

Trustworthy Conversational Agent Design for African Americans with Chronic Conditions during COVID-19

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This paper discusses preliminary findings on how to design chatbots that can increase African Americans' trust in health information, particularly those who have experienced chronic conditions during the COVID-19 pandemic. COVID-19 has disproportionately affected the African American community in terms of severity and mortality, and scholars point towards the long-held medical mistrust among this population as a possible reason. Recent studies on the impact of conversational agents (CAs) on increasing trust in health information suggest that CAs can be effective. Through interviews and design studies with ten participants, we present four findings on how to design trustworthy CAs for our target population.

CCS Concepts: • **Human-centered computing** → **HCI design and evaluation methods**; • **Social and professional topics** → *Race and ethnicity*.

Additional Key Words and Phrases: datasets, neural networks, gaze detection, text tagging

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1 INTRODUCTION

It has been over a year since the first case of COVID-19 was identified in the U.S. on January 20th of 2020. Since then, more than 28 million cases of infection and more than 500,000 tragic deaths have been reported [2]. African Americans are known to be more prone to the illness and experience more severe outcomes. Reports suggest that in the U.S., counties that consist mostly of African Americans have three times the rate of infections and six times the fatalities than counties with mostly Caucasians [24, 29]. Moreover, African Americans constitute 13.4% of the U.S population, but more than 24% of COVID-19 deaths occur in this population [27]. One of the reasons for the prevalence of COVID-19 among African Americans is their higher rate of chronic health conditions. Conditions such as diabetes, obesity, hypertension, COPD, and asthma are more likely to result in severe cases and are more widespread in the African American population [7, 14, 23]. Besides the higher rate of chronic conditions, recent studies suggest other reasons for their vulnerability during the pandemic [13, 14, 31]. Some point towards structural racism that generates inequity in social risk factors such as homelessness [31], higher poverty rates [14], and limited healthcare access [10, 13],

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which in turn results in higher rates of COVID-19 infections. These social risk factors are known to be higher among the African American population [10, 13, 14, 31]. Some scholars and media reports also suggest that medical mistrust towards the US healthcare system and the government may play a role in COVID-19 inequities [4, 6, 19, 25, 26, 33].

Having trust in the healthcare system is especially important in a global pandemic such as COVID-19 because the relationship between people and the healthcare system strongly depends on it [15]. Baker [4] points out that during the pandemic, public distrust in science has been exacerbated due to mixed information, questionable treatments, political interference in public health, and conspiracy theories. Social media has also played a role in spreading misinformation from “armchair experts” [18]. Studies also investigated conspiracy beliefs around COVID-19, which has led to the concern of trust in harmful information and lack of trust in the scientific healthcare system [18]. The distrust in the healthcare system is important because it leads to the reduction of healthy behaviors. A recent study investigated how medical mistrust is associated with hesitancy regarding COVID-19 treatment and the vaccines [6].

The influence of medical mistrust in COVID-19 health behaviors is notably harmful to the African American population because they have had persistent medical mistrust that is deeply rooted in history. The Tuskegee experiment [9, 28] is widely known within the population and poses a threat to trusting the medical system and the government. Discrimination experiences and perceived racism in healthcare are also factors that contribute to their medical mistrust [16]. Therefore, African Americans’ reaction to COVID-19 and its treatments has also been impacted by this medical mistrust. The media has reported that African American individuals do not trust the healthcare system’s or government’s response to COVID-19 [26]. This results in their hesitancy in receiving a COVID vaccine [12, 19] and also may end up in preventing individuals from seeking COVID-19 related medical care or adhering to evidence-based COVID-19 prevention guidelines [18].

In the HCI field, past studies have investigated the building of trustworthy artificial intelligence (AI) and how this innovation influences the perception of information [11, 17]. In this regard, we suggest that AI can be a potential solution to the problem of medical mistrust among African Americans by increasing their trust in AI-based conversational agents (CAs) that provide health information. Specifically, CAs are computer-generated characters that use conversational interfaces to interact with humans. They are increasingly used in the healthcare sector due to several benefits, and they also have the potential to be used among marginalized populations to bridge the health disparity [21]. Studies have demonstrated that CAs are effective in improving the health of patients with chronic conditions, such as diabetes, obesity [22] or asthma [20], suggesting that they can be beneficial to people at high risk for COVID-19. CAs have also been shown to be trustworthy for users [5] by exhibiting a culturally familiar style to the user [3], being honest while using empathetic expressions, [30] and by being knowledgeable and accurate [34]. CAs have also been proven effective in delivering health information to marginalized populations such as African American women or Hispanic women [5, 32]. As a result of the aforementioned studies, CAs have the potential to increase trust in health information among the African American population with chronic conditions and support their health during COVID-19.

