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# Study Protocol for Investigating Physician Communication Behaviours that Link Physician Implicit Racial Bias and Patient Outcomes in Black Patients with Type 2 Diabetes Using an Exploratory Sequential Mixed Methods Design

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# BMJ Open Study protocol for investigating physician communication behaviours that link physician implicit racial bias and patient outcomes in Black patients with type 2 diabetes using an exploratory sequential mixed methods design

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**To cite:** Hagiwara N, Mezuk B, Elston Lafata J, *et al*. Study protocol for investigating physician communication behaviours that link physician implicit racial bias and patient outcomes in Black patients with type 2 diabetes using an exploratory sequential mixed methods design. *BMJ Open* 2018;**8**:e022623. doi:10.1136/bmjopen-2018-022623

► Prepublication history and additional material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2018-022623>).

Received 27 February 2018  
Revised 12 June 2018  
Accepted 17 August 2018



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## ABSTRACT

**Introduction** Patient-physician racial discordance is associated with Black patient reports of dissatisfaction and mistrust, which in turn are associated with poor adherence to treatment recommendations and underutilisation of healthcare. Research further has shown that patient dissatisfaction and mistrust are magnified particularly when physicians hold high levels of implicit racial bias. This suggests that physician implicit racial bias manifests in their communication behaviours during medical interactions. The overall goal of this research is to identify physician communication behaviours that link physician implicit racial bias and Black patient immediate (patient-reported satisfaction and trust) and long-term outcomes (eg, medication adherence, self-management and healthcare utilisation) as well as clinical indicators of diabetes control (eg, blood pressure, HbA1c and history of diabetes complication).

**Methods and analysis** Using an exploratory sequential mixed methods research design, we will collect data from approximately 30 family medicine physicians and 300 Black patients with type 2 diabetes mellitus. The data sources will include one physician survey, three patient surveys, medical interaction videos, video elicitation interviews and medical chart reviews. Physician implicit racial bias will be assessed with the physician survey, and patient outcomes will be assessed with the patient surveys and medical chart reviews. In video elicitation interviews, a subset of patients (approximately 20–40) will watch their own interactions while being monitored physiologically to identify evocative physician behaviours. Information from the interview will determine which physician communication behaviours will be coded from medical interaction videos. Coding will be done independently by two trained coders. A series of statistical analyses (zero-order correlations, partial correlations, regressions) will be conducted to identify physician behaviours that are associated significantly with both physician implicit racial bias and patient outcomes.

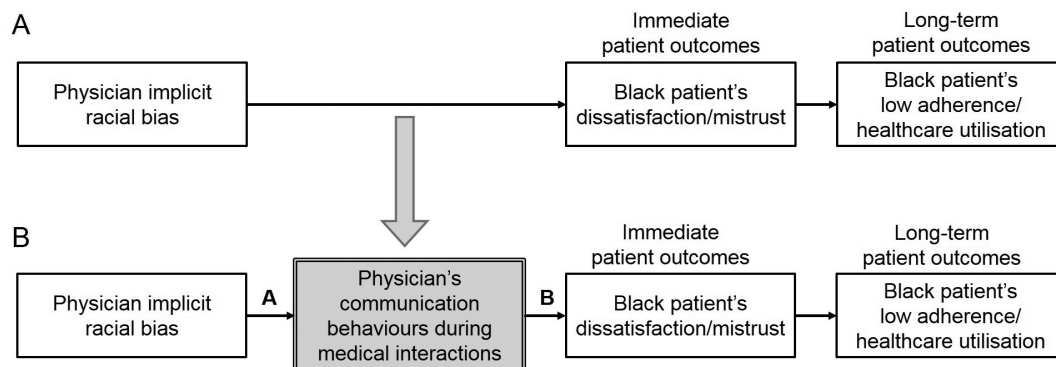
## Strengths and limitations of this study

- Use of an exploratory sequential mixed methods research design will incorporate Black patients' perspectives into patient-physician communication research, an approach crucial for advancing understanding of the impact of physician communication behaviours on patient outcomes (ie, patient perceptions, self-care and clinical indicators of diabetes control).
- The study combines physiological assessment and in-depth qualitative video elicitation interviews in a unique way for methodological innovation.
- This research will produce a novel, culturally tailored *Medical Interaction involving Black Patients Coding System* that will be designed to assess physician communication behaviours that can negatively or positively impact patient outcomes.
- One study limitation is that physician implicit racial bias is only one of several factors that determine patient outcomes.
- The generalisability of findings from this research to Black patients with other diseases (eg, hypertension, asthma, cancer) will need to be tested empirically.

**Ethics and dissemination** Ethics approval was obtained from the Virginia Commonwealth University IRB. Study results will be disseminated through publications in peer-reviewed journals and presentations at conferences. A novel *Medical Interaction involving Black Patients Coding System* from this project will be made publicly available.

