University of Florida IRB-01
Protocol

Title: A sociolinguistic-enabled web application to develop precision health intervention for African Americans

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1. Abstract:

This pilot study will explore the preliminary efficacy of a colorectal cancer (CRC) screening intervention delivered by virtual health assistants (VHAs). Participants will include 750 patients in the US between the ages of 45 and 75 recruited through Qualtrics panels: 375 who are non-adherent to CRC screening guidelines, and 375 patients who are adherent to CRC screening guidelines. The main research question is: How does the integration of different levels of dialect density of the linguistic features of African American English (AAE) influence the perceived credibility of a Black VHA? Four types of VHAs will be presented to our patients: a VHA with Standardized American English (SAE) linguistic features, a VHA with a low level of African American English (AAE) linguistic features integrated, a VHA with a high level of African American English (AAE) linguistic features integrated, and a text-only control condition. Survey questions will be used to obtain credibility judgments about VHAs post-interaction.

2. Background:

B.1. Vocal characteristics of VHAs for African American patients. Krieger, Lok, and colleagues (Zalake, Wilson, and Vilaro) collaborated to develop and conduct user-testing on a CRC screening intervention facilitated by a VHA. The team developed a male and female VHAs for African Americans and Caucasians (see Figure 1). The VHAs were developed through a series of focus groups and individual interviews were held with male and female African American patients (*N*=78) to review the visual and verbal characteristics of the VHAs.[24,25] Focus group participants identified a number of important vocal characteristics that influenced perceived credibility. Rate of speech was important; voices that were too fast, too slow, or sounded like a salesperson were criticized. One voice was described as sounding "Black," and participants responded positively. Speech characteristics were linked to the VHA being perceived as credible, friendly, and likeable. For example, one participant said: "Her voice was so convincing. You could just ease right into it" (P34, FG7, VER3). Another said, "His voice was knowledgeable and patient, um, kind of has some authority, but not like, he wasn't judgemental." Another expressed a similar perspective:

> …she seemed like a real doctor…talkin' to a real patient…I was listenin' to her voice and how she was takin' time and explainin' step by step…She seemed like a real person that was really there talkin' to you [about] what's goin' on with your body, and you need to be checked. I wasn't thinkin'

about she was no video person. She was a real person, like I'm talkin' to my doctor. It was like, "Oh, yeah, thanks, doctor, for helpin' me out…Yeah, I'm gonna go be checked…" (P138, FG7, VER3)

While patient responses were generally positive to the VHA, the importance of how the VHA sounded was consistent across groups. One limitation of this preliminary work is that participants were only exposed to sample voices from Black actors speaking Standardized American English. Thus, the current work builds on this limitation by exploring whether some patient populations will perceive a VHA whose speech incorporates linguistic features of African American English as more credible.

B.2. African American English. Over the last 60 years or so, a profusion of scientific inquiry performed mainly by African American linguists and scholars has provided a nuanced look into the mosaic of African American language use (Lanehart & Malik, 2015). The main goals of this linguistic endeavor were to dispel racist myths of linguistic deficiency, explicate the legitimate, systematic, and rule-governed nature of the linguistic varieties of many African Americans, and dismantle the linguistic discrimination and institutional racism which had produced disparate harm for speakers in realms such as education, job procurement, and healthcare (Baugh, 2018). For the purpose of this pilot study, three main aspects are relevant. First, researchers have identified specific pronunciation, sound, and grammatical structures from the speech of various groups of African Americans across the United States and throughout various time periods that do not appear in Standardized American English (SAE). Together, these structures, along with other linguistic features, have traditionally been termed African American English (AAE)[1] (Green, 2002). These linguistic features are not inferior or flawed versions of SAE counterparts, an idea that white supremacist narratives baked into U.S. society and the U.S. education system promote (Lippi-Green, 2012), but rather display the normal traits of all languages and linguistic varieties, play an important role in social interactions and identity building (King & Rosa, 2019), and are a part of the speech of 80-90% of African Americans at some level (Rickford, 1999; Smitherman, 1998). Second, AAE is not a delimiting set of structures that defines all African American speech. The speech of individual African Americans may or may not contain the linguistic features of AAE, along with SAE and also other language varieties. Third, the speech of individual African Americans is influenced not only by racialization but also by the intersections of various social identities (King & Rosa, 2019) such as gender, age/generation, education, sexuality, occupation, religion, ability status, social/socioeconomic class, and regional background (Alim & Reyes, 2011).[2] All of these layers contribute to larger linguistic repertoires that vary by individual and may be consciously or subconsciously drawn upon as African American speakers "shape and engage in processes and projects of identification" (Alim, 2016) in various contexts and social situations.

