous. Some also described the ability to link to anonymized medical history as a potential benefit that would increase trust and allow for tailored information to facilitate decision making. White women expressed concerns about the security of the personal information used within the intervention and questioned its potential to be hacked. They suggested that using MyChart, a patient portal, would be a way to deliver the VHA that would improve trust related to security. Additionally, White participants (both men and women) perceived any intention on the part of the VHA to sell a medical product or procedure, or any interaction that cost money, as a barrier to developing trust with the VHA. For example, one participant stated that to increase trust, you need to “have a comfort level with the source or the team. You don’t want us to think it’s a pharmaceutical company or some insurance company or some other type of issue where they’re kind of cleaning information” (WM, P4).

Behavioral Intentions

Our second research question explored intentions to engage in CRC prevention behaviors among the focus group participants who had engaged in informing the development of the VHA-delivered intervention. Our analysis found similarities and differences in three behavioral intentions related to CRC prevention: (a) information seeking, (b) information sharing, and (c) CRC screening. Nuanced differences between the Black and White participants’ intentions to engage in cancer prevention behaviors emerged (Table 3).

Information Seeking Intentions—Information seeking behaviors among participants included wanting to learn more about CRC risk in general and wanting to talk to a doctor about screening. All participants expressed some extent of interest in learning more about CRC risk. They expressed a variety of intentions to search for more information about CRC. Among Black adults, there was a tangible interest in wanting to learn about risk from the VHA specifically. White adults expressed intentions to seek additional information from more familiar or traditional routes, including their own doctors or their own research efforts. While it was difficult to determine what drove these nuanced differences, Black participants’ comments indicated that they were impressed with the option to obtain information about CRC and screening from a novel source. For example, one Black participant expressed an intention to forgo her regular information seeking behaviors and instead trust the VHA’s information:

> I think being a computer, having all that information and everything, I would trust that doctor. I don’t really trust doctors ‘cuz they all, I mean they all have the knowledge, but they all have different opinions. I like to do my research because I don’t always agree with some of them, so, but that doctor I would trust. (BW, P8)

The views expressed in this quote indicate that the VHA produced a sense of trust that made this participant feel she would agree with the information it delivered. The VHA allowed Black users to imagine how obtaining CRC risk information from someone other than a traditional doctor might affect them if it became an available option in the future: “It’ll have a tremendous influence. I think—and I hate to segregate, but the Black community definitely because we don’t do the doctor visits … —that app would do a world of good” (BM, P106).

Information Sharing Intentions—All groups said they would feel comfortable and confident sharing the app that delivered the intervention, and that they would be interested in sharing content about CRC they learned from the VHA. However, Black adults wanted to share the content with their family members and in particular with young members of their social network:

> Yeah, because I wanna call them now and say, 'Look, they got this app out now.' See, they got boys, too. The boys are ages where around 10, 11. Get them involved, and then you can go there and get more information, too. It's stuff you might not get from your doctor. (BM, P126)

Only Black participants expressed interest in learning more about CRC risk at younger age than 45 or 50 years, which is when CRC screening is recommended to begin.

Among Black participants, a common motivation to share information was that it could save a life. Black participants were comfortable sharing the app with friends and family, specifically mentioning brothers, sisters, children, and boyfriends. Black women commented that they wanted to share the app because the VHA would communicate the information more efficiently than they would themselves.

White participants also wanted to share the app and discussed sharing the information with family and friends. In addition to sharing the app for its content on cancer prevention, White men said it could facilitate them sharing their own health information with others:

> You could save it and refer back to it or send it to somebody. So, you'd want to be able to do that. You want to capture the valuable information and almost always, you want to share these important things that are happening to you. (WM, P96)

White men provided several suggestions for how to share the app widely with others, recommending employees, American Association of Retired Persons (AARP), Veterans Affairs (VA), Facebook, advertising, celebrities, football, and word of mouth to "get it out to millions of people" (WM, P95).

CRC Screening Intentions—We found that many participants in the moderated focus groups already had experience with CRC screening in general. Their exposure to different screening modalities varied. Most were familiar with traditional colonoscopy. Some had heard about fecal or stool testing such as FIT (fecal immunochemical test), but Cologuard commercials were referenced most often. Some were even familiar with the details of FIT (e.g., how to use it, why and when to use it, and who can use it), but for many this was new information.

