REVIEWS

Physicians' Perceptions of Race and Engagement in Race-Based Clinical Practice: a Mixed-Methods Systematic Review and Narrative Synthesis

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BACKGROUND: Using race—a socially assigned identity that does not adequately capture human genetic variation—to guide clinical care can result in poor outcomes for racially minoritized patients. This study assessed (1) how physicians conceptualize and use race in their clinical care (race-based care) and (2) physician characteristics associated with race-based care.

METHODS: PubMed, CINAHL, EMBASE, and Scopus databases were searched. Qualitative, quantitative, and mixed-methods studies written in peer-reviewed, English-language journal articles evaluating US physicians' perceptions of race and physician factors associated with race-based care were included. Risk of bias was assessed using the Mixed Methods Appraisal Tool. Qualitative studies were evaluated using thematic analysis, and quantitative findings were summarized and combined with qualitative findings in a narrative synthesis.

RESULTS: A total of 1149 articles were identified; 9 (4 qualitative, 5 quantitative) studies met inclusion criteria. Five themes emerged: (1) the belief in race as biological; (2) the use of race to contextualize patients' health; (3) the use of race to counsel patients and determine care; (4) justifications for race-based practice (evidence-based, personal experience, addresses disparities, provides personalized care, increases compliance); and (5) concerns with race-based practice (poorly characterizes patients, normalizes disparities, patient distrust, clinician discomfort, legitimized biological race). In quantitative studies, older age was positively associated with race-based care.

DISCUSSION: Physicians had varied perceptions of race, but many believed race was biological. Concern and support for race-based practice were related to beliefs regarding the evidence for using race in care and the appropriateness of race as a variable in medical research. Older physicians were more likely to use race, which could be due to increased exposure to race-based medical literature, in addition to generational differences in conceptualizations of race. Additional research on the evolution of physicians' perceptions of race, and the role of medical literature in shaping these perceptions, is needed.

KEY WORDS: racial group; clinical decision-making; healthcare delivery; health equity.

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INTRODUCTION

Although racial groups are not genetically distinct,[1] physicians are encouraged to consider race when providing medical care. For instance, guidelines advise using race to select antihypertensive medications[2] and risk calculators use race to estimate the risk of atherosclerotic cardiovascular events.[3] However, physicians have varied perceptions of race (e.g., as a socially assigned identity insufficiently correlated with human genetic variation[4] or a biological trait[5] representing shared genetic ancestry) and must reconcile these perceptions with their use of race when providing care. How physicians perceive race affects patients. One study found that viewing race as a biological trait was associated with an increased use of race in medical decision-making (race-based care),[6] which can result in poorer outcomes for racially minoritized patients.[7,8] Moreover, physicians' perceptions of race may affect how they understand and interpret racial health disparities and the solutions they offer to solve them. Attributing disease risk to race obscures the impact of structural racism on health outcomes,[9] as it relates disease risk with patients' social identities instead of the society-specific privileges and harms associated with their status in the racial hierarchy. More research is needed to evaluate how physicians perceive race and use it in clinical care.

Only one systematic review has evaluated how physicians value race in clinical care. That review—a qualitative meta-synthesis[10] focused on physician decision-making for African

American and Hispanic patients—incorporated two studies assessing the clinical value of race. The study authors concluded that physicians had varied beliefs regarding the utility of race in clinical care. This metasynthesis did not address how physicians perceived race, how their perceptions were related to their use of race in care, nor physician factors associated with race-based practice. Furthermore, as the review was a qualitative metasynthesis, quantitative studies evaluating race-based care were excluded, limiting the scope of the analysis.

A mixed-methods systematic review, which includes both quantitative and qualitative studies, can offer greater insight into physicians' perceptions of race and physician characteristics—including racial beliefs—related to the use of race in clinical care. Quantitative studies test qualitative discoveries, while qualitative research provides context for quantitative work. We conducted a mixed-methods systemic review and narrative synthesis evaluating (1) how physicians conceptualize and use race in clinical decision-making and (2) physician characteristics and beliefs associated with the use of race in clinical care.