The speech of African Americans, then, is a mosaic, rather than a monolith. At the same time, however, Black linguists and scholars estimate that between 80-90% of the African American population retain and utilize a selection of the linguistic features of AAE at varying level as they weave through the various interactions in their lives (Smitherman, 1998; Rickford, 1999; Hutcheson, 2018). We find it plausible, therefore, that many of the participants in this study may utilize these features at some level as well and may find our VHA's linguistic accommodation appealing.

B.3. Linguistic accommodation. The connection between dialect density and cancer screening adherence has to do with trust and accommodation. Accommodating to a shared linguistic style improves communication effectiveness, understanding, and trust, which can lead to message compliance (Giles et al., 2007). Both objective and perceived language similarities enhance perception of credibility, competence, and persuasiveness (Aune & Kikuchi, 1993). In the clinical setting, healthcare providers who

[1] The term African American Vernacular English (AAVE), among others, has also widely been used.
[2] African American English is also not limited to the African American community but can be the first language of any person.

match their communication style to that of patients are considered most appropriate (Bourhis, Roth, & MacQueen, 1988). This is especially salient among racial ethnic minorities, who may maintain or accentuate linguistic features tied to racial identity in order to protect their racial identity (Bourhis & Giles, 1977, Giles & Johnson, 1987). For example, racial minorities might view “standard” language as more socially desirable but find the “non-standard” similar accent persuasive (Giles, 1973). Therefore, making an African American healthcare provider option with shared linguistic features is not cultural insensitivity, but rather a potential accommodation to those whose speech patterns also have non-standard linguistic features.

Accommodating to various African American patients’ speech is equivalent to communicating with patients competently, through appropriate (not offending others) and effective (meeting the goal) means (Cupach & Spitzberg, 1983). In communication, all humans navigate identity and solidarity with interlocutors through linguistic accommodation. If we feel connected to someone, we speak more like they do; if we don’t, we dissociate our speech from theirs. This has been shown to be true with doctor-patient interactions as well, particularly with African American doctors and patients using AAE (Tamasi, 2008; Wood, 2019). Our hope is to understand if the use of AAE by our virtual doctors increases trust and comfort with this screening process or not.

Previous research done by this team has shown a clear positive effect of racial identity via appearance on the response of patients of color. When patients of color were paired with a virtual health professional that matched their racial identity, patients were much more likely to follow-up with colorectal cancer screenings. Building off these findings, we plan to investigate whether the adjustment of linguistic features will have a positive, neutral, or negative effect.

3. Specific Aim:

African Americans are at risk for a number of health inequities, including increased morbidity and mortality due to colorectal cancer (CRC) as compared to White Americans. While the reasons for this inequity are complex, the disparity can be reduced through regular screening. Unfortunately, adherence to CRC screening guidelines is low, especially among African Americans. One strategy for reducing CRC screening disparities is to develop strategic communication interventions about the fecal immunochemical test (FIT), a low-cost, non-invasive screening method that alleviates common patient barriers to CRC screening and is equally effective as colonoscopy screening in reducing CRC incidence and mortality.

Interventions that use tailored messages are effective for improving CRC screening. However, two important questions must be answered before tailored screening interventions can be implemented in healthcare systems. One is the degree to which message content must be tailored to be effective and another is how to effectively engage participants. The current project is an extension of an existing project that uses mobile virtual human technology (VHT) to deliver tailored CRC screening messages for African Americans to improve screening within guidelines. Interventions using VHT offer numerous advantages, including the capability to be customized to the linguistic preferences of the patient. As such, the use of virtual technology could help reduce CRC screening barriers such as cultural mismatch and low self-efficacy among African American patients.

