

Patient reactions to personalized medicine vignettes: An experimental design

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Purpose: Translational investigation on personalized medicine is in its infancy. Exploratory studies reveal attitudinal barriers to “race-based medicine” and cautious optimism regarding genetically personalized medicine. This study describes patient responses to hypothetical conventional, race-based, or genetically personalized medicine prescriptions. **Methods:** Three hundred eighty-seven participants (mean age = 47 years; 46% white) recruited from a Baltimore outpatient center were randomized to this vignette-based experimental study. They were asked to imagine a doctor diagnosing a condition and prescribing them one of three medications. The outcomes are emotional response to vignette, belief in vignette medication efficacy, experience of respect, trust in the vignette physician, and adherence intention. **Results:** Race-based medicine vignettes were appraised more negatively than conventional vignettes across the board (Cohen’s $d = -0.51$ – -0.57 , $P < 0.001$). Participants rated genetically personalized comparably with conventional medicine (-0.14 – -0.15 , $P = 0.47$), with the exception of reduced adherence intention to genetically personalized medicine (Cohen’s $d = -0.38$ – -0.41 , $P = 0.009$). This relative reluctance to take genetically personalized medicine was pronounced for racial minorities (Cohen’s $d = -0.38$ – -0.31 , $P = 0.02$) and was related to trust in the vignette physician (change in $R^2 = 0.23$, $P < 0.001$). **Conclusions:** This study demonstrates a relative reluctance to embrace personalized medicine technology, especially among racial minorities, and highlights enhancement of adherence through improved doctor-patient relationships. *Genet Med* 2011;13(5):421–428.

Key Words: doctor-patient relationship, clinical vignette, genetics, race and ethnicity, personalized medicine

Research on human genetic variation has implications for medication development. As the patterns and meaning of this variation are further illuminated, there is the potential for better-tailored treatments that minimize adverse events and maximize efficacy for an individual or group. Medications intended for a specific racial group have been approved or investigated in cardiology, oncology, neurology, and other areas of medicine.¹ As technology improves, the medical advance-

ments toward further personalized medicine are expected by some to be swift. However, as the promises of personalized medicines are many, research is also needed to understand behavioral reactions to personalized treatment options and develop approaches that facilitate the appropriate use of these technologies.

There has been exploratory investigation into patients’ receptivity to personalized medicine approaches.^{2–6} Focus group studies indicate a suspicion of race-based therapeutics, with the meaning of this approach differing for those in the racial majority versus minority.^{3,4} For example, one study (number of focus groups = 25; number of survey participants = 224) found high levels of public suspicion of race-based medicine, which varied by respondent race. Approximately 40%, 60%, and 90% of white, African American, and multiracial participants, respectively, reported “very suspicious” or “moderately suspicious” attitudes regarding the safety and effectiveness of a drug designed for African Americans only.³

Regarding genetically personalized medicine (GPM), participants generally express openness to DNA-based tailoring options that are expected to reduce side effects and increase efficacy. However, concerns include privacy, the potential for discrimination, and cost.^{4–6} Trust is often mentioned as a crucial dimension to the acceptance of unfamiliar tailoring approaches.^{3,4}

Trust is an essential concept in medicine that stems from the vulnerability inherent in needing guidance from a physician to treat an illness.⁷ Trust can be defined as an “optimistic acceptance of a vulnerable situation in which the truster believes the trustee will care for the truster’s interests.”⁸ Trust is associated with many important health outcomes, including adherence.^{9,10} Physicians’ communication and behavior impact patients’ trust (e.g., elicitation of patient’s illness experience is associated with increased trust).^{11,12} In addition, there is some evidence that trust is lower among racial minorities,¹³ although the demographic composition (e.g., degree to which race and socioeconomic status are associated in the study sample) and specific context (e.g., history of race relations in a certain region) of a study setting can affect this relationship.¹⁴ Respect is a conceptually related, yet distinct, construct that refers to the recognition of the unconditional value of patients as persons and itself is independently associated with adherence.¹⁵

The theoretical framework for this study was informed by the model of relationship-centered care¹⁶ and the risk information seeking and processing theory.¹⁷ Relationship quality as a modifying factor in personalized medicine acceptance was a theme found in exploratory studies on the topic.^{3,4} This caused us to consider theories that reflect the moral dimensions and interpersonal influence in doctor-patient relationships. The model of relationship-centered care is one such model and emphasizes the personhood of both patient and physician.¹⁶ The perceived acknowledgment of this personhood may be diminished or illuminated with group or DNA-based tailoring approaches; perceived respect from the vignette physician was included in

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the measurements to capture this variation. The risk information seeking and processing theory further describes factors that influence the extent to which patients rely on physician advice in decision making.¹⁷ Along with the model of relationship-centered care, this theory further underscored the role for trust and also lead to the inclusion of belief in medication efficacy and intention to adhere.