Comments indicated that the intervention's combination of novel technology (i.e., the VHA) and new screening options (i.e., FIT) provided opportunities for participants to access different experiences and choices within the healthcare system: "I didn't know I had a choice, I guess. I thought the app was very informing. I really like it" (BM, P16). Seeing the virtual demonstration of how to use the FIT had a positive effect on intentions to try it: "In the application, when you put the thing across the seat—'cause I didn't know that. That's why I haven't really been botherin' with the thing. But now, I might try and put [it] across the seat" (BM, P152). FIT was also seen as an easy alternative to colonoscopy: "Yeah, no muss, no fuss, very, at home, not intrusive, you know. I was actually relating to that, because I've done that, you know. I was saying, this is really easy stuff" (WM, P3). Others joked, "I wish my doctor would say I could use the FIT (laughing)" (WW, P11).

Some comments suggested that Black adults may be likely to experience a lack of support in the process of CRC screening. One particularly vivid account demonstrated this:

> Last time I went to my doctor, he did the finger and made me throw up. I threw up. The nurse just laughed at me. I didn't never go back there. I was scheduled to go get it done [colonoscopy] and didn't go 'cause I was scared. (BM, P154)

This account of the visceral negative experience of being laughed at by a healthcare provider during a vulnerable moment is important for understanding the emotional and lived experience of Black men engaging with the healthcare system. A healthcare provider, rather than addressing this man's fear and embarrassment, mocked him at a critical point. This behavior negatively affected the patient's motivation to complete future screening tests. In this example, we see a specific way that a patient's needs were not met at the point of care, as well as how the lack of care created a barrier to seeking recommended CRC screenings.

Most participants felt that screening was important and that FIT would be an easy way to complete the important task. FIT was described as offering increased control of the screening process plus the ability to avoid the hassles of colonoscopy prep. "In my experience, the biggest challenge for the colonoscopy is the preparation, not the actual process. So, with the FIT you don't have to go through that preparation, so, I found that attractive" (BM, P15).

For Black participants, the benefits of FIT compared to colonoscopy may be implicitly activated by previous poor experiences with the healthcare system. White adults may not access negative associations with the healthcare system as readily, either because they have no negative associations or because any such associations occurred in different contexts. When participants did express preferences for colonoscopy, their comments reflected concerns over the accuracy of FIT or a lack of clarity regarding the benefits of FIT over colonoscopy. Some preferred coloscopy because it could be done in a more formal setting and provide more information. Some mentioned that the FIT might be a strange item to put in the mail.

Discussion

In this study, we employed a subjective culture approach to understand and compare rural Black and White adults' perceptions of a VHA that promoted CRC screening. The analysis assumed that people's various experiences within, and perceptions of, the healthcare system are driven by dynamics of race. These healthcare experiences likely shape patient engagement in care and the pervasiveness of screening inequities. Our study provided an opportunity to use telemedicine, specifically through VHAs, to enhance healthcare access among Black and White adults. We identified a range of benefits of the VHA-delivered messages, including that the message recipients had the opportunity to learn about CRC screening without an in-person clinic visit and to formulate questions prior to talking to their doctor.

We also analyzed the participants' perceptions of the source of information—the VHA itself. All participants wanted the VHA to be a friendly authority with expertise on CRC screening.

Across gender and race, participants reported that the VHA having a medical background, being informative, looking and sounding professional, and appearing to be the right age appeared to cue perceptions of credibility. While perceptions and desires for friendliness were consistent across participant groups, there were nuanced differences between Black and White participants in preferences for how authority and expertise was communicated. White participants, and White men in particular, reported reluctance to trust the VHA and often expressed a desire for a more formal authority to be visibly connected to the VHA.

A number of cues were found to calibrate trust of the VHA. However, we found that once the VHA was developed to the point where most participants expressed trust in it, they described wanting to engage fully with it. This is one reason why trust is so important: once gained, it can help participants use and engage with the content and benefit from its full potential. This finding regarding trust is in line with previous research. Positive source attribution has also been demonstrated as being associated with increased intentions to seek additional cancer information, to share information, and to intend to screen for cancer—all important cognitive precursors to actual cancer screening (Ruzek et al., 2016). In fact, Nivens et al. (2001) found that among a predominantly African American study population, receiving information from a trusted health source was more strongly associated with increased prostate screening than any other kind of predictor.

