Between-Race Differences in Processes Predicting Physician Communication for African American and European American Recipients of Breast Density Notifications

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Abstract

Background Breast density notification laws mandate reporting of dense breast to applicable women. The same psychological and systemic barriers that yield between-race differences in mammography use will probably yield between-race differences in women's psychological and behavioral responses to breast density notifications.

Purpose We used the theory of planned behavior as a framework to examine between-race differences in the likelihood of following-up with physicians after receiving breast density notifications and to examine differences in African American and Caucasian American women's behavioral decision-making processes.

Methods A subset of 212 African American and Caucasian American women who participated in an initial and follow-up survey examining responses to breast density notifications were examined for this study. Participants reported background and demographic measures, psychological responses to receiving notifications, and planned behavior measures related to following up with physicians approximately 2 weeks after receiving their mammogram reports. Participants self-reported their behaviors 3 months later.

Results There were no between-race differences in self-reported physician communication; however, there were differences in processes that predicted behavior. For Caucasian American women, behavioral intentions, education, and income predicted behaviors. Instead of intentions, group-based medical suspicion, confusion, breast cancer worry, and breast density anxiety predicted behaviors for African American women.

Conclusions Behavioral decision-making processes for Caucasian American women were in line with well-validated theoretical predictions. For African American women, race-related medical suspicion, prior breast density awareness, and emotional responses to breast density notifications predicted behavior. The results highlight the need to focus on racially distinct psychological targets when designing interventions to support guideline concordant behavioral decisions among women who receive breast density notifications.

Keywords Breast density notification • Theory of planned behavior • Between-race differences • African American women

Introduction

By the end of 2018, more than half of the USA has adopted breast density notification laws [1]. These laws are meant to notify women with dense breasts that they are at increased risk for breast cancer [2–4]. However, these laws have been adopted with little consensus regarding recommendations for follow-up behaviors [5, 6], which presents significant challenges when it comes to physicians' guidance for affected women [7, 8]. These challenges are particularly concerning, as they could exacerbate racial disparities in breast cancer mortality, which disadvantage African Americans [9, 10]. African American women present with later stage, have lower survival rates at each stage, and have a 42% higher breast cancer mortality compared with Caucasian American women [9]. Inadequate mammography screening [11, 12] and longer time to follow-up screening after an abnormal mammogram [13, 14] have both been related to racial disparities in breast cancer mortality. The association between screening-related behaviors and racial disparities in breast cancer mortality suggests the potential

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for similar associations between breast density notification follow-up behaviors and, ultimately, racial disparities in earlier breast cancer detection and breast cancer mortality.

Lacking guidelines specific to breast density as the sole breast cancer risk factor, follow-up recommendations for women who receive notifications may be informed by breast cancer risk-based screening guidelines. Consistent with most guidelines, high-risk women should be supplementally screened with breast MRI; women at intermediate risk should engage in shared decision-making with their physicians with option for breast ultrasound; and no follow-up is recommended for women at average risk [15–18]. Implicit in these options, particularly for women who had been unaware of their breast density before the notification, is a conversation that women should have with their physicians to either prescribe supplemental screening or to discuss whether supplemental screening is warranted. It is worrisome, therefore, that physicians are less likely to inform African American women about their breast density and associated risk, which consequently affects African American women's (lack of) awareness of their own breast density and breast density-related knowledge [19]. Generally, communication is demonstrably poorer between physicians and African American patients (arguably attributable to race-related biases and different treatment on the part of the physician, and mistrust on the part of the patients), and this poorer communication is associated with worse health and health care for African American women [20–28]. Poorer physician communication on average may cause fewer African American women to discuss the notifications with their physicians; alternatively, relatively greater lack of prior breast density awareness among African American women [19, 29] may cause greater proportions of African American women to discuss the notifications with their physicians. In either case, we expect between-race differences in the behavioral decision-making processes following receipt of breast density notifications given between-race differences in the presence of psychological and systemic barriers to breast cancer screening behaviors.