However, there is a lack of concrete literature on how CAs should be designed for African Americans with chronic conditions to increase their trust in health information, especially regarding COVID-19. It is important to address this because medical mistrust extends even beyond the pandemic and has an impact on the lack of adherence to treatments and vaccinations. Therefore, we aim to understand how CAs can be a potential solution to the problem of medical mistrust and how the population would like CAs to be designed to support their needs. To sum up, this paper would like to answer the following research question: How can conversational agents be designed for African Americans with chronic conditions to increase their trust in health information during COVID-19? In this study, chatbots were used as the CAs because they are easily accessible through smartphones and more popular than voice-based agents.

2 METHODOLOGY

To answer our research question, we interviewed 10 African American participants with chronic conditions remotely. This is an ongoing project, and we are planning to recruit more participants in the process of analyzing our initial data. Participants were recruited through a university’s health clinic or its recruitment system. We sent out emails and text messages to search for those who wanted to participate. In order to be part of the study, participants had to (1) be African American with one or more chronic conditions that pose a high risk to COVID-19, (2) own a laptop or a desktop with a webcam and have Internet connection at home to participate in the Zoom study, and (3) be between 18 and 65 years old. Once these eligibility criteria were confirmed, we sent out emails to plan and conduct Zoom interviews.

The interviews lasted 60 to 70 minutes and were divided into three main parts. The first part involved talking to a Facebook chatbot designed by the researchers. The purpose of this activity was to allow participants to get acquainted with chatbots, since the majority of our participants most likely never encountered chatbots prior to the interview. The chatbot also gathered their demographic information for analysis. The second part of the interview was responding to the questions about participants’ current chronic condition management during COVID-19 and challenges they faced. Questions about where they get information about COVID-19 and how much trust they had in these sources were also asked. The purpose of this section was to understand their health behaviors and challenges, which lead to the third part. The third part of the interview was the design activity, where each participant designed an imaginary conversation between themselves and a chatbot. They were instructed to base their conversation on the challenges they have felt throughout COVID-19 in relation to their chronic conditions. To make the process easier and more realistic, we provided them with a link to a platform called botframe.com [1], which displayed an imaginary conversation in Facebook’s chat format. After the first five interviews, the challenges participants faced were summarized into six scenarios. Starting with the sixth interview, we gave participants the six scenarios and let them choose one with which they could best empathize. During the design activity, we stressed that they could assume that the chatbot was able to do anything to support them and to let their imagination run wild. We also told them that we were interested in what they wanted the chatbot to tell them and what they would want to tell or ask the chatbot, instead of the accuracy or the feasibility of the chatbot’s responses. After the design activity, we asked questions to investigate their motivations behind their design. All interviews were recorded upon receiving consent from the participants, and the conversation designs were downloaded as photos. We transcribed the recordings through a third-party service, and two researchers analyzed the transcripts using grounded theory [8]. Two researchers each coded the transcripts and identified recurring themes that were relevant to trust and the relationship between the chatbot design and trust.

3 FINDINGS

3.1 Providing information gathered from trustworthy sources

For many of the participants, it was important for the chatbot to aggregate information from what they believed were trustworthy sources. They were willing to trust information from the chatbot when it came from sources such as the CDC, health journals, or even the board of health in their community. Specifically, P01 said, “...the bot could have information from CDC, health department, you know, research studies, you name it, and they can draw off of all of them to help everybody.” In addition, P09 wanted to find information about health data in the community, by saying that “in this particular scenario, I would have wanted it to say, ‘You can find those stats at a particular place.’ Yeah, at a particular place, whether that be at the county board of health or whatever it’s called, or the state.” Some participants wanted the chatbot to act as a connection to health experts. They were willing to talk to health experts directly when

they had questions. This also stemmed from one participant's experience when she was able to attend Zoom seminars on COVID-19 that were held by doctors and health experts. This gave her an idea that the chatbot can also act as an intermediary that would connect the public to health experts. For example, P01 mentioned during the interview that "maybe there could be a section in there where you are able to either live chat with someone from the science field, some nurses, some doctors... a lot of information of what's been discovered these last nine months."