This study’s findings offer multiple implications for effective health communication strategies. First, intervention dissemination and implementation strategies that build on knowledge of the local community context may yield better buy-in. In this study, all participants responded positively to the VHA being affiliated with the local university hospital, which is well known to the community. We also found perceptions of the source of the VHA are important. For White participants, it was important for the VHA to be delivered directly from doctors: they said they would use the VHA intervention fully if their doctor said they should, but if it was disseminated via other methods, they might look and listen but would not interact fully. This is an important implication given that more and more healthcare interventions are being developed with and disseminated via web-based platforms. It’s important to understand how digital interventions should be disseminated during implementation phases to encourage full engagement. Learning the nuances of what drives certain patient populations to engage fully with recommendations, and recognizing that these drivers may vary across populations, is warranted.

Second, framing the VHA as a way to improve communication with an existing provider (i.e., a patient’s real doctor) may be an important part of marketing an intervention to White adults. Black adults did not explicitly express the same need or desire for the VHA to connect them to “their own doctor,” although they did find the VHA appealing in that it could provide a valuable second opinion on options for care. Thus, for Black adults, dissemination efforts that position the VHA as a trusted, reliable source who has access to diverse health information and can provide a second opinion may be particularly engaging. And while, previous literature indicates African Americans may be less likely to ask questions of medical professionals when getting a physical exam (Whetten et al., 2006), our data indicated a specific desire to ask questions of the VHA and concern over not being able to do so. while, we are not able to determine if a desire to ask questions would translate into the behavior of asking questions during either patient provider interactions or VHA-user interactions, this is an important point that could be tested in future research as a component of assessing the quality of VHA communication.

The use of VHA technology in healthcare also presents opportunities to explore how people's previous experiences of having a race-concordant doctor in real life may influence their perceptions of concordant or discordant VHAs. Black Americans receive poorer-quality healthcare than White Americans, even after controlling for various sociodemographic factors and ability to pay for care, and there is growing acknowledgment among health professionals that racial bias is a likely contributor to this disparity (Bailey et al., 2020; James, 2017). These well-documented biases may or may not affect clinical decision making. However, poor experiences with healthcare among Black adults likely contribute to a well-earned mistrust of medical systems going back to the infamous Tuskegee study (Dula, 1994). With the emergence of telehealth and remote access to healthcare, trust and experiences of racism remain important issues, with technology-supported solutions emerging that have the potential to shape patient engagement with healthcare.

Of particular importance, all men and women in our focus groups repeatedly expressed interest in sharing the intervention and the information learned with their networks, including family, friends, and others. A significant point of concern was the need to promote CRC screening and prevention at a younger age: participants said they wanted to share content with younger children or family members, well before the age of screening guidelines. The desire to disseminate CRC education to a range of network members may reflect the lived experiences of Black adults, who experience higher rates of morbidity and mortality at earlier ages compared to other groups. This finding—of the importance of CRC prevention and screening messages for younger populations in the Black community—has implications for healthcare policy and guidelines. It also raises questions about insurance and reimbursements for screening, as well as a number of other barriers to screening.

Finally, while all participants were open to CRC screening, Black adults were more expressive about the novelty of the FIT test. In comparison, White adults were positive about FIT but engaged in more discussion about concerns with its accuracy. It is possible that the convenience of FIT becomes more or less appealing as a function of previous healthcare experiences. The driving force behind CRC screening preferences should be further explored, and future research findings could facilitate the development of engaging, patient-centered messages to promote screening. While more research, and perhaps triangulation of different types of data, could enhance these insights regarding CRC screening preferences, we found our participants were open and responded positively to learning about alternatives to more well-known, and more invasive, screening tests such as colonoscopies.

Study Limitations

One limitation of this study is that some of the differences and similarities described here as a function of race may be related to components of identity that the analysis did not account for. For example, all our participants lived in rural zip codes; however, the rurality of areas within the zip codes varies. Thus, rural identity may also have been a factor influencing both perceptions of healthcare access and previous experiences with the healthcare system. Study participants also represented a specific demographic of adults living in the southern United States, and results may not be transferable to those from different geographic and cultural backgrounds. In addition, our analysis did not link participant comments in focus groups to individuals' questionnaire responses. This limited our ability to infer how other demographic factors may shape perceptions. Finally, our stimuli (the VHA) were evolving from focus group to focus group as participants provided feedback and suggested changes to the intervention. These changes included adjustments to graphics, backgrounds, affordances within the digital interface, and the VHA's appearance. Findings reported here should be interpreted with consideration that different groups of study participants were exposed to different and evolving versions of the intervention.