## INTRODUCTION

Patient-physician racial discordance is associated strongly with patient reports of dissatisfaction with and mistrust in physicians,<sup>1–7</sup>



**Figure 1** A conceptual model summarising findings from the previous research on physician implicit racial bias (A) and our conceptual mediation model of the role of physician implicit racial bias in Black patient immediate and long-term outcomes (B).

which in turn are associated with poor patient adherence to treatment recommendations and underutilisation of healthcare.<sup>8–10</sup> This poses serious public health concerns because approximately 80%–90% of Black patients see physicians from different racial groups.<sup>5–7 11 12</sup> Recent research has shown further that patient dissatisfaction and mistrust are magnified particularly when physicians hold high levels of implicit bias towards Black Americans (figure 1A).<sup>13–16</sup> This negative association between physician implicit racial bias and Black patient reports of satisfaction/trust suggests that physician implicit racial bias impacts their communication behaviours during medical interactions and ultimately contributes to worse long-term outcomes in Black patients (figure 1B).

Social psychology research provides strong evidence that an individual's implicit bias often is reflected in their nonverbal (eg, body posture, eye contact, nodding) and paraverbal (eg, the amount, speed and pitch of the speech) behaviours, as opposed to verbal behaviours (ie, the content of the speech), during inter-racial interactions.<sup>17–19</sup> Drawing on this literature, several recent studies have successfully identified specific physician communication behaviours during racially discordant medical interactions that are associated with physician implicit racial bias. Specifically, physicians with higher levels of implicit racial bias had a greater ratio of physician to patient statements in a given medical interaction, reflecting their verbal dominance, as compared with physicians with lower levels of implicit racial bias.<sup>15</sup> Similarly, higher levels of implicit racial bias were associated with a greater ratio of physician to patient talk time.<sup>20</sup> Finally, physicians with higher levels of implicit racial bias were more likely to use first person plural pronouns (eg, we, us, our) and anxiety-related words (eg, worried, afraid, nervous).<sup>21</sup> However, none of the physician communication behaviours identified and tested in the previous studies have been directly associated with immediate patient outcomes.

We posit that one major reason why previous studies have failed to identify physician communication behaviours linking physician implicit racial bias and patient outcomes is due to a lack of Black patients' perspectives in the assessments. Specifically, the identification of physician

communication behaviours associated with physician implicit racial bias was based on the researchers' perspectives on or assumptions about what positive patient-physician communication *should* look like. Although this theory-driven approach is one strength of the previous studies, it is not sufficient for two reasons. First, research has consistently shown that immediate patient outcomes are better predicted by *patient reports* of patient-physician communication than *observer-rated* patient-physician communication.<sup>22–25</sup> This suggests the conceptualisation of positive patient-physician communication is likely to be different between patients and researchers. Second, social psychology demonstrates that the same behaviours can be viewed in different ways in intra-racial versus inter-racial interactions.<sup>26</sup> This suggests how Black and White patients conceptualise positive patient-physician communication may be different.

Hence, little is known about how physician implicit racial bias manifests behaviourally during medical interactions (Path A in figure 1B) and how Black patients react to such behaviours (Path B in figure 1B). To illuminate these processes, an innovative methodological approach that integrates Black patients' perspectives in patient-physician communication research is crucial. The overall goal of this research is to identify physician communication behaviours during medical interactions that are associated with both physician implicit racial bias and Black patient immediate (satisfaction, trust) and long-term outcomes (mediation adherence, self-management, healthcare utilisation). This investigation uses an exploratory sequential mixed methods research design, a design characterised by initial qualitative exploration and subsequent quantitative assessment of a phenomenon of interest.

To address this study goal, we will focus on Black patients with type 2 diabetes mellitus (T2DM) for both theoretical and methodological reasons. The focus on T2DM is *theoretically* important because evidence shows an overwhelmingly low rate of diabetes medication adherence in Black patients.<sup>27–36</sup> Physician communication behaviours stemming from implicit racial bias are likely to explain at least partially why medication adherence is particularly low in Black patients with T2DM. This assertion is based

on evidence showing that patient reports of patient-physician communication quality are associated with diabetes medication adherence in general.<sup>37–43</sup> Focusing on Black patients with T2DM is also *methodologically* important as it increases the homogeneity of patient encounters and thus provides greater precision in estimating the role of physician implicit racial bias in patient outcomes, including immediate and long-term outcomes as well as clinical indicators of diabetes.

## OBJECTIVES

To achieve the study goal, we will address four objectives:

**Objective 1:** To explore what physician communication behaviours during medical interactions are perceived as negative and what behaviours are perceived as positive by Black patients and why.

**Objective 2:** To identify which physician communication behaviours identified in Objective one are associated with physician implicit racial bias.

**Objective 3:** To examine how physician implicit racial bias is associated with Black patient satisfaction, trust, adherence and healthcare utilisation through physician communication behaviours.

**Objective 4:** To develop the *Medical Interaction Involving Black Patients Coding System (MIBPCS)*, a novel culturally tailored coding system that will identify physician communication behaviours that are perceived as negative and behaviours that are perceived as positive by Black patients.