The barriers that contribute to disparities in breast cancer screening will probably operate differently for African American and Caucasian American women as they decide whether to follow-up with their physicians. In particular, perceptions of discrimination and medical mistrust adversely affect health and health care of African Americans [23, 26, 30, 31] and are associated with decreased adherence to breast cancer screening guidelines for African American women [21, 32]; hence, they may be more salient cognitive determinants of communication decisions among African American women. We used a measure of personal discrimination as well as the discrepancy between perceptions of personal discrimination and group-based discrimination in our

analyses. Whereas this discrepancy has been consistently documented, there is varying consensus as to why it happens [33–36], though there is some consensus that the discrepancy is stronger among people who identify more with their group. As we lacked a direct measure of group identity, we adopted discrimination discrepancy both as a proxy to indirectly account for group identity, and so that we could examine whether the veritable discrepancy phenomenon yields further insight into between-race differences in decision-making. Socioeconomic (SES) barriers (e.g., low income, lack of transportation) also demonstrably hinder breast cancer screening among minority women [37] and thus may be particularly important determinants for African American women. Decreased knowledge about breast cancer and breast cancer risk are related to African American women's decreased adherence to breast cancer screening guidelines [37–39]. Such knowledge deficits may cause more confusion regarding follow-up behaviors among African American women; however, in light of expectations of poorer health care interactions in general, confusion may have less influence on decision-making for African American women. African American women reported greater anxiety related to their breast density, and anxiety attenuated African American women's intentions to discuss notifications with physicians whereas it increased similar intentions for Caucasian American women [19, 40]; therefore, anxiety may differentially influence outcomes for African American and Caucasian American women. To test these hypotheses, we examined differences in how these constructs were related to women's behavior via a validated behavioral decision-making model.

We used the theory of planned behavior (TPB) [41, 42] to model the behavioral decision-making process and to examine between-race differences in that process. The TPB is a well-validated and parsimonious cognitive-process model, which has been used successfully to predict health behaviors [43, 44] and to study breast cancer screening behavior [45–47]. The model positions behavioral intentions and actual behavioral control as proximal predictors of behavior (in practice, perceived behavioral control serves as a proxy for actual control). In turn, behavioral attitudes (positive or negative evaluations of engaging in the behavior), perceptions of descriptive norms (what others do) and injunctive norms (what others want you to do), and perceptions of behavioral control (PBC: how much control you think you have over behavior) predict intentions. Other distal factors affect intentions and behavior indirectly via attitudes, norms, and PBC [48, 49]. In other words, the TPB process is expected to mediate the effects of relevant distal factors (i.e., discrimination, medical mistrust, confusion, anxiety, and SES) on patients' self-reported physician communication following breast density notification receipt (see Fig. 1).

Fig. 1. Theoretical model. a = direct paths from distal predictors to attitudes, injunctive, and descriptive norms and perceived behavior control (PBC). b_1 – b_4 = direct paths from attitude, norms, and PBC to behavioral intentions. c_1 and c_2 = direct paths from behavioral intentions and PBC to behavior. d = direct paths from distal predictors to behavior. BC breast cancer; BD breast density.

The goal for the present study is to examine differences between African American and Caucasian American women in the processes that relate distal factors to physician communication following receipt of breast density notifications. We hypothesize that (a) fewer African American women will follow-up with physicians following breast density notifications; that (b) the effects of discrimination, medical mistrust, confusion, anxiety, and SES on behavior will be different between African American and Caucasian American women; and that (c) the relationship between distal factors and behavior will be mediated by processes outlined by the TPB.

Materials and Methods

Participants and Procedures

Participants for the present study were a subset of women who responded to a follow-up survey invitation from an initial study reported elsewhere [50]. Briefly, 557 women (21% response rate) who presented for routine screening mammogram, had dense breasts (and thus received breast density notification), no prior breast cancer and screen-negative mammograms participated in a survey investigating “opinions and perspective on some information that was included in your mammogram report.” Although no information was available on the women

who declined to participate, the response rate was consistent with other studies among this population (e.g., [19, 29]). Relevant sociodemographic variables, pre-existing psychological variables and psychological responses to receiving breast density notifications were assessed via the initial survey. Survey respondents were reinvited to complete a 3-month follow-up survey to assess “behaviors that women engaged in following notification about their breast density.” Participants completed all survey materials via a secure online research platform [51] and received a \$25 gift certificate for participation in each survey. The study was approved by Wayne State University’s Institutional Review Board.