3.2 Being personable and empathetic

The chatbot had to be personable and empathetic for certain participants in order to be trustworthy. This resonates to what they emphasized during the interview regarding how they trusted their clinicians more when the clinicians were being open, honest, and personable because they were able to share more about their lives even beyond health. This information sharing resulted in the clinician accommodating those life circumstances when giving prescriptions or treatment advice. Participants projected this characteristic onto the chatbot in order to trust it. Indeed, many conversations designed by participants included parts of the dialogue that were caring and empathetic. For instance, P02 felt that her past clinicians lacked interpersonal relatability with their patients, and the chatbot was able to fill that gap. P08 has also said that from the chatbot she would want "a real person or at least someone that cares... I want it to learn, talk to me, and care, but I still want it to be open, just understanding."

3.3 Specific identities of the chatbot were associated with trust

Participants also expressed various types of identities that they would like the chatbot to have. Some participants wanted the chatbot to be a medical professional because they wanted reassurance that the information they were getting was reputable. Having a picture of a professional would give them this form of assurance. For instance, P03 said that having a face like a doctor will make them more trustworthy. "To actually see the doctor's face and something beforehand... like some type of disclosure that you read in the beginning that indicates that you're talking to a certified doctor, that makes you feel comfortable." (P03) P08 also mentioned that she wanted the chatbot to act like a therapist and talk her through her hardships regarding COVID-19, which was important for her because she wanted someone to rely on without being judgmental. Others said that the identity of a robot will make the chatbot more trustworthy. Because robots and computers are perceived as intelligent, explicitly presenting the chatbot visually as a robot gave participants the perception that they could believe what the chatbot says. Finally, there were also participants who discussed how they wanted the chatbot to be similar to a parental figure. For example, P05 wanted the chatbot to be like his mother because she used to take good care of him and was knowledgeable about his health. P05 wanted this form of caring and knowledge from the chatbot, so he channeled his desire of a parental figure to the chatbot.

"If the computer proves to be informative, which I'm sure it will, I'm always willing to conversate with it and get advice from the computer. It probably knows more than humans, I'm sure... Obviously robots are intelligent. So I was thinking about the look of it (which would) give me a little bit confidence on its answers." (P05)

3.4 Barriers in trusting the chatbot

Nevertheless, there were participants who did not choose to trust the chatbot wholeheartedly because of certain barriers that needed to be overcome and types of information that they would not want to share with the chatbot. For example, some participants expressed a desire to verify the information from the chatbot. P03 wanted to verify the information

with her clinician by saying that “I would, I mean, it was helpful with me thinking what I feel the doctor would say. But, I would still talk with the doctor just to see if it corresponds.” P05 also wanted verification, but through his own self-guided research on the Internet. “I would have to know the name of the chatbot and look up... what information it gets and where it gets it from and things like that, and once I get the information on that I can make a decision on whether to trust any advice it’s giving me or not.” This tells us that some participants were willing to evaluate the information provided from the chatbot based on what they know to be verifiable information through experience. P05 also mentioned that he was not willing to share his financial information with the chatbot, although he was willing to share his health information. Because the chatbot he designed was geared towards providing him health information, he had no trouble giving the chatbot his related private information. However, he wanted to exclude other information that he deemed was unnecessary in regard to the chatbot giving him health-related suggestions.

These findings reveal certain design implications that are necessary to develop trustworthy healthcare CAs for African Americans with chronic conditions. To increase trust in the chatbot and the health information it delivers, the chatbot should obtain information from what is believed to be trustworthy sources, have identities such as medical professionals or robots, but at the same time have a personable and empathetic attitude towards the user. The chatbot should also be programmed to understand the extent of one’s willingness to share personal information. These findings can be useful for determining characteristics necessary in developing CAs for this population even beyond COVID-19.

4 EXPECTATION FOR THE WORKSHOP

We would appreciate the opportunity to participate in the workshop for CHI 2021 because of the relevance of our research and the potential to have fruitful discussions with researchers working in a similar domain. We would like to bring up insights from the current study and seek feedback from a different perspective. For instance, we found it interesting that in our study the design activity gave participants a chance to actively use their imaginations to build a technological tool that they wanted, which was a novel experience for them. Most of our participants said that they were not technologically savvy, but the effortless process of the design study allowed them to come up with an innovative technological tool that they can use and enjoy. Indeed, participants thoroughly enjoyed the experience and expressed hope about how this could affect the future. It also allowed them to look at their challenges from a different perspective. It would be interesting to discuss these findings with workshop participants, especially this type of CA design for health in terms of building trustworthy chatbots. Moreover, I would like to share ideas on some sociotechnical impacts trustworthy chatbots have on African Americans with chronic conditions.

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