METHODS

Citation Index Database and Search

The search was conducted under the guidance of a research librarian and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Search terms,[11] consisting of combinations of key words and Medical Subject Headings terms synonymous with "race," "clinical decision-making," and "physicians," were trialed and refined in PubMed and translated for other databases using the Polyglot Search Translator.[12] See Supplement 1 for the complete search strategy. A search of PubMed, CINAHL, EMBASE, and Scopus was conducted on 11/24/2020 and updated on 12/10/2021. The research team used Google Scholar to conduct a citation search on all included studies resulting from the 11/24/2020 search.

Selection Criteria

Table 1 describes the search inclusion and exclusion criteria. Included studies were published in peer-reviewed journals; written in English; and evaluated United States (US) physicians' perceptions of race or the association between physician characteristics and use of race in clinical care. Study designs were either cross-sectional, controlled, or qualitative. Studies including non-physician clinicians were included if physicians represented >75% of the sample or if physician responses could be analyzed separately. This study was limited to physicians to allow comparison among a sample with similar educational and training backgrounds. Excluded studies were those not published in peer-reviewed journals; non-English language; evaluated non-US population; and did not address physicians' perceptions of race or the association between physician characteristics and use of race in clinical care. Case reports, cohort, and case-control study designs were excluded. The date of publication was not used to determine study inclusion.

Data Extraction

Abstract, title, and full-text review were conducted independently by the lead investigators (EO and LG). The researchers resolved discrepancies through discussion or engaging a third author (GD) as a tiebreaker. Extractions were completed by EO and reviewed by TG. The research team extracted data on study year, aim, design, population, and outcomes from each study.

Quality Assessment

Quality assessment was determined independently by the two lead authors using the Mixed Methods Appraisal Tool (MMAT), version 18.[13] MMAT (see Table 2) evaluates the quality of multiple study designs and has been used in previous mixed-methods systematic reviews.[14,15] The MMAT assesses each study design using five characteristics unique to that study type. The scores for each characteristic are not summed but provide a measure of study quality that gives

Table 1 Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Publication language	English	Non-English
Publication type	Published, peer-reviewed journal articles	Dissertations, editorials, systematic or similar review articles, commentaries, presentations, abstracts, posters, letter to the editor, presentations, grey literature, non-peer-reviewed
Population	US physicians (including residents and fellows)	Non-physician health professionals (e.g., nurses, nurse practitioner, physician assistants, medical students), non-US physicians
Phenomenon of interest	The use of race to guide medical decisions (including screening and treatments)	Studies that do not discuss the use of race to guide medical decisions
Design	Cross-sectional, controlled studies, grounded theory, general qualitative	Phenomenological, ethnographic, case study, case series, cohort studies, case-control
Evaluation	Physician characteristics (e.g., physician demographics, practice characteristics, physician racial beliefs and attitudes)	Studies that do not discuss physician characteristics
Research type	Qualitative, quantitative, or mix-methods	None

Table 2 Mixed Methods Appraisal Tool Scores

Study design	Reference no. for studies meeting criteria	Details regarding missed criteria
Qualitative (4)[17–22]		
Qualitative approach appropriate to answer the research question.	17–22	
Qualitative data collection methods adequate to address the research question.	17–22	
Findings adequately derived from the data.	17–22	
Interpretation of results sufficiently substantiated by data.	17–22	
Coherence between qualitative data sources, collection, analysis, and interpretation	17–22	
Quantitative RCT (1)[24]		
Randomization appropriately performed.		Not described[24]
Groups comparable at baseline.	24	
Complete outcome data.		Missing outcomes[24]
Outcome assessors blinded to the intervention provided.	24	
Participants adhere to the assigned intervention	24	
Quantitative descriptive (4)[6,23,25–29]		
Sampling strategy relevant to address the research question.	6, 23, 25–29	
Sample representative of the target population.	6, 25, 26	Not described[23,27–29]
Measurements appropriate.	6, 25–28	Not described[23,29]
Risk of nonresponse bias low.		Low response rates[6,23,25–29]
Statistical analysis appropriate to answer the research question.	6, 23, 25–29	

context to study findings. MMAT scores were not used to determine study inclusion.