Conclusions

Assessing perceptions of health interventions that deliver cancer prevention messages is becoming increasingly important, as this information can play a significant role in improving access to medical services. Professional and academic organizations working at the intersection of health and practice are formally identifying that racism is an intrinsic part of the healthcare experience for the Black community and that it is prudent for health communication scholars to understand this perspective and incorporate that knowledge into communication goals and strategies aimed at improving health outcomes (O'Reilly, 2020). Borrowing the assumptions of CRT, we defined race in the context of culture as shared experiences of the healthcare system. The tenets of CRT align well with the strategies used to develop culturally-informed health messages. Bridging theory, health communication, and technology can be a powerful tool for inclusive delivery of CRC prevention messages.

Acknowledgments:

This research was supported by the National Cancer Institute, National Institutes of Health, Award #R01CA207689. The content is solely the responsibility of the authors and does not necessarily represent official views of the NIH.

Data Availability Statement:

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

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Table 1

Participant Characteristics

Variable		*N*	%
Gender	Women	96	62.3%
	Men	58	37.6%
Race	Black	85	55.2%
	White	69	44.8%
Income	< $10,000–$19,999	42	27.3%
	$20,000–$34,999	21	13.6%
	$35,000–$74,999	21	13.6%
	≥ $75,000	17	11.0%
	Preferred not to answer or missing	53	34.4%
Marital status	Married	54	35%
	Single, divorced, widowed, or separated	100	65%
Education	Grade 1–8	1	0.7%
	Some high school or technical, vocational school	15	9.7%
	High school graduate or GED certificate	20	13.0%
	Some college or college graduate	76	49.4%
	Post-graduate training	33	21.4%
	Preferred not to answer or missing	9	5.8%
Total		154	100%

Table 2

Insights and Strategies for Improving Perceptions of VHA Credibility Derived From Focus Groups With Adults 50–73 Years Old

VHA Cue	Definition	Insights/Communication Strategies	Participant Quotes
Trust	The degree to which a message recipient believes the VHA is conveying the truth as they know it. Indicates a positive belief about the perceived reliability or dependability of the VHA (includes perceived fairness or lack of bias)	Similarities: Participants desired a VHA connected to a trusted source. Trust of this study's VHA was contextualized by perceptions of the local university hospital. Perceptions of the VHA costing money, or of any money-making intentions, lowered trust. Differences: White participants would trust the VHA if it came directly from their doctor. White adults' privacy concerns were balanced by the potential benefits of personalized information. Black adults reported that a VHA who could provide help with health questions, normalize fears, and reduce uncertainty enhanced trust. Black men responded positively to interacting with the Black male VHA. Potential communication strategies: Race and gender concordance may be particularly important for Black men. For Black participants, trust included interpersonal considerations such as friendliness and ability to alleviate uncertainty. White participants commented on the structural ways their privacy and security might be violated.	**BW:** I think we all agree we would be more likely to use it because it came from UF. (P7) **BW:** Yes, because of the rep. They have a good reputation. (P8) **BM:** Like I say, bein' as that he was a brother-doctor look, it was more acceptable to listen to it opposed to another type. (P150) **BM:** Yeah. I was just looking at her picture that we've been talking about. It seems like more—not the doctor part, but this person can explain it to me more. (P107) **WW:** You know, maybe you do voices for different regions, you know, because people relate and sort of trust, you know. Hopefully nobody's from New York, but if you have a New Yorker (indicates accent) or somebody from Massachusetts speaking, people are going to go, what? Where are they? (P9) **WW:** If my doctor told me at an appointment, "I recommend that you do this," then I would find a way to do it. (P10). **WM:** Well, the question is how do I trust it. And when it presents itself as "I'm a person" when I know, but, and I'm looking at it, and it's very, very clear, this is not a person, that uh, that leads me to not trust it. (P42) **WM:** I would want to not only put in my information once I trusted the system. I would want to put in what happened to my dad, and my great-aunt, and my uncles and my sisters, brother, cousins. (P96)
VHA Cue	**Definition**	**Insights/Communication Strategies**	**Participant Quotes**
Expertise	The degree to which a message recipient believes the VHA to be knowledgeable about a topic, with a specific level of skill derived from training or experience	Similarities: Visual attributes of the VHA (e.g., age, clothing) were important cues to expertise. The VHA's ability to integrate relevant patient information and communicate on a variety of topics during the interaction was viewed as a type of expertise. Listening skills were considered an area of VHA expertise. Differences: Black adults primarily commented on the VHA's professional appearance. Only a few Black males discussed expertise. Only White adults wanted to evaluate the external sources of information that informed the messages (e.g., seeing a diploma on the wall, or hearing the message was backed by research) as a way to assess the VHA's expertise. Potential communication strategies: Visual expectations of expertise can be cued by different features (appearance vs. evidence). Gender may play a strong role in perceptions of expertise and can be explored further.	**BW:** She sounded young. Like she was too young to be a doctor giving us this important advice. (P18) **BW:** I think with the virtual human, I think they have all that information just readily, as opposed to a doctor that may not think of something, you know, so. I would definitely go for that 'cuz I like all that information type thing coming in. (P10) **BM:** If you wanted the [virtual] doctor to seem an expert, I probably would have done a better job on the animation … I hadn't seen many doctors dressed that way. He had his shirttail out … but his voice was very clear, and his diction was really good. (P19) **BM:** Like it was informative, … seem like he had some kinda medical background to speak on it, and that's what I looked at. (P150) **WW:** I would enjoy it—because the virtual human is backed by the research and profession, it's not just a website or some testimony. (P88) **WM:** But a virtual doctor with a resource of background information that can bring this together, I think would actually be better than an actual doctor. (P95) **WM:** A patient advocate. They would know things, but would they articulate my needs of why I'm there? I'd like the doctor's opinion then. Eight years of schools of schooling as opposed to three years of junior college. (P81)
VHA Cue	**Definition**	**Insights/Communication Strategies**	**Participant Quotes**
Authority	The degree to which the VHA is observed to have credentials or training as a	Similarities: Black and White participants both wanted the VHA to represent a medical authority. When the VHA was perceived as a community health worker, it was a less	**BW:** When you look at the way she was dressed … you knew that she was a doctor or a nurse. Yeah, she was 100 percent. (P30) **BW:** I would definitely go for that 'cuz I like all that information coming in … basically