With this theoretical underpinning as background, the broad objective of this study was to assess the association of conventional, race-based, or GPM approaches on participant's responses regarding emotion, belief in medication efficacy, respect, trust, and adherence intention. We hypothesized that participants would have the most negative ratings of race-based medicine vignettes and the most positive ratings of conventional medicine vignettes. We also hypothesized that minorities would have more negative ratings of the race-based medicine vignettes based on the qualitative finding on this topic. Current and historical inequities were listed among reasons for more negative appraisals among minorities in the qualitative literature. This is among the first quantitative investigations on this topic to our knowledge.

MATERIALS AND METHODS

Study population and randomization

Participants were recruited in Baltimore, MD, from the general internal medicine clinic waiting room and laboratory testing waiting room at the Johns Hopkins Outpatient Center ($n = 387$). Patients and visitors in these settings were approached about participating in this study during May to August 2009. The exclusion criteria were age <18 years and inability to understand English. The age cutoff was established to target those whose health care management is primarily their own responsibility. Interested and eligible participants were given an information sheet, underwent a verbal consent process, took a brief literacy screen, and were given a survey. Those participants identified by the literacy screen as reading at ≤ 6 th grade level had the researcher administer the survey to them. In addition, participants with adequate literacy were given the same offer to accommodate preferences and visual/medical abilities.

The surveys were randomized using a random number generator to contain one of three vignettes portraying the prescription of a conventional, race-based, or genetically personalized medication. In these vignettes, participants were asked to imagine themselves going to a courteous doctor they had seen before, being diagnosed with a common but serious condition, given lifestyle recommendations, and being prescribed one of three different medications. The only difference among the vignettes was the type of medication prescribed. Additionally, the specification of a courteous and familiar doctor was made to cast him/her in favorable light without indicating he/she was extraordinary. The full-length version of the vignettes can be found in the Appendix. The vignette version of the survey was concealed from the recruiter to avoid subtle bias in subject selection or administration. However, when surveys were read aloud to participants, concealment was not possible. The Institutional Review Boards of the National Human Genome Research Institute and the Johns Hopkins Bloomberg School of Public Health approved this study.

Study measures

Vignette version was the primary independent variable. Demographic information and five other measures were included as independent variables. The initial literacy screen was conducted using the eight-item version of the rapid estimate of

adult literacy in genetics.¹⁸ The three measures comprising the constellation of background trust (specifically, Trust in the Medical Profession Scale¹⁹ and the Medical Mistrust Index²⁰) and experience with discrimination²¹ variables were selected for content relevancy and strong psychometrics. One item was also added to document the participant's ability to imagine themselves in the vignette.

Outcome variables included emotional response, belief in medication efficacy, perceived respect, trust in the vignette physician, and adherence intention. A previously validated 7-point scale of emotional response²² was modified for use in this study by the inclusion of the emotion "anger."

Perceptions of respect from the vignette physician were assessed using a previously reported single-item measure with a 3-point response option.^{15,23} This measure asks whether participants believed the vignette physician treated them with a great deal of respect and dignity.

Participants reported their level of trust in the physician portrayed in the vignette using the 11-item Trust-in-Physician Scale,²⁴ with slight wording modifications to specify the vignette physician as the physician in question. This modified scale has previously been used with vignettes.²⁵

Belief in vignette medication efficacy (i.e., one's belief that the medication would work for them, be safe, and free from side effects; comprised three items) and adherence intention (one item) were assessed by asking participants to select their level of agreement on 5-point Likert-scaled items to statements such as "This medicine will be effective in controlling my condition" and "I would be willing to take this medication everyday as treatment for my condition."