## METHODS AND ANALYSIS

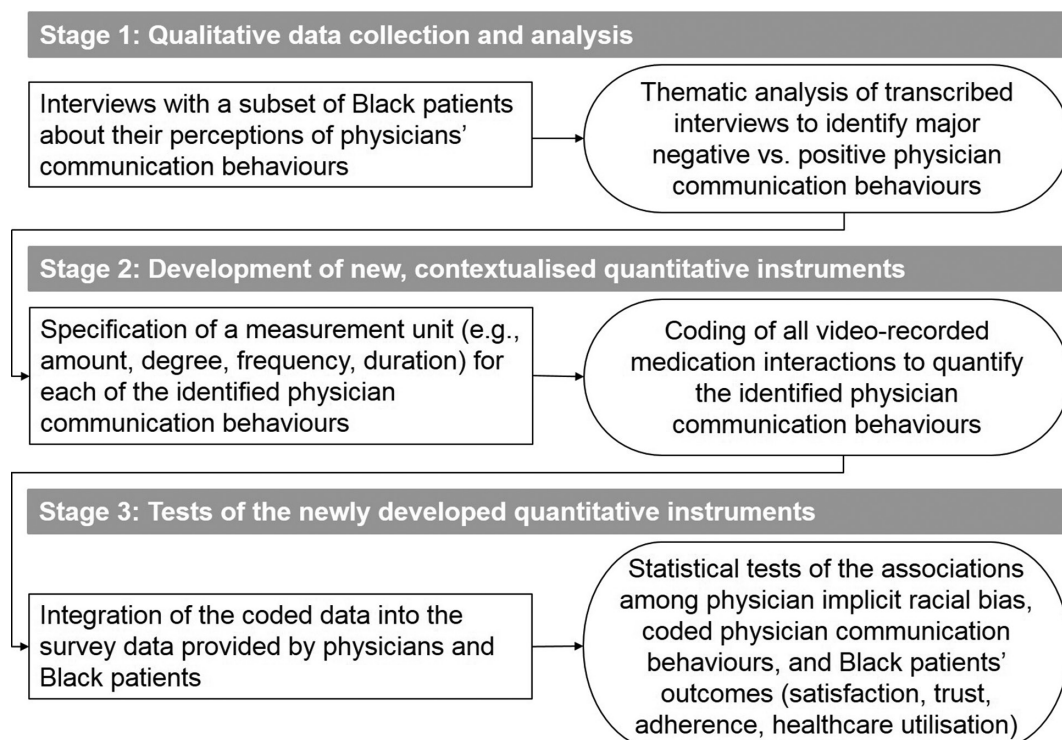
### The overview of the study

We will use an exploratory sequential mixed methods research design, initial qualitative data collection and analysis informing subsequent quantitative data collection and analysis, that integrates the strengths of inductive and deductive reasoning. This will allow us to explore Black patient narratives on physician communication behaviours and to identify theoretically meaningful behaviours (figure 2).<sup>44</sup> In Stage 1, to address Objective 1, we explore what physician communication behaviours during medical interactions are perceived as negative and what behaviours are perceived as positive by Black patients and why. In Stage 2, we will develop and refine a novel instrument designed to quantify negative and positive physician communication behaviours. In Stage 3, we will address Objectives 2–4 by conducting a series of statistical analyses. The summary of chronological study flow and the research design are presented in figure 3 and table 1, respectively.

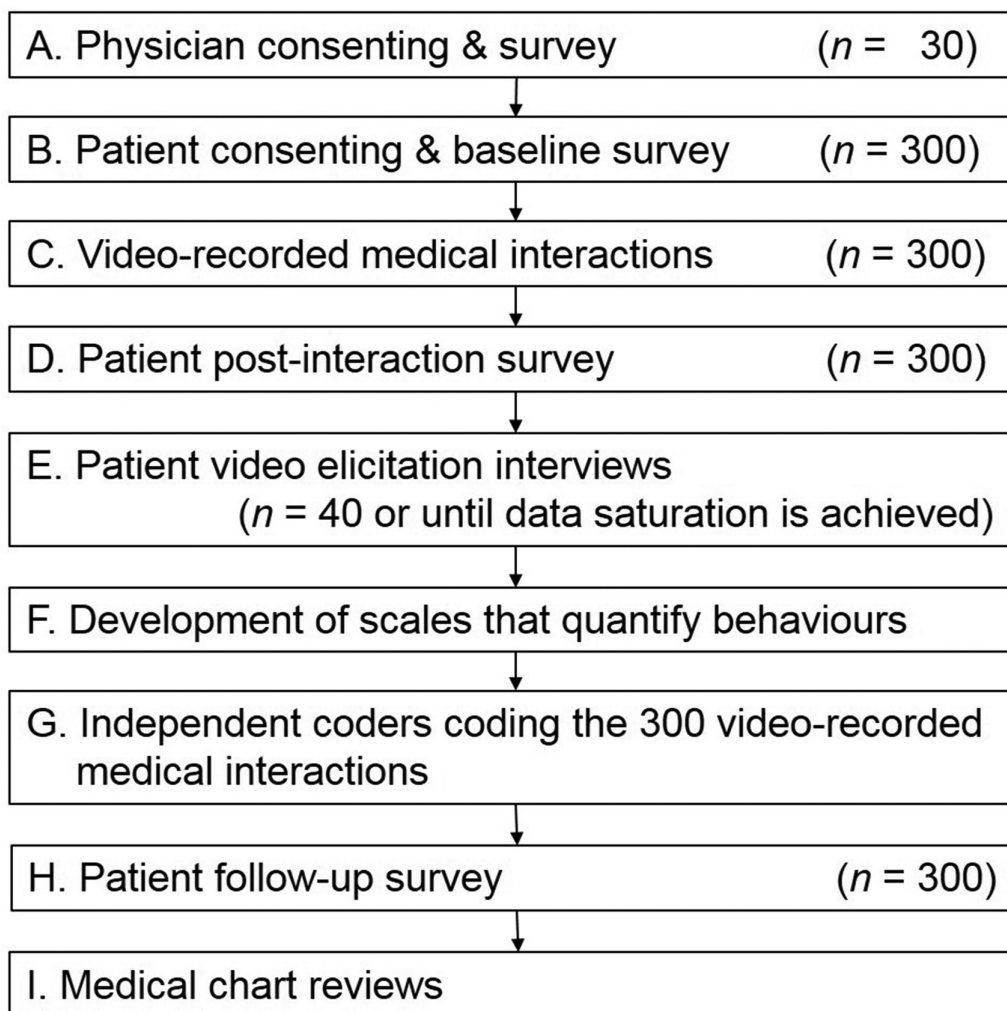
### Surveys, video-recorded medical interactions and medical chart reviews