The purpose of this proposal is to investigate to what extent the incorporation of AAE linguistic features increases, decreases, or has no effect on the perceived credibility of VHAs. This pilot study is meant to be exploratory in nature. We seek to explore the following specific aim:

- Examine how tailoring the dialectal variety of the speech of VHAs influences their perceived credibility. **Approach:** Each participant will interact with a VHA that differs in speech containing

either: (1) strictly linguistic features of SAE, (2) a low level integration of AAE linguistic features, (3) a high level integration of AAE linguistic features, or (4) a voiceless, text-only control. Post-interaction, participants will be asked to judge how credible they felt the VHA was through survey questions.

4. Research Plan:

6.1. Pilot study design. This pilot study will use a posttest-only, 3 (SAE: Standardized American English / low level AAE: African American English / high level AAE) x 2 (Introduction / No introduction) with a control group (i.e., no voice) randomized experimental message design. Patients (N=750) will be recruited from a national panel by Qualtrics. In order to be included in the study, participants must be between the ages of 45-75, and have health insurance. We will recruit equal numbers of male and female patients.

After providing informed consent, participants will be randomly assigned to a VHA. Participants will be assigned at random to a Black, gender-matched VHA that speaks SAE, AAE (low level), or AAE (high level). Each VHA will also either include an introduction from the voice actor/actress or will not include an introduction. The control group will be the same intervention content delivered via text-only (e.g., photos of the Black VHA). After completing the intervention, participants will complete a questionnaire with dependent measures and potential mediators. This questionnaire will solicit participant opinion on the credibility of the VHA and also gauge the participant's intent to screen for CRC. Participants will receive monetary compensation which will credited to their Qualtrics member account on the site.

6.2. National panel recruitment information
According to Qualtrics' IRB Information Sheet, "Participants are recruited from various sources, including website intercept recruitment, member referrals, targeted email lists, gaming sites, customer loyalty web portals, permission-based networks, and social media, etc." With regards to how panel members are invited to a survey, "Panel members are sent an email invitation or prompted on the respective survey platform to proceed with a given survey. The typical survey invitation is generally very simple and generic. It provides a hyperlink which will take the respondent to the survey as well as mention the incentive offered." More information is available in the Qualtrics' IRB Information Sheet attached under Section 3.0 of the "Miscellanous Attachments" page in the IRB smartform system.

6.3. Informed consent process
The first page of the Qualtrics survey will display the information outlined in the informed consent form document. Specifically, the following passage will be included on this informed consent page, "Completion and return of the survey implies that you have read the information in this form and consent to take part in the research. Please keep this form for your records or future reference."

6.4. Timeline. The proposed pilot study is funded through the CTSI. As such, the study team is required to receive UF IRB approval prior to the procedures being submitted to NCATS for additional review. The additional review required by NCATS is expected to take two months. Thus, it is important for the study team to receive SRMC approval for the randomized message design experiment that was funded by the CTSI as soon as possible.

6.5. Stimuli. The speech of the VHA will be manipulated by varying its Dialect Density Measure (DDM) which is the number of dialectal features that are specific to AAE within an utterance in proportion to the number of words spoken in that given utterance. At the pronunciation level, this may include features such

as -g dropping, as in, “I’m gettin’ a cold.” At the grammatical level, this may include features such as the zero copula/auxiliary (“be” verb) as in, "How you feeling today?”

The scripts with different levels of dialectal density will be read by professional voice actors/actresses. Specific instructions and speech samples illustrating our target AAE features will be provided to the voice actors to ensure a natural and native production of AAE. The instructions will be designed by our team’s linguists who have experience conducting linguistic fieldwork and communicating with laypeople without using technical terminologies.