Statistical analysis

With 387 participants, this study had 0.82 power to detect a small to medium effect size of the randomized intervention ($P = 0.05$, two sided), with all covariates expected to account for 10% of the total variance in the outcome. Covariates were included based on theoretical and empirical evidence for their association to relationships of interest. Analysis of covariance and χ^2 tests confirmed that the baseline adjustment between treatment groups on demographic characteristics was unnecessary. The primary analyses regarding adherence and trust were conducted using multivariate general linear models. Secondary analyses, which stratified based on patient race, were also conducted using multivariate general linear models. Adjusted analyses were performed by initially including covariates that were associated at $P < 0.10$ levels with the dependent variable of interest. Variables with theoretical support and statistical significance of $P < 0.05$ were included in the final model. Cohen's d is used to show effect size. Analyses were performed using SPSS 16.0.1 (SPSS Inc., Chicago, IL).

RESULTS

Study participants

A total of 674 people were approached for participation in the study. Of these, 387 (57%) agreed to enroll and completed the survey. Participants were randomly assigned to the three study arms. Participant characteristics are listed in Table 1. Of the 387 participants used in analysis, 67% were women. Forty-six percent were white, 47% were black, and the remainder reported a variety of races. The mean age was 47 years, range 18–82 years. There were no statistically significant differences in the demographic composition of the randomization groups, no deviations from protocol, and no adverse events.

Table 1 Participant characteristics

Demographic characteristics	Total (N = 387, %)	Randomization group		
		Conventional (N = 138, %)	Race-based % (N = 123, %)	GPM (N = 126, %)
Gender				
Female	260 (67.2)	92 (66.7)	88 (71.5)	80 (63.5)
Age				
Mean (yr)	47	45	50	47
Race				
American Indian	2 (0.6)	2 (1.5)	0 (0)	0 (0)
Asian	13 (3.4)	3 (2.2)	5 (4.1)	5 (4.0)
Black	183 (47.3)	63 (45.7)	52 (42.3)	68 (54.0)
White	176 (45.5)	62 (44.9)	63 (51.2)	51 (40.5)
Biracial	12 (3.1)	7 (5.1)	3 (2.4)	2 (1.6)
Ethnicity				
Not Hispanic/Latino	374 (96.6)	133 (96.4)	118 (95.9)	123 (97.6)
Hispanic/Latino	13 (3.4)	5 (3.6)	5 (4.1)	3 (2.4)
Literacy				
Less than 6th grade level	50 (13.0)	16 (11.6)	14 (11.4)	20 (15.8)
Admin				
Researcher administered	62 (16.0)	20 (14.5)	19 (15.4)	23 (18.3)
Highest level of education				
Some high school	48 (12.4)	19 (13.8)	12 (9.8)	17 (13.5)
High school graduate	83 (21.4)	27 (19.6)	24 (19.5)	32 (25.4)
Some college	91 (23.5)	32 (23.2)	33 (26.8)	26 (20.6)
Completed college	87 (22.5)	26 (18.8)	28 (22.8)	33 (26.2)
Graduate school	77 (19.9)	31 (22.5)	27 (21.9)	19 (15.0)
Income				
Below \$30,000	154 (39.8)	57 (41.3)	45 (36.6)	52 (41.3)
\$30,000–\$50,000	68 (17.5)	28 (20.3)	21 (17.1)	19 (15.1)
\$50,000–\$70,000	44 (11.4)	17 (12.3)	12 (9.8)	15 (11.9)
Above \$70,000	121 (31.3)	37 (26.8)	45 (36.6)	39 (31.0)
Health status				
Excellent	34 (8.8)	14 (10.1)	7 (5.7)	13 (10.3)
Very good	123 (31.8)	48 (34.8)	37 (30.1)	38 (30.2)
Good	110 (28.4)	35 (25.4)	39 (31.7)	36 (28.6)
Fair	98 (25.3)	33 (23.9)	31 (25.2)	34 (27.0)
Poor	22 (5.7)	9 (6.5)	8 (6.5)	5 (4.0)
Chronic disease				
Yes	205 (53.0)	62 (44.9)	73 (59.3)	70 (55.6)
No	172 (44.4)	75 (54.4)	46 (37.4)	51 (40.5)
Unsure	9 (2.3)	1 (0.7)	4 (3.3)	4 (3.2)

(Continued)

Table 1 Continued

Demographic characteristics	Total (<i>N</i> = 387, %)	Randomization group		
		Conventional (<i>N</i> = 138, %)	Race-based % (<i>N</i> = 123, %)	GPM (<i>N</i> = 126, %)
Discrimination				
Experienced > monthly	102 (26.3)	43 (31.2)	30 (24.4)	29 (23.0)
Trust in med. profession				
Mean score	11.0	10.6	11.2	11.2
Trust in med. system				
Mean score	8.8	8.9	8.7	8.8

GPM, genetically personalized medicine vignette.