#### Participants

We will recruit approximately 30 physicians and 300 patients from multiple Family Medicine clinics affiliated with Virginia Commonwealth University that serve patients from diverse racial/ethnic backgrounds. The only eligibility criterion for physicians is that they have to be either 2nd to 3rd year medical residents or faculty physicians at the participating clinics. The number of Black physicians



**Figure 2** An overview of an exploratory sequential mixed methods research design in the proposed research.



**Figure 3** Chronological order of data collection.

will not be sufficient to conduct conclusive inferential statistics and compare racially concordant versus discordant medical interactions. However, we will not exclude Black physicians from the present study. Rather the data from Black physicians will be used as hypothesis generating for future work to inform specifically how to interpret physician communication behaviours during racially concordant versus discordant medical interactions.

In order to be eligible for the study, patients must: (1) self-identify as Black or African American; (2) be at least 21 years old; (3) have a diagnosis of T2DM and (4) be able to comprehend all documents in English, written at a 6th grade reading level. A Monte Carlo Simulation with 1000 simulated datasets revealed that we can achieve adequate power (0.80) to detect a small to moderate effect of physician implicit racial bias on physician communication behaviours (with 8 physician factors and 11 patient factors included in the model) with a total of 15 physicians and 150 patients. An additional simulation showed a total of 15 residents, 15 attending physicians and 300 patients will further enable testing for a moderating effect of physician status (resident vs attending) on the association between physician implicit racial bias

and communication behaviours. Research has shown that even a small sample size at the upper-level (ie, physicians in the context of the present research) has been found to yield accurate estimates of the regression coefficients, the variance components and SEs when the lower-level sample size was greater than 50. Only when the lower-level sample size was 50 or less, the small upper-level sample size resulted in biased estimates of the SEs.<sup>45</sup> Thus, 30 physicians with 300 patients are enough to obtain unbiased and accurate estimates. However, we will take a more conservative approach and use generalised estimating equations (GEE) framework to correct for potential biased estimates of the SEs, which is a common statistical approach in the current patient-physician communication literature.<sup>46–50</sup>

#### Procedure

Physicians who meet the eligibility criterion and agree to participate will provide written consent and complete a one-time survey either on a laptop or desktop computer prior to meeting with participating patients. The physician survey is designed to assess implicit and explicit racial bias as well as covariates that are likely to be

**Table 1** Summary of research design: data sources, analyses and goals of each objective

Objectives	Data sources	Analyses	Goals
1	▶ Video elicitation interviews (Step E)	<i>Qualitative</i> analysis of transcribed interviews for themes regarding negative and positive physician communication behaviours	Identify physician communication behaviours perceived as negative and behaviours perceived as positive by Black patients
2	▶ Physician survey (Step A) ▶ Video-recorded medical interactions (Step C) ▶ Scales quantifying behaviours (Step F) ▶ Coding of the video-recorded medical interactions (Step G)	<i>Quantitative</i> analysis of: (1) physician communication behaviours (eg, amount, degree, frequency, length) in all video-recorded medical interactions and (2) the association between physician implicit racial bias and communication behaviours	Identify coded physician communication behaviours that are statistically significantly associated with physician implicit racial bias
3 & 4	▶ Physician survey (Step A) ▶ Patient baseline survey (Step B) ▶ Patient postinteraction survey (Step D) ▶ Coding of the video-recorded medical interactions (Step G) ▶ Patient follow-up survey (Step H) ▶ Medical chart reviews (Step I)	<i>Quantitative</i> analysis of associations among physician implicit racial bias, physician communication behaviours during the medical interactions, patient reports of satisfaction/trust, patient reports of subsequent T2DM medication adherence and healthcare utilisation	Identify physician communication behaviours that mediate the association between physician implicit racial bias and Black patient outcomes Develop the MIBPCS

T2DM, type 2 diabetes mellitus; MIBPCS, *Medical Interaction Involving Black Patients Coding System*.

associated with patient-physician communication and/or patient outcomes, including basic demographic information,<sup>51–54</sup> professional information and prior training and experiences.<sup>55–59</sup>

Eligible patients will complete a total of three surveys: the baseline, postinteraction and 6-month follow-up. First, the patients will complete the baseline survey over the phone immediately after they provide verbal consent and HIPAA authorisation and before the scheduled appointment with their participating physician. The patient baseline survey is designed to assess covariates that are likely to predict patient-physician communication and/or patient outcomes, including basic demographic information,<sup>60–64</sup> general trust and satisfaction,<sup>38 65–67</sup> and perceived discrimination.<sup>20 68–71</sup>

On the day of the scheduled appointment, the patients will first be asked to sign a consent form and HIPAA authorisation. Then, the patient and the physician will participate in a previously scheduled routine or follow-up office visit interaction while being video-recorded. The examination room will be equipped with two cameras: one focusing on the physician and the other focusing on the patient. Immediately after the video-recorded medical interaction, the patient will complete the postinteraction survey on a laptop computer. The postinteraction survey is designed to assess patient immediate outcomes—satisfaction with the care they have just received and trust in the physician they have just seen.