VHA Cue	Definition	Insights/Communication Strategies	Participant Quotes
	medical authority. Perception of the VHA having a formal position/job indicating specific education or requiring relevant experience (e.g., doctor)	acceptable source of screening messages. Differences: Black adults accepted and endorsed the authority of the VHA itself. White adults conferred authority on the VHA based on it being recommended directly by a medical doctor. For White adults, perceptions that a “real doctor” maintained authority was important. Potential communication strategies: Add an introduction from a medical doctor. Disseminate via a local, reputable health organization or a patient portal.	be an expert authority on different things. (P10) **BM:** Being that he [the VHA] was a brother-doctor … it was more acceptable to listen to. (P150) **BM:** His voice was knowledgeable and patient, um, kind of, has some authority … but he wasn’t judgmental. (P17)
			WW: I would say phooey, because if the doctor hasn’t asked me to do an exam, the question is, then why are you asking me to do this? I don’t have time to do this. (P80) **WW:** I know studies show that you put the white coat on and that’s where people see authority, I see what I think you’re trying to get at with like, a step down from a doctor, here, but still a medical person, and I do think that’s probably a smart way to go. (P86) **WM:** I just think if you’re going to do it [create a VHA], you might as well go all the way and have a medical doctor. (P97) **WM:** No, I’m just saying. It, he’s not an authority. He’s an authority on the subject, but he’s not an authority as a doctor or a nurse or a policeman or something. He is helping us to make a decision, so does he really need our personal information to do that? (P95)
Friendliness	The degree to which an individual feels an affective bond toward the VHA For example, people agree… with those they like based on the reasoning that “People I like usually have correct opinions on issues”	Similarities: Both Black and White participants desired a friendly and likable VHA. Adjusting VHA appearance (e.g., smiling) and voice cues improved perceptions of friendliness. Participants referenced the VHA acting like a “friend” or “best friend” when it comes to helping them navigate their health. Differences: None discerned. Potential communication strategies: Perceived friendliness of the message source was universally desired. In this context, friendliness may not require specific or extensive tailoring beyond a basic perception of an engaged, caring, and kind communicator.	**BW:** Make her a little more friendly. (P21) **BW:** The one they said sounded country sounded fun to me. She was like, “Alright y’all, let’s get it” (laughter). (P19) **BM:** He look like he more could be a doctor or a friend or something. Somebody that’s concerned about your problem with cancer—that you could trust, really trust. (P109) **BM:** You probably feel more comfortable with the—the virtual human walking you through it than sitting there listening to the doctor talking about it. (P107)
			WW: It would have been nice to be a little more human, a little bit warmer. I want to hear the smile. (P10) **WW:** I like more of a smile. … But more receptive look on the face, like they’re hearing you and interacting, and something that’s positive. (P76) **WM:** I like the woman’s voice on my GPS, and I would like to have a VHA that was a nice friendly woman that was very knowledgeable, an artificial intelligence that when I ask it a question, it could become my best friend in terms of getting me the right answer. (P96) **WM:** You want your Virtual Human to be your more loving, affectionate friend. Your dear most friend. The one that’s always going to be there for you, that’s always trustworthy, that’s always gonna support you when you’re down. (P96)

Note. BM = Black man, BW = Black woman, VHA = virtual health assistant, WM = White man, WW = White woman.