Vignette ratings: Emotion, belief in medication efficacy, respect, trust, and adherence intention

As presented in Table 2, conventional medicine vignettes were rated more positively than race-based vignettes on every measure (effect size range, Cohen's $d = -0.37$ to -0.61). GPM vignettes were rated comparably with the conventional medicine vignette for all outcomes except one. The only statistically significant contrasts for GPM relative to conventional medicine vignettes was a lower rating for adherence intention (Cohen's $d = -0.38$ to -0.41 , $P = 0.009$).

Racial differences in outcomes

Analyses of vignette ratings were done for all participants. Differences in vignette ratings by patient race are presented in Table 3. There are several notable associations when comparing racial minorities with nonminorities: overall, racial minorities

had greater trust in the vignette physician (Cohen's $d = 0.16$, $P = 0.03$); racial minorities had a more negative emotional response to the GPM vignette (Cohen's $d = -0.43$, $P = 0.004$); and racial minorities reported lower adherence intentions in response to the GPM vignette (Cohen's $d = -0.38$, $P = 0.02$).

The role of trust in adherence

Given the centrality of behavior and trust in the conception of this study, investigating the relationship between trust in the vignette physician and adherence intention was part of the planned analyses for all participants. The effect of trust on behavioral intention is demonstrated through the changing value of R^2 in multiple linear regression when "Trust in the Vignette Physician" is added to a model of "Adherence Intention." As shown in Figure 1, R^2 increased by 0.25 ($P < 0.001$) when trust

Table 2 Evaluation of vignettes by randomization group

Outcome	Survey version	<i>N</i>	Mean	Effect size, <i>d</i> , with 95% CI ^a	<i>P</i>
Emotional response	Conventional	134	34.80	—	—
	Race based	120	30.13	-0.46 – 0.50 – 0.54	<0.001 ^b
	Genetic	124	34.47	-0.03 – 0.04 – 0.05	0.96
Belief in medication efficacy	Conventional	135	7.52	—	—
	Race based	121	6.13	-0.57 – 0.61 – 0.68	<0.001 ^b
	Genetic	124	6.88	-0.26 – 0.30 – 0.33	0.08
Perceived respect	Conventional	120	1.78	—	—
	Race based	101	1.45	-0.60 – 0.53 – 0.47	<0.001 ^b
	Genetic	106	1.74	-0.10 – 0.08 – 0.06	0.40
Trust in the vignette physician	Conventional	133	25.85	—	—
	Race based	119	23.21	-0.32 – 0.37 – 0.41	0.01 ^b
	Genetic	123	25.11	-0.10 – 0.11 – 0.12	0.71
Adherence intention	Conventional	134	2.93	—	—
	Race based	119	2.38	-0.51 – 0.55 – 0.60	<0.001 ^b
	Genetic	121	2.53	-0.38 – 0.41 – 0.44	0.009 ^b

^aThe conventional medicine vignette group was used as the references group in calculating Cohen's d .

^bStatistically significant at $P < 0.02$.