Patients will also complete a follow-up phone survey approximately 6 months after the video-recorded medical interactions. The follow-up survey is designed to assess patient long-term outcomes (ie, medical adherence, self-management, healthcare utilisation). The long-term

outcomes also will be assessed with medical chart reviews. Specifically, we will code: (1) the number of healthcare visits within 12 months of the video-recorded medical interaction and (2) history of diabetes complications (eg, retinopathy, neuropathy, kidney disease, cardiovascular disease, amputation) and laboratory values (eg, body mass index (BMI), blood pressure, HbA1c, cholesterol and so on). The medical chart reviews will be conducted 12 months after the video-recorded medical interactions in order to ensure that each patient had at least one required follow-up visit as periodic clinic visits are part of recommended T2DM treatment regimens. The American Diabetes Association treatment guidelines state that patients with T2DM should have their haemoglobin A1c (a measure of glycaemic control over the past 30–90 days) checked by a physician (1) every 3 months if glycaemic control goals are not being met or if they have diabetes complications or (2) every 6 months if their control is adequate and they do not have diabetes complications.<sup>72</sup>

## Video elicitation interviews

### Participants

On completion of the postinteraction survey, a subset of the patients will be recruited to participate in the subsequent video elicitation interviews. For the patients to be eligible for this subset of individuals participating in video elicitation interviews, they must: (1) have interacted with a physician with either one of the five highest or the five lowest *Implicit Association Test* (IAT) scores and (2) be able to commit to a 3-hour interview within a few weeks of their video-recorded medical interactions. The first criterion ensures securing patient narratives for both groups of physicians, those with high and those with low

levels of implicit racial bias. Within these constraints, we will sample a roughly equal number of men and women. Based on prior video elicitation work on 'tacit clues' (subtle communication that people do not notice during interactions but impact people's judgments) in primary care,<sup>73 74</sup> we expect to reach data saturation with n=40. However, we will terminate data collection once we reach data saturation, the point when no substantively new information is being found.

### Procedure

Video elicitation interviewing is a qualitative technique that has patients: (1) recall the thoughts and emotions they experienced during the interactions; (2) re-experience the thoughts and emotions or relive the interactions and (3) reflect on their thoughts, emotions and actions or those of their physicians.<sup>73 75</sup> This technique is particularly suitable to the proposed research for two reasons. First, we cannot ask patients about their reactions to their physician communication behaviours during the actual medical interactions. Second, research provides strong evidence that people's *recall* of their emotions is often inaccurate.<sup>76–78</sup>

Before each video elicitation interview, the research team (NH, JEL, MF and a trained female Black interviewer) will meet and create a set of interview questions that is personally tailored for each patient by going through five steps. In Step 1, we will watch the entire video-recorded medical interaction. Each research member will note: (1) moments she/he got the impression that the patient was either negatively or positively reacting to the physician and (2) physician communication behaviours that she/he perceived to be either negative or positive even if the patient reaction to the behaviours was neutral. In Step 2, we will share notes and discuss each point raised by the research members by replaying the video-recorded interaction. In Step 3, we will create a set of interview questions for the patient based on the discussion in Step 2. In Step 4, the interviewer will simulate the interview with the questions. During the simulation, the other members will jot down any concerns. In Step 5, we will share noted concerns and modify the question set as necessary. We will repeat Steps 4 and 5 until we have no more concerns with the question set. A key purpose is to identify points in the video as possible feeling-provocative events where the interviewer will stop the video (if the patient does not her/himself) and discuss whether the event elicited any negative or positive feelings in the patient.

Each video elicitation interview will consist of three phases. In Phase I, the patient will be connected to equipment measuring physiological parameters and rest for 5 min to stabilise baseline physiological activity. Specifically, we will use electrodermal activity (EDA) to assess arousal of the sympathetic nervous system. We will also use a facial expression analysis programme to determine whether the arousal recorded with EDA is associated with positive or negative facial expression. In Phase II, the patient will watch her/his entire video-recorded medical

interaction without any interruption. The patient will be instructed to pay attention to physician communication behaviours that cause her/him to feel negatively or feel positively. While the patient is watching her/his video-recorded interaction, the research assistant will monitor the patient's physiological activity, identify any emotional reactivity and record the nature of physiological reactivity and when the activity occurred. In Phase II, the patient will rewatch the entire video-recorded interactions and be instructed to stop the video to elaborate on thoughts and feelings whenever she/he observes physician communication behaviours that are negative and behaviours that are positive. In this phase, the interviewer will also stop the video at predetermined points. The stopping frequency and the timing of stopping of the video by the interviewer is determined by both (1) the set of interview questions about possibly feeling evocative as developed by the research team prior to the interview and (2) changes in the patient's physiological activity recorded by the research assistant when the patient watched the encounter in Phase 2. At each predetermined point, the patient will be asked to report how a physician communication behaviour that she/he has just observed makes her/him feel and if possible, why it makes her/him feel that way. The interviews in Phase III will be video recorded and audio recorded for later analysis.