Analysis and Synthesis

Qualitative studies were evaluated using thematic analysis with an inductive approach.[16] A preliminary list of codes, representing ideas found in the studies and relevant to the study question, was developed after a cursory read of the Result sections of each study. Codes were refined through a thorough line-by-line evaluation of all aspects of the Results sections (i.e., quotes, theme headings, and thematic summaries) related to race-based clinical care. Self-reflexivity was accomplished through discussions regarding perceptions of race-based care prior to the initiation of coding and through writing positionality memos. All qualitative texts were double coded by EO and LG in Atlas.ti (Version 8.4.26.0). Consensus meetings, at least four, were focused on reconciling codes and selecting illustrative quotes. Following these meetings, memos were written summarizing changes to the coding process or aspects of the text that required additional discussion. Findings were discussed, codes were condensed, and themes—representing a collection of codes—were developed. The entire research team reviewed, discussed, and modified codes and themes. Due to the heterogeneity of quantitative studies, a meta-analysis could not be conducted. Statistically significant associations (i.e., p value < 0.05) found in the original research articles or quantitative findings related to qualitative themes were described using a narrative synthesis.

RESULTS

Study Selection

A total of 1149 articles were reviewed (Fig. 1); 1093 and 42 were excluded in abstract and full-text review, respectively. The most common reason for exclusion in the full-text review was lacking evaluation of physicians' perceptions of race or the association between physician characteristics and the use of race in clinical care. Fourteen relevant articles representing 9 (4 qualitative[17–22] and 5 quantitative)[6,23–29] unique studies (see Table 3) were included in the narrative synthesis. All studies were published between 2008 and 2021. The combined study population totaled 2450 physicians (228 in qualitative studies; 2222 in quantitative studies) and 198 other healthcare workers (20 in qualitative studies; 178 in quantitative studies). Inter-rater agreement between reviewers was 95% for abstract/title review, 91% for full-text review, and 93% for quality assessment. Five themes emerged from qualitative studies (see Table 4).

Theme 1: Conceptualizations of Race as a Biological Phenomenon

Physicians' perceptions of race ranged from describing it as a strictly social construct[17,19,21] to a mixture of biological and social components.[17–21] Two studies[17,18] noted that clinicians discussed race almost exclusively as a combination of biological and cultural factors. Notably, one study[17] found that clinicians used medical research as evidence that justified their belief in race as a biological trait.

Quantitative studies that directly assessed physicians' perceptions of race found the majority believed race had biological components. In national survey studies, 82% of internists[25] defined race as primarily a biological or genetic ancestry group, and 97% of family physicians[23] believed genetic differences played a role in racial health disparities. In a randomized controlled study evaluating BiDil (hydralazine and isosorbide dinitrate) prescribing,[24] almost half (24 of 49; 48.9%) of internists