Measures

Prior breast density awareness

Breast density awareness was assessed with binary (“Yes”/“No”) responses to the item “Prior to receiving your current mammogram report, did you know how dense your own breasts are?”

TPB variables

The behavioral target was “Talking to my doctor (i.e., primary care, ob/gyn, etc.) about the notification regarding the density of my breasts within the next three months...”

With the exception of self-reported behavior, item responses were on a 7-point scale anchored with “strongly agree” to “strongly disagree” (except for semantic differential attitude items). Some items were reverse scored to address biased responding due to responder acquiescence.

Behavioral intentions

Two items (“I intend to talk...”; “I have decided that I will talk...”) were used to assess intentions ($r = .53$, $p < .001$).

Behavioral attitudes

The mean of five semantic differential items (e.g., “pleasant – unpleasant,” “Extremely good – extremely bad,” “Not at all worthwhile – Extremely worthwhile,” “Beneficial – harmful,” “Unsatisfying – Satisfying”) assessed attitudes toward the behavior ($\alpha = .83$).

Injunctive norms

Two items (e.g., “Most people I care about would expect me to talk...”; “Most people who are important to me would want me to talk...”) were used to assess injunctive norms ($r = .58$, $p < .001$).

Descriptive norms

Two items (e.g., “Most women who I care about would talk...”; “I could see most of the women who are important to me talking...”) were used to assess descriptive norms ($r = .45$, $p < .001$).

Perceived behavioral control

One item (“Whether or not I talk...”) was used to assess perceived behavioral control.

Self-reported behavior

Behavior was assessed with binary responses (“Yes”/“No”) to the item “In the past three months, have you talked to your doctor (your primary care doctor, obstetrician/gynecologist, or whichever doctor you discuss women’s health with in particular) about the breast density notification you received with your last mammogram report.”

Psychological Responses

Breast density anxiety

We used one item (“How anxious do you get when you think about how dense your own breasts are?”) to assess breast density anxiety. Women responded on a scale from 1 (“not at all anxious”) to 10 (“very anxious”).

Breast cancer worry

One item (“How often do you worry about breast cancer?”) was used to assess breast cancer worry, with responses from 1 (“never”) to 5 (“all of the time”).

Confusion

Three items that were designed for this research (“Learning that I have dense breasts is very confusing to a woman like me”; “I know exactly what to do now that I learned that I have dense breasts”; “Since learning that I have dense breasts, I have been confused about my own risk of being diagnosed with breast cancer”; $\alpha = .76$) assessed confusion, with responses from 1 (“strongly disagree”) to 5 (“strongly agree”). We designed these items based on scientific and periodical literature, discussing concerns about potential confusion following receipt of notifications, and discussions with clinicians regarding their own concerns about what may confuse notification recipients.

Race-Related Perceptions

Group-based medical distrust

Group based medical mistrust (GBMM) was assessed by the 12-item Group-Based Medical Mistrust Scale [21], which yields three dimensions of GBMM: lack of support (three items: e.g., “Doctors have the best interests of people of my ethnic group in mind [Reverse scored]”; $\alpha = .63$); group discrimination (three items: e.g., “In most hospitals, people of different ethnic groups receive the same kind of care [Reverse scored]”; $\alpha = .88$); and suspicion (six items: e.g., “People of my ethnic group cannot trust doctors and health care workers”; $\alpha = .88$). Women responded on a scale from 1 (“strongly disagree”) to 7 (“strongly agree”).

Personal and group discrimination

Personal and group discrimination were each assessed in line with Dion and Kawakami [52] by means of responses to five items with the following stems, respectively: “Have you ever experienced discrimination against yourself personally in the following areas?” ($\alpha = .87$) and “How much are individuals of your ethnic/racial group discriminated against in the following areas?” ($\alpha = .97$). Women responded by indicating on a scale 1 (never) to 5 (all the time) for obtaining work, wages/pay, obtaining loans or credit, health care, and obtaining health insurance. For analyses, we used the difference between group-based discrimination and personal discrimination to create a discrepancy score where positive values indicated that respondents perceived more group discrimination compared to personal discrimination.