### Measures

#### The physician survey

##### *Demographic information*

We will assess physician age, ethnicity, race and gender.

##### *Professional information*

The professional information includes: position (second year resident, third year resident, faculty), medical degree (M.D., D.O., Other), years in practice (faculty only), years at the current clinic (faculty only) and location of medical school training (in the USA, outside the USA).

##### *Prior training in cultural competency*

The physicians will be asked to select when they last participated in cultural competency training (within the last 6 months, 1 year, 2–3 years, 4–5 years, more than 5 years ago, never). They will also be asked to rate their own level of cultural competency (poor, adequate, good, very good, outstanding).

##### *Prior training in communication skills*

The physicians will be asked to report: (1) when they last participated in communication skills training (within the last 6 months, 1 year, 2–3 years, 4–5 years, more than 5 years ago, never) and (2) how they rate their communication skills.

##### *Prior experiences with the target patients*

The physicians will be asked to: (1) report how often they treat patients with T2DM (not much, little, somewhat, much, a great deal); (2) report how often they treat Black patients and (3) rate their performance treating

patients with T2DM (poor, adequate, good, very good, outstanding).

#### Implicit racial bias

Implicit racial bias will be assessed with the computer-based *Race IAT*<sup>79</sup> and computer-based *Affect Misattribution Procedure* (AMP).<sup>80</sup> In the *IAT*, the physicians respond to items that are to be classified into four categories: two representing racial groups (White vs Black) and two representing valence (negative vs positive), which are presented in pairs (online supplementary appendix A). The premise is that individuals respond more quickly when the social group and valence mapped onto the same response are strongly associated than when they are weakly associated. The well-validated<sup>81–85</sup> *IAT* will be scored by computing a *D* score that ranges from  $-2.0$  to  $2.0$  (the average  $as=0.78$ ).<sup>81</sup> In the *AMP*, the physicians rate unfamiliar images (eg, foreign alphabets) that come up on a computer screen immediately after the priming images (White vs Black faces; online supplementary appendix B). The premise is that unfamiliar images are rated more negatively or positively following the prime to which the individuals feel negatively or positively, respectively. The *AMP* will be scored by subtracting the proportion of positive responses on trials with Black faces from that on trials with White faces ( $as>0.85$ ).<sup>80</sup>

#### Explicit racial bias

Explicit racial bias will be assessed with the *Symbolic Racism 2000 Scale* (SR2K).<sup>86</sup> The SR2K is a well-validated 8-item scale that is designed to measure people's belief systems based on the ideas that racial discrimination is no longer an issue in the USA and that Black Americans' demands for fairness are unjustified. An example item includes 'Over the past few years, blacks have gotten more economically than they deserve' ( $\alpha=0.75$ ).<sup>87–90</sup>

#### The patient baseline survey

##### Sociodemographic information

Patient age, gender, marital status, education, income, BMI (computed with weight and height) and health insurance will be assessed.

##### Perceived racial discrimination

Perceived discrimination will be assessed with the *Brief Perceived Ethnic Discrimination Questionnaire-Community Version* ( $\alpha=0.87$ ) designed to assess both daily and lifetime experience of multiple forms of discrimination (eg, exclusion, stigmatisation, threat) in multiple domains (eg, work, public places).<sup>91</sup> We will also use a measure that is designed to assess the perceptions of racial discrimination at both personal and group level ( $\alpha=0.77$ ).<sup>92</sup>

##### Perceived competence in T2DM management

Patient competency in T2DM management will be assessed with the 4-item *Perceived Competence Scale* (PCS). The PCS has good internal consistency ( $\alpha>0.80$ ) and has been found to predict diabetes self-care.<sup>93 94</sup>

#### General trust in physicians

Baseline trust in physicians will be assessed with the 10-item *Wake Forest Physician Trust Scale*, which has been found to have better internal consistency ( $\alpha=0.93$ , test-retest reliability=0.75), validity, discriminability and scale distribution as compared with other trust scales.<sup>95 96</sup>

#### General satisfaction

Baseline patient satisfaction will be assessed with the *Patient Satisfaction Questionnaire Form III* (PSQ-III).<sup>97</sup> The PSQ-III is highly reliable and captures patient satisfaction with seven specific domains of medical care nested within an overall general domain.<sup>98</sup> We focus on three subscales: General (six items,  $\alpha=0.88$ ), Interpersonal Aspects (seven items,  $\alpha=0.82$ ) and Communication (five items,  $\alpha=0.82$ ).<sup>97</sup>

#### General T2DM adherence

The modified version of the *Summary of Diabetes Self-Care Activities Questionnaire* (SDSCA) will be used to assess baseline T2DM adherence in five domains: diet, exercise, self-monitoring of blood glucose, foot care and medication.<sup>99</sup>

#### The patient postinteraction survey

##### Trust in/satisfaction with the physician the patient has just met

The Wake Forest Physician Trust Scale and PSQ-III will be modified to reflect the specific physician each patient saw during study appointments (as opposed to physicians in general).