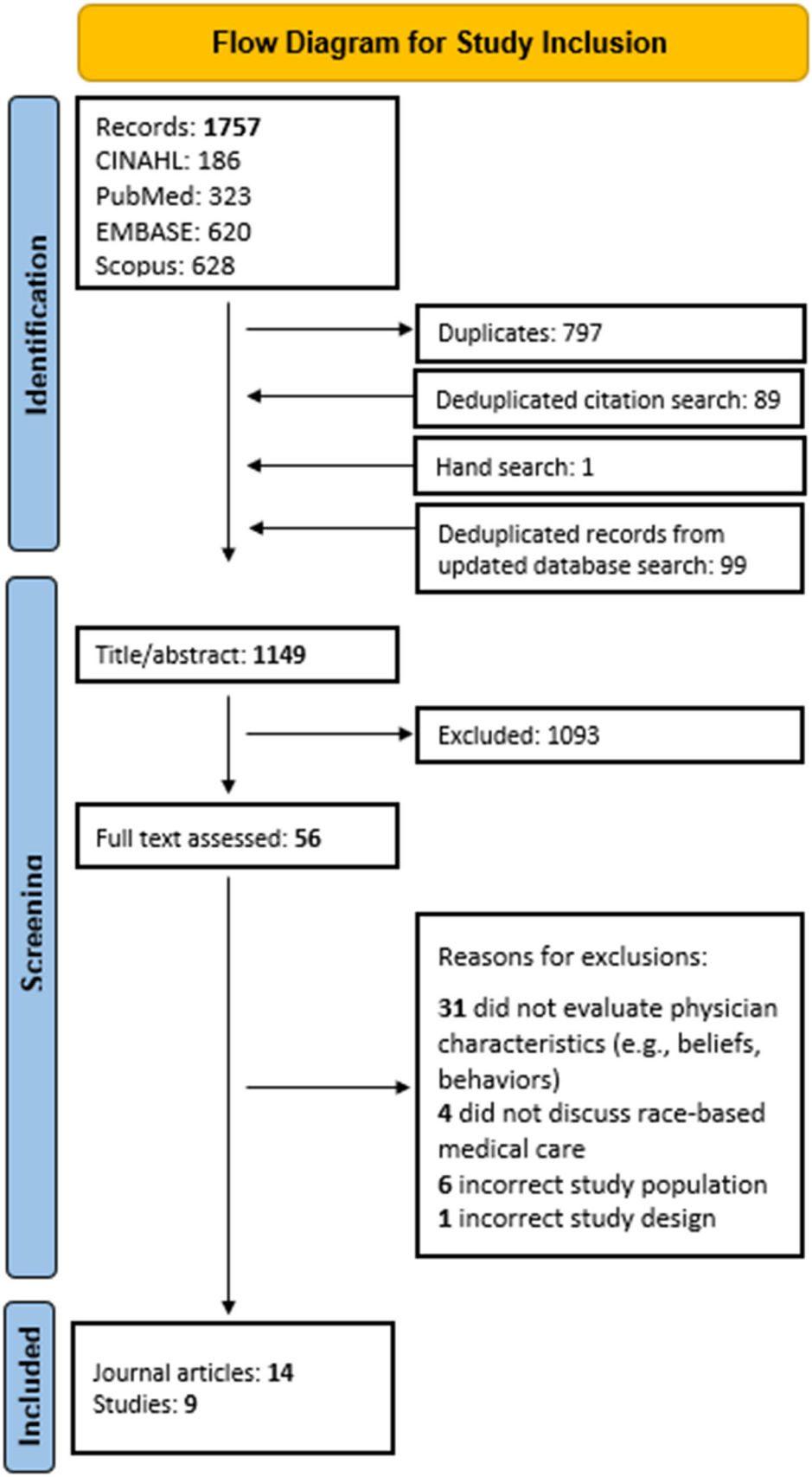

Figure 1 Flow diagram for study inclusion.

Table 3 Characteristics of Included Studies

Study[a]	Author	Year	Aim	Design	Population, N
1	Hunt, Truesdell, Kriener[17]	2013	Examine how primary care providers perceive race and interpret racial health disparities.	In depth-interviews	Physicians, 51 Physician assistants, 2 Nurse practitioners, 5
2	Bell et al.[18]	2019	Explore how providers and patients at an obesity and diabetes clinic interpret the value of race in clinical care.	Focus groups	Physicians, 6 Other providers, 13[b]
3	*Bonham, Sellers, Woolford*[19]	2009	*Describe physicians' perceptions on the clinical utility of race.*	*Focus groups*	*Internists, 90*
	Frank et al.[20]	2010	*Describe race-based medical practice as it relates to the prescribing of ACEI and BiDil for patients.*		
	Snipes et al.[22]	2011	*Describe the importance of patient race in medical decision-making by Black and White physicians.*		
4	Callier et al.[21]	2019	Explore cardiologists' perspectives on the benefits and harms of race-based drug labels.	Semi-structured interview	Cardiologists, 81
5	*Sellers, Cunningham, Bonham*[6]	2019	*Evaluate the association between knowledge of genetics, racial beliefs, and race-based clinical care.*	*Cross-sectional*	*Internists, 787*
	Bonham et al.[25]	2017	*Evaluate the association between comfort with (and method of) collecting race and race-based medical practice.*		
	Cunningham et al.[26]	2014	*Evaluate the association between anxiety due to uncertainty and race-based clinical practice.*		
	Abdallah et al.[27]	2019	*Evaluate the association between clinician type (i.e., nurse practitioner v internist) and race-based medical practice.*		*Internists, 759*[c] *Nurse practitioners, 178*
7	Warshauer-Baker et al.[23]	2008	Measure the association between physicians' beliefs in genetics as the source of racial/sex differences in health outcomes and the importance of race/sex in clinical decision-making.	Cross-sectional	Family physicians, 1035
8	Maglo et al.[24]	2014	Evaluation of factors (1) influencing physicians' decision to prescribe BiDil and (2) determine whether the controversy surrounding BiDil is associated with physicians' use of race when prescribing BiDil.	Randomized controlled trial	Internists, 70
9	Okah et al.[28]	2021	Evaluate the association between colorblind racial beliefs and the use of race in clinical care.	Cross-sectional	Family physicians, 239
10	Peterson et al.[29]	2014	Evaluate how physicians perceive and rate barriers to personalized medicine.	Cross-sectional	Physicians, 91