Demographics

Race

Participants indicated race from among eight options; only those indicating “Black or African American”

or “White or Caucasian American” were included for analyses.

Income

Participants indicated household income in one of 11 categories that increased in ranges of \$10,000 (e.g., less than \$9,999; \$10,000–\$19,999; up to more than \$100,000).

Education level

Participants categorically indicated their highest education level in one of seven categories (“0–8 years,” “Some high school but didn’t finish,” “High school diploma or GED,” “Business or Trade School,” “Some college,” “College degree,” “Graduate or professional degree”). As only one person indicated “0–8 years,” the lowest two categories were combined.

Marital status

Participants indicated marital status on one of six categories (e.g., “Married,” “Single, never married,” etc.). Responses were aggregated into three categories (married or partnered; separated, widowed, or divorced; single or never married) and effects coded for analyses.

Planned Analyses

Because prior awareness of one’s breast density may influence whether women talk to their physicians about the notifications, we accounted for prior breast density awareness in our analyses. We examined the associations of race and prior awareness with physician communication using binary logistic regression. We fit multigroup path analysis to examine between-race differences in the extent to which the associations between distal factors (i.e., discrimination, medical mistrust, confusion, anxiety, and SES constructs) and behavior were mediated by processes indicated by the TPB—we controlled for effects of prior breast density awareness in the decision-making process (see Fig. 1). We regressed intentions onto attitudes, injunctive and descriptive norms, and PBC, which were in turn regressed onto each distal predictor. Behaviors were regressed onto intentions, PBC, and the distal predictors. Consequently, the model specifies both direct and indirect effects of the distal predictors on behaviors. To test for significant between-group differences in predictive paths, we compared model fit for our hypothesized unconstrained model in which all model parameters were freely estimated between groups to a constrained model in which predictive paths were constrained to be equal between groups. Given the relatively small sample size [53, 54], we fit the behavioral outcome with a linear probability model [55] via maximum likelihood estimation using Mplus v7.4 [56]. We bootstrapped

standard errors (500 draws) for the indirect effects (i.e., the product of paths from predictors to mediators and from mediators to outcome) and examined between-group differences in direct and indirect effects.

Results

Comparing Follow-up Responders to Nonresponders

Of 557 women who responded to the baseline survey, 271 (49%) responded to the follow-up. Of those, 212 who were either African American (43%) or Caucasian American (57%) comprised our analysis sample. Caucasian American women were more likely to respond to the follow-up survey than African American women (57% vs. 37%; $\chi^2 [1] = 19.42, p < .01$), and thus respondents had higher income ($t_{419} = 3.64, p < .01; d = 0.35$), higher education levels ($\chi^2 [2] = 9.78, p < .01$), were more likely to be married ($\chi^2 [2] = 8.83, p < .05$), had lower suspicion ($t_{448} = 2.04, p < .05; d = -0.19$), and were more likely to have prior awareness of breast density ($\chi^2 [1] = 9.60, p < .01$). When we examined differences between follow-up responders and nonresponders within race, there were no between-group differences for Caucasian American women; however, for African American women, income was associated with responding ($\chi^2 [10] = 27.70, p < .01$)—this was due to significantly fewer African American respondents in the lowest income category (i.e., less than \$9,999; 8% vs. 33%), whereas there were no differences in the other 10 categories. There was also a marginal association with prior breast density awareness among African American women ($\chi^2 [1] = 3.85, p < .10$); compared with nonresponders, respondents were more likely to have prior awareness of breast density (33% vs. 22%).