##### Prior interaction with the physician the patient has just met

Patients will be asked to indicate whether they have ever seen the physician before (Yes, No, Don't remember). If they answer affirmatively, they will be asked further to report: (1) how frequently they see the physician (not much, little, somewhat, much, a great deal) and (2) how well they think the physician knows them.

#### The patient 6-month follow-up survey

##### T2DM adherence in the past 6 months

The same modified version of SDSCA as the patient baseline survey will be used to assess T2DM adherence except that the patients will be instructed to think about the past 6 months specifically.

##### Additional interactions with the physician they met

Patients will be asked to indicate whether they have had any additional interaction with the physician they met during the video-recorded medical interaction in the last 6 months (Yes, No, Don't remember). If they answer affirmatively, they will be asked to indicate further whether the additional medical interactions were related to their T2DM management (Yes, No, Don't remember).

#### Assessment of emotions during the video elicitation interviews

*Emotional reactivity*. EDA is one of the most commonly used tools for assessing emotional arousal.<sup>100–106</sup> It monitors sweat gland activity of the skin, an indicator of increased activity of the sympathetic nervous system.<sup>107–110</sup> EDA does not differentiate different types of positive and negative



emotions. To assess specific emotions associated with arousal recorded with EDA, we will use a non-intrusive facial expression analysis method (iMotions Affectiva).

### Analysis of data from the video elicitation interviews

**Objective 1:** To explore what physician communication behaviours during medical interactions are perceived as negative and what behaviours are perceived as positive by Black patients and why.

The audio-recorded interviews will be professionally transcribed verbatim using a transcription protocol and analysed in four steps. Step 1 involves unitisation of thought units (ie, identifying appropriate blocks of text that represent discrete units of meaning rather than predefined blocks of text such as sentences and paragraphs) using deidentified transcripts. Two research assistants will be trained to unitize a sample of 10 transcript pages until they achieve consensus. After the training period, the research assistants will complete the unitizing of the remaining transcripts. They will meet with the PI after coding every five transcripts in order to discuss any discrepancy and achieve consensus. Unitisation of thought units allows logical partitioning of the transcripts into discrete categories.<sup>111–113</sup> Step 2 involves development of a *transcript codebook*. The research team (NH, JEL, MF) will examine about 40% of the transcripts to create a comprehensive list of themes. The data will be analysed inductively: transcripts will be read and themes identified, refined, collapsed and organised into higher-level categories. The transcript codebook provides coding procedures, rules for coding and descriptions and examples of the codes. Step 3 involves the coding of all transcripts. Two research assistants will be trained on coding a few transcripts until they achieve consensus. The transcript codebook will be fine-tuned during this training period. After the training period, the research assistants will analyse the remaining transcripts. They will meet with the PI every third transcript to avoid coding drift by comparing results, discussing any discrepancies and reaching consensus. Step 4 involves the identification of potentially evocative negative and positive physician communication behaviours that are endorsed by multiple patients. Identification of a clear pattern will be a major criteria for saturation. The research team members will first independently identify evocative physician communication behaviours by reviewing the data. Then, they will discuss and select the final set of physician communication behaviours that are going to be further coded using the video-recorded medical interactions.

### Analysis of data from the video-recorded medical interactions

The research team members will first discuss an appropriate measurement unit (eg, amount, degree, frequency, duration) and coding procedure for each discrete physician communication behaviour identified by analysing the interview transcripts (see above) and then creating a *video codebook*. The video codebook will provide coding rules, describe procedures for each physician communication

behaviour that need to be identified, provide examples for each, describe parameters for exclusion and note related-code cross-referencing. For each discrete behaviour, three research assistants will be first trained in the coding procedure using a set of 10 video-recorded medical interactions that will be randomly chosen until they reach consensus. The video codebook will be refined iteratively as necessary during this training period. After the training period, two of the three research assistants will continue analysing the rest of the approximately 300 video-recorded medical interactions independently. Every 10 will be double-coded to prevent coding drift. On completion of the coding, the PI will identify any substantive discrepancies in two coders' ratings that will be resolved by the third research assistant and if necessary the PI. Finally, values provided by the two coders (or the two closest values if there was a third coder) are averaged to compute a single score representing the quantity (eg, amount, degree, frequency, duration) of a particular discrete behaviour. Some behaviours are not discrete and cannot be easily identified, such as speech characteristics (eg, pitch, tone, amplitude) and facial expression of emotion (eg, neutral, surprise, happy). These behaviours will be quantified with computer software widely used in academic research, rather than by using coders (eg, Praat to quantify speech characteristics, iMotions Affectiva to quantify facial expression of emotion).

### Statistical analysis

In general, participants enrolled in the qualitative portion of the study are not enrolled in the quantitative portion of the study in order to avoid potential data contamination. In order to address this potential concern, we will conduct the following analyses for Objectives 2–4 with and without the patients who participated in the video elicitation interviews. This approach will enable us to empirically examine whether an inclusion of the overlapping patients ( $n$ ≈approximately 40) can bias the results.