[a]*Papers written using the same study data were grouped together and italicized*
[b]*Nurses or nurse practitioners (3); medical assistants (3); physician assistants (3); behaviorists, exercise specialists, dieticians (4)*
[c]*The 759 internists were derived from the 787 internists in the larger study*
ACEI angiotensin-converting enzyme inhibitors, BiDil isosorbide dinitrate and hydralazine HCL

selected pharmacogenetic and physiological differences to explain racial differences in BiDil efficacy.

Theme 2: Race Used to Contextualize Patients' Health

Physicians used racial narratives to explain the poor health of racial minorities. Physicians associated race with culture,[17–19,22] health behaviors,[17,18,22] socioeconomic factors,[17,19,22] and exposure to racism.[17,19] Culture and socioeconomic status were viewed as contributing to health behaviors that resulted in poor health outcomes.[17] Physicians related exposure to racism with distrust of the healthcare system[17] and both were used to explain patient behaviors. Nevertheless, a survey study[23] of family medicine physicians found no association between the extent to which physicians believed environmental factors contributed to racial differences in health outcomes and the value of race in patient care.

Theme 3: Race Used in Providing Medical Counseling and Determining Care

Physicians used race in patient counseling[17–20,22] and to assess disease risk[17,18,22] and management.[17–22] The diseases physicians described as having racialized risk were hypertension,[17,22] diabetes,[17,18,22] renal disease,[22] prostate cancer,[17] Tay-Sachs,[17] and cystic fibrosis.[17]

Only one quantitative study provided insight into the extent to which physicians used race to manage disease. In this study, [24] physicians scored an average of 70 on a 100-point Likert scale (0=not at all; 100=very much) in response to the question "How comfortable are you taking race into account when treating patients with congestive heart failure?" While two survey studies[6,25–28] evaluated the general use of race in disease management, neither reported specific clinical practices in which clinicians engaged nor described criteria to determine high or low level of race-based practice.