Table 3 Racial differences in ratings by randomization group^a

Outcome	Vignette version	Racial minority	Nonminority	Effect size, <i>d</i> , with 95% CI ^b	<i>P</i>
Emotional response	Conventional	34.69	35.61	-0.08 ^{-0.11} _{-0.14}	0.35
	Race based	29.66	29.66	-0.06 ^{0.00} _{0.06}	1.00
	Genetic	32.95	36.12	-0.31 ^{-0.37} _{-0.43}	0.004 ^c
	Total	32.75	33.57	-0.07 ^{-0.09} _{-0.11}	0.22
Belief in medication efficacy	Conventional	7.24	7.63	-0.18 ^{-0.21} _{-0.24}	0.09
	Race based	5.89	6.30	-0.15 ^{-0.16} _{-0.17}	0.21
	Genetic	6.87	6.83	0.00 ^{0.02} _{0.04}	0.89
	Total	6.75	6.91	-0.07 ^{-0.07} _{-0.07}	0.34
Perceived Respect	Conventional	1.78	1.80	-0.02 ^{-0.04} _{0.06}	0.75
	Race based	1.38	1.49	-0.12 ^{-0.15} _{-0.17}	0.31
	Genetic	1.69	1.81	-0.16 ^{-0.24} _{-0.32}	0.09
	Total	1.64	1.69	-0.07 ^{-0.08} _{-0.10}	0.29
Trust in vignette physician	Conventional	26.06	25.12	0.12 ^{0.15} _{0.18}	0.18
	Race based	23.98	22.13	0.21 ^{0.23} _{0.25}	0.08
	Genetic	24.90	24.93	-0.07 ^{0.00} _{0.06}	0.97
	Total	25.10	23.97	0.16 ^{0.16} _{0.16}	0.03 ^c
Adherence intention	Conventional	2.96	2.88	0.06 ^{0.09} _{0.13}	0.45
	Race based	2.43	2.32	0.08 ^{0.10} _{0.12}	0.45
	Genetic	2.39	2.71	-0.25 ^{-0.31} _{-0.38}	0.02 ^c
	Total	2.62	2.63	-0.03 ^{-0.01} _{0.01}	0.89

^aAll analyses are adjusted for method of administration, literacy, education, income, experience with discrimination, trust in the medical profession, trust in the medical system, and ability to imagine oneself in the vignette.

^bThe nonminority group was used as the references group in calculating Cohen's *d*.

^cStatistically significant, *P* < 0.05.

was added to the model of adherence intention for all vignettes. An inverse relationship exists, such that trust in the vignette physician has the strongest association with adherence intention (change in $R^2 = 0.31$, $P < 0.001$) for the race-based vignette, which has the more negative ratings than either of the other vignettes, across the board (as presented in Table 2).

DISCUSSION

Synopsis

The results from this study indicate that participants' rated race-based medicine vignettes less positively and rated GPM vignettes comparably with conventional medicine vignettes. Although race-based vignettes were rated lower compared with conventional vignettes on every measure ($P < 0.02$), only the contrast on adherence intention reached statistical significance for GPM. The relative reluctance to adhere to GPM prescriptions was especially pronounced for minority participants. Furthermore, for all participants, trust was strongly associated with adherence in this study, and the relationship between trust and adherence was strongest with the most negatively rated vignettes.

Possible explanations and comparison with literature

Race-based findings

Participants responding to a hypothetical offer of race-based medicine reported statistically significantly more negative emotion, less belief that the medicine would work, lower perceptions of respect from the vignette doctor, and less willingness to take the medication, compared with participants responding to the conventional medicine vignette. Using the historically charged construct of race to personalize medicine may be associated with lower reported levels of perceived respect because it may appear to the patient to be a prescription decision that fails to capture their personhood. It is unknown whether using other variables to personalize medicine, such as ethnicity, would elicit this same response, or whether this report of lower respect is specific to the use of race. Additionally, and in distinct contrast to some predictions from a recent focus group study of primary care physicians,¹ the majority of participants in this study were not additionally motivated by race-based tailoring to adhere to their medication. In fact, they were less likely to intend to adhere.

Generally, the findings from this study are in agreement with other focus group work on race-based medicine^{3,4} and reflect participants' negative reaction to race-based therapies. How-