Table 3

Intentions to Engage in Colorectal Cancer Prevention Behaviors Among Black and White Adults Who Tested a VHA-Delivered Intervention

Intentions	Definition	Insights/Communication Strategies	Participant Quotes
Information seeking intentions	Wanting to talk to someone about screening or learn more about personal cancer risk from a trusted source	Similarities: All participants expressed interest in receiving CRC screening information from the VHA and responded positively to new information. Differences: Black adults liked the idea of receiving information from the novel source. White adults wanted to talk to a doctor, engage in additional research, or contact another source in addition to the VHA. Potential communication strategies: This novel source (e.g., a VHA) may have a specific appeal for Black adults. Framing a VHA as a new way to get information vs. as a way to connect you with existing resources may be useful to engage audiences with different information seeking orientations.	**BW:** It convinced me to go ahead and do this, to talk to my doctor about this. (P19) **BM:** On this little app thing, when can I contact you if me and brother-doctor [VHA] here clash on certain issues? (P152) **WW:** I don't think there's anything wrong with it, but I just think you really ultimately, you're gonna have to go to a doctor. (P77) **WM:** It was enough to make me wanna look further into it. (P131) **WM:** I think it would be really nice if this [app] actually gave you references for the studies that back up the thing this guy is saying, and actually gives you a link so you can actually read those. (P81)
Information sharing intentions	Wanting to share the information learned or share the intervention with friends and/or family members	Similarities: Most participants wanted to share content with friends, family, and others. Differences: Black participants expressed a strong desire for screening information to be shared with people at younger ages than the recommended age for CRC screening (e.g., children, grandchildren). Potential communication strategies: To enhance perceived utility, enable easy and secure platforms for users to share content with others.	**BW:** You've heard of the game "telephone"? By the time it gets back around to you it's different. It's the same thing. I would rather give them, from the horse's mouth [the VHA]. (P22) **BW:** It would help save somebody else also. If I can help save a life, or help prevent this from coming about? I would tell the world, you know? (P3) **BM:** I would definitely share it, even with the teenagers. I'd share it with them right now. (P126) **WW:** If I used it myself and liked it, I'd share it. (P78) **WM:** That's right! Get the football players to sign autographs, you get a free jersey if you watch it. Or a free ticket! (P98)
CRC screening intentions	Discussing the intention to engage in CRC screening (includes expressing a desire to screen without explicit preference, expressing a desire to avoid screening)	Similarities: Participants were interested in pursuing CRC screening, saw it as important, and saw FIT as an easy way to screen. Differences: For Black adults' previous negative experiences with healthcare may affect screening decisions. White adults may be more influenced by perceptions of accuracy and process. Potential communication strategies: Visual demonstrations of the screening process may enhance screening intentions. Incorporate user preferences and lived experience. Address the user's feelings (e.g., what modalities do they trust and why).	**BW:** It's good that you do have a choice, that they're giving you a choice now, whether you can do it with the FIT or the old way. (P13) **BM:** I've been through the FIT test, and I can tell you most men of our age and our color, we have that feelin'. That's why I asked about, do they put you to sleep? I'm a do the FIT. (P154) **WW:** I actually might have that [FIT] done. (P8) **WM:** I guess I'm old-fashioned. I'd rather have a colonoscopy where they scope and they see what's up there. If somethin' there, they scrape it, take it, and biopsy it right then and there. (P131) **WM:** I kind of question whether it might be better to drop [the FIT sample] off in person, than to trust the US mail. Not that I don't trust … but that's a very unusual thing to put in the mail. It's the kind of thing that young people are going to make jokes about and that's gonna make me mad and that's gonna jack my blood pressure again. (P82)

Note. BM = Black man, BW = Black woman, CRC = colorectal cancer, VHA = virtual health assistant, WM = White man, WW = White woman.