Table 4 Codes, Themes, and Example Quotes from Qualitative Studies

Codes	Quote
Theme 1: Physicians' conceptualizations of race as biological	
Strictly social construct[17,19,21]	"Race is a social construct. It's useful. It's very useful, given the historic context; I would not let anybody not refer to me as a black woman. However, I actually do believe that there's no biological basis for that…." [19]
Biological components[17–21]	"Asked if racial identity was the same as genetic risk, most clinicians (68 percent, 13/19) said they were essentially the same, and in providing specific examples of genetically based disease risk, they invariably identified racial/ethnic minorities—African Americans, Hispanics/Latinos, and Native Americans. There was no distinction in this view by training: Physicians, nurse practitioners, and medical assistants alike spoke of race in terms that intermingled genetics and behavior." [18]
Theme 2: Race used to contextualize patient's health	
Socioeconomic factors[17,19,22]	"I'd want to know the race so you would have an idea of how they grew up. I mean what their diet was, what their socioeconomic and the milieu was as they were growing up."[22]
Culture[17–19,22] and health behaviors[17,18,22]	"Many (76%, 44/58) said that certain groups hold attitudes and beliefs that drive behavioral choices that negatively impact their health"[17]
Exposure to racism[17,19]	"A few (12%, 7/58) said racism may cause long-term stress that can result in illness, noting that the pressure and anxiety of living as a minority person in poverty in the United States can have physical effects."[17]
Theme 3: Race used in disease management	
Counseling[17–20,22]	"These discussions involved using race to inform decisions regarding test-ordering and as a motivational communication tool to encourage patient adherence to screening recommendations."[19]
Assess disease risk[17,18,22] and management[17–22]	"I think it's very significant to know what her race is because it will make some decisions... about what paths I'm going to use to treat her..." and "I mean [race] is important to choosing the medication."[22]
Theme 4: Justifications of race-based medical care	
Medical literature[17,18,20,21]	"Nearly half (48%, 28/58) mentioned clinical research or medical science as the basis for this conviction. They often prefaced their assertions about racial differences with phrases like 'The literature tells us… .' 'Research shows… .' or 'Medical science has found… .' Many also said race had been emphasized in their medical education, saying things like 'We've always been taught… .' or 'You hear a lot about it in school… .'"[17]
Personal clinical experience[17,20]	"I'm sure all of us see it. Whites will respond much quicker to ace-I at lower doses than black patients will."[20]
Address racial disparities[21]	"Such respondents believed that the A-HeFT clinical trial provided evidence that BiDil provides a mortality benefit to black patients with heart failure. Some of these participants contended that most clinical trials involve white, male, patient groups, and that the A-Heft study presented an important opportunity to address the needs of black patients who, they emphasized, suffer immense health disparities in health outcomes. Capturing this sentiment, one cardiologist explained: 'A lot of the studies, at least the older studies, really haven't addressed the race issues in terms of differences in morbidity and mortality in terms of the disease state, so I think that we have a lot to learn about it. This was one of the earlier studies that seemed to indicate that there was an advantage in blacks so I don't have a problem with it.'" [21]
Provide personalized care[19–21]	"How can you not tailor a particular drug to a particular population when it gives you superior outcomes? Especially when you are looking at a particular population or if it's directed towards a specific disease that wrecks *[sic]* havoc. I think it is hypocritical not to bring a drug to market if it's going to address a need that has very specific outcomes"[20]
Encourage patient compliance[20]	"It would improve compliance in [a] black patient. They're going to take it because they've somehow perceived that it's for them more so than it would be for the general population."[20]
Theme 5: Concerns with race-based medical care	
Failed to adequately characterize patients[17,19–21]	"Numerous participants felt that cardiologists risk making an inaccurate determination about the best course of treatment for a patient based on the 'blanket designation' of race. Participants provided a number of reasons as to why this is problematic. As one cardiologist stated, '[i]t's one's experience and social position, for instance, rather than genes that can cause a person to identify as African American.' Another participant reflected on the fact that a patient may be '20 percent African and 80 percent Irish.' Along the same vein, a cardiologist expressed the belief that there is not 'just one racial type and that's the problem. There's a lot of mixing.' " [21]
Normalizes the poor health of racial minorities[17,20]	"I have patients who come to me and tell me [their previous doctor] took no concern about their health. And when I go back and review their old records, it appears that if the doctor had treated them more aggressively they could have prevented them going into renal failure… . Maybe those doctors say, "You black people end up in renal failure anyway.""[17]
Patient distrust[19,21,22]	"Finally, some cardiologists feared that race-based drug labels could agitate patients or cause anxiety among providers. A patient may feel, for instance, that he or she is not getting the best possible medical care because of the provider's focus on race."[21]
Clinician discomfort[19,21,22]	"Notable issues from the discussions surrounding the complexity of race were the discomfort physicians have while discussing race with their patients."[19]
Legitimizes biological race[20]	"Many discussed the idea of a "slippery slope" with race-based medicine giving legitimacy to the notion of distinct genetic differences between racial groups."[20]

Theme 4: Justifications for Race-Based Medical Care

Physicians' justifications for race-based clinical care were as follows: support in medical literature;[17,18,20,21] personal clinical experience;[17,20] desire to address racial disparities;[21] allows for personalized care;[19–21] and belief that race-based care encouraged patient compliance.[20] A few studies[17,19,22] provided examples of physicians speaking of biological differences between racial groups as uncontested medical facts without specifically attributing this knowledge to medical literature. One physician[19] stated, "*We clearly know* that biologically there are different chemicals and different functional processes going on in African-Americans" to explain why race was important.