AAE linguistic features to be added will be drawn from linguistic literature and scholarly research (as outlined in Section B.2.). Further, to ensure that each feature is an authentic representation of AAE, the Corpus of Regional African American Language (CORAAL) (Kendall & Farrington, 2020) will be consulted on the particular feature in question to ascertain whether the feature actually appears in the speech of various African Americans. CORAAL is a corpus of over 150 hours of recordings of interviews with African Americans from around the country and over time. CORAAL is especially beneficial in this process as it contains the speech of African Americans who differ in gender, age, and regionality, and the recordings span the late 1960s to the late 2010s. As much as possible, actual audio snippets of African American speakers using the linguistic feature in question will be included in the script via hyperlink both as an accountability mechanism to ensure the scripts avoid incorrect, stereotyped language and also to offer voice actors/actresses real life examples of the features to assist them in producing the most authentic and natural voice recording possible.

6.6. Measures. The primary outcome in the current pilot study is credibility score. We expect that source credibility is the mechanism through which intentions to screen will be strengthened. Source credibility will be measured using a series of semantic differential items (e.g., “Please rate your virtual health assistant on the following dimensions”: Trustworthy/Untrustworthy, Honest/Dishonest, Expert/Inexpert, Competent/Incompetent). Further, we will measure whether the integration of AAE linguistic features impacted credibility through the use of useability questions (e.g., “How would you describe your virtual health assistant on the following scales:” “Is similar to me/Is different from me”, “Speaks like me/Does not speak like me”). Given that the primary manipulation in this study is speech characteristics associated with ethnic group membership, we will also assess strength of ethnic identity using the Multi-group Ethnic Identity Measure.[39]

6.7. Sample size justification and statistical analysis plan. As this is a pilot study, our main purpose is preliminary information collection and exploratory analysis instead of hypothesis testing, a formal sample size calculation is not necessary. The study sample size is determined by budget.

Descriptive statistics for credibility score including mean, standard deviation, median, and inter-quartile range (IQR) will be calculated (1) in the overall study cohort and (2) within each of the 7 groups. Similarly, descriptive statistics for intention to CRC screen including frequency and proportion will be calculated (1) in the overall study cohort and (2) within each of the 7 groups. Such information will serve as preliminary estimates to facilitate future powered studies. We will also generate descriptive statistics of collected demographic and clinical variables (e.g., age, gender, etc.). Graphical illustration will be provided if applicable. One-way ANOVA or Kruskal-Wallis test will be used to test difference of credibility score among 7 groups and two-sample t-test or Wilcoxon rank sum test will be used for post-hoc pairwise comparison. Chi-squared test or Fisher exact test will be used to test difference of intention to CRC screen among 7 groups and pairwise comparison. As this is a pilot study, all statistical analysis is exploratory. Therefore, multiple comparison adjustment will not be considered.

6.8. Patient-centeredness. The proposed intervention will test different levels of linguistic variation. To maximize patient centeredness, the investigators will conduct formative research with members of the intended patient population during the period in which the current study is under review at NCATS. The co-PI (Krieger) currently has an open protocol in which focus groups are being used to ensure patient acceptability of all aspects of the VHAs. For more details on focus group procedures, please see our recent manuscript published in *Psycho-Oncology* (see Vilaro et al., 2020). Krieger will conduct additional focus groups to examine patient perceptions of the different levels of linguistic variation and use this feedback to finalize how the stimuli are presented in the experiment to maximize patient centeredness.

5. Possible Discomforts and Risks:

- As with any behavioral intervention, there is the possibility of minimal emotional discomfort from being presented with individual risk factors for a disease. However, the probability of any physical, psychological, or social harm is minimal to none.

Adverse Event Reporting

- The data is collected by Qualtrics, so we will not have any direct contact with participants. The adverse event we will potentially encounter is someone sharing something concerning in the written feedback section. If this occurs, we will contact Qualtrics so they can reach out to the participant.