Between-Race Differences in Study Variables

For the analysis sample, 96% of all women reported having health insurance. African American women were more likely to be single/never married (27.8% vs. 5.8%) compared with Caucasian American women who were more likely to be married or partnered (70.2% vs. 38.9%; $\chi^2 [2] = 27.00, p < .01$). African American women were more likely to have lower education levels ($\chi^2 [5] = 14.29, p < .05$) and lower median income (\$40 k to \$49 k vs. \$90 k to \$99 k, $p < .01$) than Caucasian American women. African American women were less likely to have prior breast density awareness (33.3% vs. 60.3%; $\chi^2 [1] = 15.06, p < .01$). Results of *t*-tests for between-race differences in continuous variables are presented in Table 1 (see Supplementary Table for correlations). Results of a multivariate analysis of variance indicated significant race by prior breast density awareness interactions

Table 1 Between-race differences in study constructs

	Caucasian American		African American			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>
BD/BC cognition and emotion						
Confusion	2.89	0.97	2.99	0.92	−0.80	207
BD anxiety	3.35	2.77	3.47	3.01	−0.28	207
BC worry	2.66	0.82	2.47	0.87	1.61	208
Race-related perceptions						
Suspicion	1.75	0.82	2.39	1.15	−4.75**	210
Group disparity	2.67	1.43	3.62	1.63	−4.51**	209
Lack of support	2.06	0.87	3.14	1.19	−7.68**	210
Personal discrimination	1.33	0.51	1.90	0.85	−6.05**	209
Discrimination discrepancy	0.39	0.60	1.29	0.81	−9.21**	209
TPB predictors						
Intentions	5.00	1.57	5.63	1.37	−3.07**	210
Attitude	5.45	1.20	5.93	1.07	−2.93**	206
Injunctive norms	4.79	1.47	5.32	1.66	−2.46*	210
Descriptive norms	4.90	1.22	5.29	1.40	−2.14*	210
PBC	6.03	1.33	5.90	1.37	0.71	209

BC breast cancer; BD breast density; PBC perceived behavior control; TPB theory of planned behavior.

* $p < .05$; ** $p < .01$.

only for the discrimination discrepancy ($F_{1,206} = 4.51$, $p < .05$, $\eta^2 = .02$): Caucasian American women without prior breast density awareness had a larger discrepancy ($M = 0.48$, $SE = 0.10$) compared with those with prior awareness ($M = 0.34$, $SE = 0.08$), whereas African American women without prior awareness had a smaller discrepancy ($M = 1.19$, $SE = 0.09$) compared with those with prior awareness ($M = 1.48$, $SE = 0.13$). In contrast to our first hypothesis, results of logistic regression indicated no main effects of race, nor interaction between race and prior breast density awareness, on self-reported behavior; 34.1% of African American women and 27.3% of Caucasian American women reported talking to their health care professionals about the breast density notification.

Between-Race Differences in Associations With Behavior

Comparison of model fit supported the unconstrained model over the constrained model ($\Delta\chi^2 [71] = 97.27$, $p < .05$), and fit indices indicate good model fit for the unconstrained model ($\chi^2 [54] = 51.25$, nonsignificant; root mean square error of approximation = 0.00, 95% confidence interval [0.00, 0.06]; comparative fit index = 1.00; root mean square residual = 0.03). Model parameters are presented in Table 2. For Caucasian American women, as predicted by the TPB, intentions significantly predicted behaviors. There was also a significant positive association for education and an inverse

association for income. For African American women, intentions did not significantly predict behaviors. Rather, there were positive direct effects of prior breast density awareness, confusion, breast density anxiety, and being married compared with being single, and there were inverse direct effects of group-based medical suspicion, breast cancer worry, and being separated compared with being single. Breast density anxiety had significant indirect effects on behavior via the attitude and intention paths for Caucasian American women (indirect effect = 0.01, $p < .05$); however, the absence of significant indirect effects for African American women suggests that the cognitive processes implied by the TPB did not mediate the association between any of the distal factors and behavior.