Quantitative studies provided support for these findings. In a survey study on personalized medicine,[29] physicians had a median score of 7 on a 10-point Likert scale (1=strongly disagree; 10=strongly agree) in response to the statement, "I believe the delivery of personalized medicine requires consideration of a patient's racial background." In the BiDil study,[24] 34% (17/50) of physicians believed that BiDil reduced health disparities in cardiovascular disease.

Theme 5: Concerns About Race-Based Medical Care

Physicians articulated several concerns regarding race-based medicine. They believed race failed to categorize patients adequately;[17,19–21] normalized the poor health of racial minorities;[17,20] caused patient distrust;[19,21,22] created physician discomfort;[19,21,22] and legitimized the concept of biological race.[20] However, even when arguing against race-based clinical care, some physicians used the language of racial heritability.[20,21] For example, some physicians argued that race was a poorly defined construct due to genetic mixing between racial groups. No quantitative studies evaluated concerns regarding race-based care.

Quantitative Findings: Physician Factors Associated with Race-Based Care

Studies found the following demographic characteristics to be positively associated with the support of (or engagement in) race-based clinical care: older age;[6,25,28] female (v male) gender;[23] racial/ethnic minority (v non-Hispanic White) identity;[25] foreign-born (v US-born).[6]

Training characteristics positively associated with race-based practice were lack of fellowship training (v fellowship-trained);[26] general internal medicine (v other specialty);[6] osteopathic (v allopathic) medical education;[6] and international (v US) medical training.[26]

Practice characteristics positively associated with support of (or engagement in) race-based practice were greater[23] and fewer[25] years in clinical practice; percent time seeing patients;[25] percent racially/ethnically minoritized patients;[6,25,26] innovative practice style (v non-innovative style);[23] use of direct questioning (v perception) to collect patient race;[25] practice location in an area with poverty rates greater than 10% (v ≤ 10%);[23] urban (v non-urban) practice location;[23] rural (v urban) practice location.[28]

The following attitudes and beliefs were positively associated with support of race-based clinical care: greater comfort collecting race and ethnicity;[25] belief in race as a biological trait;[6,26] belief that race is clinically relevant;[6] belief that genetics has relevance in clinical practice;[6] anxiety due to uncertainty;[26] and colorblind racial beliefs.[28] Notably, belief in genetic difference as the source of racial health disparities was not associated with belief in the importance of race in clinical decision-making.[23]

DISCUSSION

We found that physicians believed race had biological components and used race to contextualize patients' health conditions and guide disease management. Some physicians perceived race-based care as evidence-based, personalized care providing superior outcomes for patients. Others distrusted race as a measure that could appropriately capture genetic differences between individuals and questioned the validity of race-based study findings. In quantitative studies, age was the only characteristic consistently shown to be positively associated with the use of race in clinical care.

We found evidence that clinicians used race-specific study findings to justify their engagement in race-based clinical care and their belief in biological race. No study has evaluated whether physicians' perceptions of race are shaped by medical literature or how their racial beliefs evolve through medical training and practice. We posit that the way race is employed in medical research,[30] education, [31] and training may encourage physicians to perceive race as a biological trait. Furthermore, several studies in our review found a positive relationship between age, practice duration, percent time spent seeing patients, and race-based care. While these associations must be interpreted cautiously given the small number of underlying studies, they collectively suggest that, in addition to generational differences in perceptions of race, increased immersion in the medical field may affect how physicians perceive race, possibly through increased exposure to medical literature providing evidence of racial difference. It is important to note that the relationship between practice duration and race-based practice was negative in the Bonham et al. analysis, emphasizing the need for additional studies in this area.

Reliance on medical literature may also explain why physicians who scored higher on anxiety due to uncertainty and practice innovation were more likely to use race in clinical care and found race clinically relevant, respectively, than less anxious and innovative physicians. Of note, in a German study evaluating how general practitioners managed anxiety due to

uncertainty, the focus group assessing the study measure suggested guideline use as a way to cope.[32] However, guideline use was not included in the final measure due to a lack of correlation with the first two themes elicited in the scale. To our knowledge, no study has evaluated the relationship between anxiety due to uncertainty and guideline use.