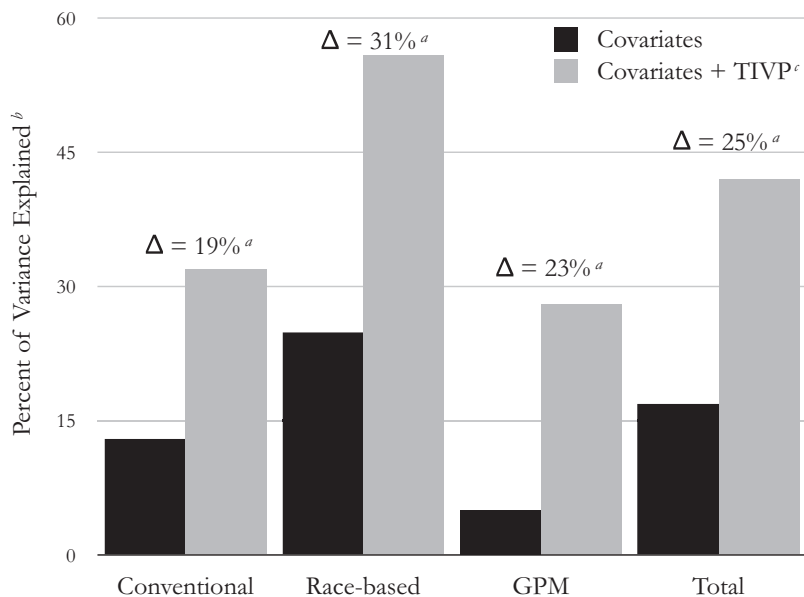


Fig. 1. Percent of variance in adherence. ^a $P < 0.001$. ^bThe covariates included in the models before introduction of TIVP were predictors ($P < 0.05$) of “Adherence Intention” and supported by theory (covariates = trust in medical profession + trust in medical system + experience with discrimination + imagine yourself). ^cTIVP, trust in the vignette physician.

ever, the agreement with the focus group literature diverges when racial differences come into question. The focus group studies reported that racial minorities had stronger negative reactions than those in the racial majority. However, our data indicate that minorities and nonminorities had equally negative appraisals regarding emotional response, perceived respect, trust in the vignette physician, belief in medication efficacy, and adherence intention. Many sources of this negative appraisal have been identified for racial minorities (e.g., historical and contemporary racial discrimination and race as a poor proxy for underlying biology).²⁶ The reasons may be overlapping but, in part, distinct for members of the racial majority. Perhaps, a lack of racial identity for those in the American racial majority^{27,28} contributed to the negative ratings nonminority participants had of race-based medicine; race-based tailoring may seem irrelevant to persons with little awareness of their own race. This study’s randomized design supports these findings by minimizing the threats to validity present in focus group studies on race-based therapies.

GPM findings

Despite perceiving GPM as comparably effective as conventional medicine, participants were reluctant to take GPM. The sticking point for hypothetical adherence to GPM may include the concerns proffered in focus group and quantitative pilot studies on the topic (e.g., confidentiality, discrimination, and cost).^{4–6}

This study also made it possible to uncover a racial difference in GPM adherence intention that was not identified in the previous research. This difference may not be surprising considering racial disparities in genetic testing are well documented. In part, these disparities may be rooted in the same social, cultural, and economic forces that contribute to most racial health care disparities.^{14,29–31} However, research on the mechanisms behind racial genetic testing disparities is underdeveloped. Genetic testing disparities related to access and knowledge may be compounded by patient-physician relation-

ship quality, thus discouraging minority patients from pursuing or consenting to state-of-the-art treatments. This study’s link between low physician trust and the relative reluctance to accept new treatment options, such as GPM, illuminates a possible point of intervention.

Equivalent overall adherence intention among racial majority versus minority participants brings into focus broadly conceptualized access issues in the racial differences in adherence to treatment and screening.^{32–34} The association between race and socioeconomic status presents obstacles to adherence.^{35,36} Additionally, physicians perceive minority patients as being less likely to adhere with recommendations,³⁷ and these expectations likely contribute to instances in which differences have been documented in physician communication with minority and nonminority patients.³⁸ This study demonstrates that overall intention for adherence does not differ between minority and nonminority patients. Aligned with theoretical and experimental evidence, this again places the onus on care providers to mitigate racial disparities in adherence through improved partnering and adherence-focused interventions.³⁶ The identification of specific barriers to adherence is essential to this end.

The Risk Information Seeking and Processing Model¹⁷ is consistent with an increased role of trust in the vignette physician in predicting adherence as the global appeal of the hypothetical treatment decreases. Thus, trust is linked with adherence in this study, as well as previous research.^{9,10} A recent meta-analysis³⁹ and subsequent commentary⁴⁰ on adherence crystallizes the importance of physician communication in the clinical encounter and directs readers to interventions associated with both increased patient satisfaction (of which trust is one dimension) and adherence. These communication characteristics include more information, less negative talk, and more positive affect.