**Objective 2:** To identify which physician communication behaviours identified in Objective 1 are associated with physician implicit racial bias

First, basic descriptive statistics will be conducted to identify any non-normal distributions of continuous variables that may require data transformation. Next, the main analyses will be carried out in three steps in order to identify physician communication behaviours that are associated with physician implicit racial bias. In Step 1, we will identify covariates that may impact physician communication behaviours by computing bivariate correlations among all quantified physician communication behaviours and factors that were assessed in the baseline surveys (eg, physician and patient demographics, physician professional characteristics, patient perceived discrimination and so on). In Step 2, we will compute partial correlations between physician implicit racial bias (both IAT and AMP) and all quantified physician communication behaviours while controlling for covariates that were associated significantly with any of

the physician behaviours. In Step 3, in order to correct for biased estimates due to non-independence in data (ie, patients nested within physicians), we will conduct regression analysis using a GEE framework for each of the physician communication behaviours that were found to be associated significantly with physician implicit racial bias in Step 2. The model will include the main effects of both IAT and AMP to control for the effect of one another. The regression modelling will also include the same set of covariates as in Step 2. We will correct family-wise error rate due to conducting multiple regression tests with the Bonferroni correction procedure.<sup>114 115</sup> The physician communication behaviours that remain statistically significant in Step 3 are considered as behaviours that reflect physician implicit racial bias.

**Objective 3:** To examine how physician implicit racial bias is associated with Black patient satisfaction, trust, adherence and healthcare utilisation through physician communication behaviours

To identify physician communication behaviours that are associated with both physician implicit racial bias and Black patient outcomes (ie, patient perceptions, self-management and clinical indicators of diabetes control), the analysis will be conducted in three steps similar to Objective 2. The physician communication behaviours that remain statistically significant after all steps will be considered as important behaviours that link physician implicit racial bias and patient outcomes.

**Objective 4:** To develop the MIBPCS

The MIBPCS will be designed to assess physician communication behaviours that negatively or positively impact patient outcomes and will not be constrained to physician communication behaviours associated with physician implicit racial bias. To create the MIBPCS, we first conduct partial correlations among all quantified physician communication behaviours and patient outcomes while controlling for potential covariates that might impact patient outcomes. Then, the significant correlations will be further tested with regression analysis using GEE. Physician communication behaviours that remain significant in the regression analysis will be compiled into the MIBPCS, which also will include detailed coding instructions as to how to quantify each behaviour (ie, the instructions used by the research assistants who coded the behaviours using the video-recorded medical interactions).

### Patient and public involvement

Patients and public were not involved in the development of the research question or the design of this study.

### DISCUSSION

Findings from this research will advance knowledge about the impact of physician implicit racial bias on Black patient outcomes by using novel approaches and methods. Understanding how physician implicit racial bias manifests behaviourally during medical interactions

and how Black patients react to these behaviours is critical to designing effective communication skills training for physicians and interventions to facilitate improved outcomes among Black patients. Additionally, the MIBPCS that will be developed in this study will be superior to prior patient-physician communication coding systems in that it will: (1) focus on physician communication behaviours during medical interactions involving Black patients that are associated directly with patient outcomes and (2) place an unprecedented importance on the patient point of view. The MIBPCS could play an invaluable role in future intervention research and ultimately in medical training as it will enable researchers to pinpoint negative and positive physician communication behaviours and provide them personally tailored communication skills training that targets those behaviours. Subsequent research should compare the predictive validity of the MIBPCS to that of the existing patient-physician communication coding systems for patient outcomes.

This is the first study to integrate physiological assessment of emotion into video elicitation interviews. One limitation with the video elicitation interviews is that emotion experienced during the video elicitation interviews could be different from that experienced during the actual interactions. However, we believe that video elicitation interviews that integrate physiological assessment are superior to either the live assessment of physiological reactivity or the reporting of emotions immediately after the interaction because they adequately address the major limitations of the two approaches: limited bodily movement and recall inaccuracy. Another potential limitation of this study is that it assumes a single visit with one specific physician is reflective of the overall office visit and care received and as such can be associated with self-management and clinical indicators of diabetes control subsequently. We also assume the ability to evaluate the contribution of a given physician's office-based care to a given patient's outcomes by statistically controlling for characteristics of that patient's relationship with that physician before and after their participation in the video-recorded medical interaction. However, future research should consider the advantages that may be afforded by a longitudinal research design.

### ETHICS AND DISSEMINATION

Certificate of Confidentiality for both participating physicians and patients was obtained from the National Institute of Health. Signed informed consent will be obtained from all participating physicians and patients, and signed HIPAA authorisation will be obtained from all participating patients prior to any data collection. Study results will be disseminated through publications in peer-reviewed journals and presentations at national and international professional conferences. The results will be also made available to those engaged in communication skills training. Finally, a novel culturally tailored MIBPCS from this project will be made publicly available.

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**Funding** This work is funded by the National Institute of Health/the National Institute of Diabetes and Digestive and Kidney Diseases (R01 DK112009).

**Disclaimer** The views expressed in the submitted article are the authors' own and not an official position of the institutions or the funder.

**Competing interests** None declared.

**Patient consent** Not required.

**Ethics approval** The Virginia Commonwealth University Institutional Review Board.

**Provenance and peer review** Not commissioned; externally peer reviewed.

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