Irrespective of the motivation for guideline use, engagement with guidelines may still be moderated by trust in the underlying medical research used in its construction. In medical research, race is not exclusively a marker of biological difference. Researchers often do not state the relevance of race to the research question[30] nor explain whether race represents biological or environmental factors. Support of race-based clinical practice necessitates approval of how race is measured, utilized, and interpreted in research from which the practice is derived. Indeed, we found several instances where physicians disapproved of race-based practice due to concern about the validity and interpretability of race-specific outcomes. As such, conversations regarding the relevance of race in clinical care may be conversations about the appropriateness of race as a variable in medical research.

While there are biological consequences of being a minoritized race,[33] there are no inherent biological differences between individuals belonging to different racial groups.[1] The belief that race is inherently biological lends itself to the opinion that race is a quantifiable and reliable measure. Nevertheless, we found that physicians also associated race with patients' values regarding health. Therefore, it is also possible that the belief in race as a social factor representing shared cultural values is positively associated with the race-based care, albeit in ways that likely differ from practice patterns associated with the belief in race as primarily biological. To our knowledge, no study has evaluated the relationship between the belief in race as a cultural trait and the use of race in clinical care.

Strengths and Limitations

There were several strengths of this study. First, this is the first systematic review to evaluate how physicians conceptualize race and physician factors associated with race-based practice. Second, a mixed-methods approach allowed for greater depth in study findings. Finally, the use of Google Scholar to conduct citation searching on all studies included from the primary database search increased the comprehensiveness of the search and allowed for the inclusion of relevant anthropological studies that may have otherwise been missed.

There were several limitations of this review. First, most studies were conducted at least 5 years ago and, given the recent movements away from race-based care,[34–36] physicians' racial beliefs may have evolved since these studies were conducted. Second, while qualitative data is rich and robust, data from qualitative studies were limited by the original study authors' interpretations and selection of exemplary quotes. Ideas not explored by study authors or excluded quotes may have affected our ability to derive a comprehensive set of themes. However, while there may be additional explanations regarding how and why physicians use race in care, the absence of these explanations does not invalidate the themes elucidated thus far. Third, quantitative studies were cross-sectional, so only associations could be explored. Fourth, there were a small number of quantitative studies, with findings often explored in only one analysis and occasionally contradictory. Fifth, survey studies had low response rates and, therefore, findings may not fully reflect beliefs or practices of US physicians. However, conversations regarding race can be contentious and provider unwillingness to engage in these conversations should not deter researchers from reporting their findings. Finally, survey studies also likely suffered from selection and response bias. However, there is no evidence to suggest that younger physicians are more likely to underreport their use of race-based care than older physicians or that younger physicians and older physicians with high and low, respectively, use of race in clinical care were less likely to participate in the study. Therefore, the positive association between age and race-based practice can be considered valid.

CONCLUSION

Physicians had varying perceptions of race, but most believed race had biological components. Moreover, age was associated with race-based clinical practice, which could result from repeated exposure to racialized care in medical literature in addition to generational changes in how physicians perceive race. No studies have evaluated the association between reliance on medical guidelines and using race to guide clinical care. Furthermore, nothing is known regarding how physicians' racial beliefs evolve during training and practice. Additional research on the evolution of physicians' racial beliefs, and the role of medical literature in shaping these beliefs, is needed.

Given the extent to which race is embedded in medical infrastructure, moving towards a unified view of race as a sociopolitical construct that does not adequately capture human genetic diversity[34,35,37] requires system-wide efforts challenging how race is studied, taught, and utilized in medical research, education, and care.[38] To this point, several journals[39–41] have developed guidelines regarding how authors can describe race in their research, which may have the beneficial effect of reorienting clinicians from viewing race as a proxy for biological or cultural difference and encourage consideration of the structural factors[42] that contribute to racial differences in health. Greater scrutiny[31,43] of how medical trainees are taught race is also needed. Medical students should be taught the history of race in medicine and the association between race and other social determinants of health, and discouraged from using race as a genetic proxy for disease risk. We should continue removing race from medical equations[44] and guidelines, where appropriate, and reorient our understanding of race to account for the impact of

racism on health when needed. Reframing race requires both inclusion of language relating genetic ancestry[45] to disease risk and considering the ways in which structural factors[9,42,46] correlate with race and, thus, disease. Finally, more work is needed to explore the factors for which race serves as proxy and the mechanisms through which racism[47] affects biology and, thus, health.

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