Furthermore, Fiscella et al.¹¹ identified communication characteristics associated with trust, which included exploring the patient’s illness experience, allowing for longer patient visits, and encouraging continuity of doctor-patient relationships for

longer than 1 year. Although some of these trust-associated characteristics may be out of providers' control, every patient encounter provides opportunity to better comprehend the patient's illness experience. This can be accomplished both by asking questions that better elicit that information and by paying closer attention to the word choice and nonverbal communication already present in the doctor-patient interaction.

Limitations

Forward-looking hypothetical scenario research may not reflect the results that would be attained in the real world when personalized medicine is being offered for common disease. This remains a primary limitation of this methodology despite its advantages in cost, accessibility, and tightly controlled nonverbal cues, as well as stringent adherence to hypothetical methodology recommendations.⁴¹

Although this study aims to capture reactions to personalized medicine vignettes in a general health care-seeking population, the results from the Johns Hopkins Hospital population may not be generalizable to patients seeking care in other settings. The response rate of 57% introduces the possibility that responders differed from nonresponders. Nevertheless, randomization made the contrasts a valid test of the concept.

Implications

The primary clinical implications of this study are twofold. Explicitly race-based approaches to medicine are unlikely to be broadly endorsed in the coming years, whereas DNA-based personalized medicine will likely surpass race-based approaches as costs decrease. This study found that both minorities and nonminorities rated race-based approaches with equivalent negativity. Additionally, minorities reported lowered adherence intention to GPM than nonminorities.

Second, this study supports the large role that trust plays in driving adherence in this context. Synthesis of this study's findings with the communication literature can help guide providers who want to improve trust and adherence. Additionally, the equal adherence intention among minorities and nonminorities in this hypothetical study urges care providers to use the empirically supported communication characteristics presented in this study to increase engagement with minority patients and increase the likelihood of adherence. Furthermore, policy makers and managers could improve adherence by endorsing programs that promote clinicians' ability to develop a trusting relationship with their patients.

Additional studies in the area of translational personalized medicine research are needed to investigate racial differences in acceptance of GPM with sensitivity to discerning preference and mistrust-mediated health behaviors. Future research should further illuminate the role doctor-patient relationships have in creating and/or ameliorating racial and ethnic health disparities. The instrumental import of the doctor-patient relationship warrants further characterization and intervention studies to help providers partner with their patients and enhance their therapeutic relationship.

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APPENDIX

GPM vignette

Imagine you are at the doctor's office for a routine visit. You have seen this doctor many times before. The doctor smiles when you enter the room and is typically courteous. The doctor talks to you about your condition. Your condition is common, but can be dangerous. It is dan-

gerous because it puts you at risk for serious problems, even early death. These risks make controlling your condition important.

The doctor also recommends a medication to take everyday to control your condition. The doctor suggests a genetic test to help choose the best medicine for you. The doctor swabs your cheek to get a DNA sample and leaves the room. The doctor returns and says the results show that medication A would be best. Medication A is used for treating the condition you have, but only for people with your genetic make-up.

Race-based medicine vignette

Imagine you are at the doctor's office for a routine visit. You have seen this doctor many times before. The doctor smiles when you enter the room and is typically courteous. The doctor talks to you about your condition. Your condition is common, but can be dangerous. It is dangerous because it puts you at risk for serious problems, even early death. These risks make controlling your condition important.

The doctor gives you advice about changing your diet. The doctor also tells you what type of exercise may help your condition. The doctor recommends a medication to take everyday to control your condition. The doctor tells you this medication is designed for people of your race. It is used to control your condition but only for people of your race.

Conventional medicine vignette

Imagine you are at the doctor's office for a routine visit. You have seen this doctor many times before. The doctor smiles when you enter the room and is typically courteous. The doctor talks to you about your condition. Your condition is common, but can be dangerous. It is dangerous because it puts you at risk for serious problems, even early death. These risks make controlling your condition important.

The doctor gives you advice about changing your diet. The doctor also tells you what type of exercise may help your condition. The doctor recommends a medication to take everyday to control your condition. It is a standard medication for people with your condition. Almost everyone with your condition is given this medication.