Data Sharing Plan

- We will share data associated with the trial by depositing these data in Dropbox, a file sharing system approved by UF Integrated Risk Management and providing access to the relevant files with outside investigators. Data include participant responses to survey questions and information about participant interactions with the intervention. Data are deidentified by Qualtrics and we do not have access to anything personally identifiable for participants.
- Data will be shared with investigators working at other accredited universities for the purposes of analysis. The names and Institutions of persons either given or denied access to the data, and the bases for such decisions, will be recorded. Participants will acquire IRB approval from their home institution to review data.

6. Possible Benefits:

- There are no direct benefits from participating in this study. However, participants may have garnered valuable information on their individual risk of developing colorectal cancer. They also learned how to screen for colorectal cancer.

7. Conflict of Interest:

- There are no real or potential conflicts of interest in regards to this research project for any members of the study team.

8. Bibliography

Aune, R. K., & Kikuchi, T. (1993). Effects of Language Intensity Similarity on Perceptions of Credibility Relational Attributions, and Persuasion. Journal of Language and Social Psychology, 12(3), 224–238.

Baugh, J. (2018). *Linguistics in pursuit of justice*. Cambridge University Press.
Bourhis, R. Y., & Giles, H. (1977). The language of intergroup distinctiveness. In H. Giles (Ed.), *Language, ethnicity and intergroup relations* (pp. 119–135). Academic Press.
Bourhis, R. Y., Roth, S., & MacQueen, G. (1989). Communication in the hospital setting: a survey of medical and everyday language use amongst patients, nurses and doctors. Social science & medicine (1982), 28(4), 339–346. https://doi.org/10.1016/0277-9536(89)90035-x
Cupach, W. R., & Spitzberg, B. H. (1983). Trait versus state: A comparison of dispositional and situational measures of interpersonal communication competence. *Western Journal of Speech Communication*, 47, 364–379.
Giles, H. (1973). Communicative effectiveness as a function of accented speech. *Speech Monographs, 40.*
Giles, H., & Johnson, P. (1987). Ethnolinguistic identity theory: a social psychological approach to language maintenance. *International Journal of the Sociology of Language, 1987*(68).
Giles, H., Hajek, C., Barker, V. et al. (2007). Accommodation and institutional talk: Communicative dimensions of police-civilian interactions. In A. Weatherall, B. M. Watson, & C. Gallois. (Eds), *Language, Discourse, and Social Identity*. Springer.
Green, L. J. (2002). *African American English: A linguistic introduction*. Cambridge University Press.
Hutcheson, N., Cullinan, D., Wolfram, W., & North Carolina Language and Life Project. (2018). T*alking Black in America*.
Kendall, T., & Farrington, C. (2020). *The Corpus of Regional African American Language* (2020.05) [Computer software]. The Online Resources for African American Language Project. Retrieved July 2, 2020, from http://oraal.uoregon.edu/coraal
King, S., & Rosa, J. (2019). Forging New Ways of Hearing Diversity: The Politics of Linguistic Heterogeneity in the Work of John R. Rickford. In R. Blake & I. Buchstaller (Eds.), *The Routledge Companion to the Work of John R. Rickford*. Taylor and Francis Group.
Lanehart, S., & Malik, A. M. (2015). Language Use in African American Communities. In S. L. Lanehart (Ed.), *The Oxford Handbook of African American Language* (pp. 1–19). Oxford University Press.
Lipi-Green, R. (2012). *English with an accent: Language, ideology and discrimination in the United States*. Routledge.
Rickford, J. R. (1999). *African American vernacular English: Features, evolution, educational implications*. Wiley-Blackwell.
Smitherman, G. (1998). Ebonics, King, and Oakland: Some folk don't believe fat meat is greasy. *Journal of English Linguistics*, *26*(2), 97–107. https://doi.org/10.1177/007542429802600202
Vilaro, M. J., Wilson-Howard, D. S., Griffin, L. N., Tavassoli, F., Zalake, M. S., Lok, B. C., Modave, F. P., George, T. J., Carek, P. J., & Krieger, J. L. (2020). Tailoring virtual human-delivered interventions: A digital intervention promoting colorectal cancer screening for Black women. *Psycho-Oncology*.