Discussion

We examined between-race differences in the processes that predicted whether women talked to their physician following receipt of breast density notification via their mammogram report. There was no between-race difference in the proportion of women who reported talking to their physicians about the notification; however, there were clear differences in the processes that lead to the outcome. Perhaps most noteworthy, intentions significantly predicted behaviors for Caucasian American women, but not for African American women, and race-related medical mistrust, prior awareness, and psychological responses directly predicted behavior for African American

Table 2 Path analysis results

	Attitude		Injunctive norm		Descriptive norm		PBC		Intention		Behavior	
	CA	AA	CA	AA	CA	AA	CA	AA	CA	AA	CA	AA
Predictors												
Prior BD aware	−0.38 [†]	−0.24	−0.33	−0.47	−0.09	−0.13	0.27	0.50	—	—	0.01	0.25*
Suspicion	−0.15	−0.14	−0.27	−0.10	−0.23	−0.30 [†]	−0.04	−0.13	—	—	0.00	−0.17**
Group disparity	−0.10	0.08	0.10	0.09	−0.03	−0.08	−0.17 [†]	0.24*	—	—	0.02	−0.07 [†]
Lack support	−0.03	−0.02	0.07	−0.05	0.07	0.11	−0.04	−0.21	—	—	−0.01	0.09
Disc discrepancy	0.02	0.12	−0.03	0.42	−0.04	0.51*	0.13	−0.15	—	—	−0.04	0.11
Personal disc	0.04	0.15	−0.11	−0.06	−0.14	0.29	0.34	0.11	—	—	0.01	0.07
Confusion	0.03	−0.12	0.18	0.12	0.07	0.30 [†]	−0.06	0.01	—	—	−0.04	0.17**
BC worry	−0.15	0.49**	−0.13	0.41 [†]	−0.11	0.00	−0.21	−0.01	—	—	0.00	−0.21**
BD anxiety	0.12**	−0.05	0.14*	−0.07	0.05	0.04	−0.03	0.00	—	—	0.00	0.05**
Married effect ^a	−0.12	−0.15	0.08	0.42	−0.13	0.44*	−0.32	−0.20	—	—	0.07	0.17*
Separated effect ^a	−0.03	−0.04	−0.38	−0.08	−0.18	−0.01	0.13	−0.18	—	—	−0.07	−0.07
Education	−0.22*	−0.16	−0.09	0.01	−0.09	−0.20	−0.15	−0.01	—	—	0.09**	−0.02
Income	0.05	0.09 [†]	−0.01	−0.05	−0.03	0.02	0.13**	0.10	—	—	−0.04*	0.00
Attitude	—	—	—	—	—	—	—	—	0.58**	0.40**	—	—
Injunctive norm	—	—	—	—	—	—	—	—	0.32**	0.23*	—	—
Descriptive norm	—	—	—	—	—	—	—	—	0.23*	0.16	—	—
PBC	—	—	—	—	—	—	—	—	0.04	0.28**	0.05 [†]	−0.01
Intentions	—	—	—	—	—	—	—	—	—	—	0.10**	0.01

AA African American; BC breast cancer; BD breast density; CA Caucasian American; PBC perceived behavior control.

^aComparison group = single/never married.

[†] $p < .10$, * $p < .05$, ** $p < .01$.

women, whereas only breast density anxiety had significant indirect effects for Caucasian American women.

Differences in Intention–Behavior Consistency

The between-race difference in intention–behavior consistency could lead one to conclude that the TPB holds only for Caucasian American women in this context. However, we argue that the results reflect greater disruptions or modifications to behavioral intentions for African American women in 3-month interim between assessments of intentions and behaviors. The strength of the intention–behavior relationship is attenuated as time passes between assessment of intentions and behaviors [41, 57], and racial differences in this attenuation may be due to a number of factors. For example, between-race differences in actual control may have moderated the intention–behavior relationship. Data show that even when individuals have similar types of health insurance, African Americans have worse experiences accessing care compared to their Caucasian American counterparts [58–62]. Therefore, despite virtually all women being insured, between-race differences in access to one's health care professionals may have precluded African

American women from following through on their intentions to speak to their physicians about the breast density notifications.

A separate consideration may be weaker intention stability among African American women. Prior research shows that intentions that are more stable over time are stronger predictors of behavior [63, 64]. Whereas reported intentions were more favorable among African American women, intentions may have become less favorable over time given well-documented racially disparate negative experiences with health care faced by African Americans [22, 25, 26, 28, 59]. We lack direct evidence that African American women considered racially disparate health care experiences in the interim between assessment of intentions and behavior. Rather, we speculate that the salience of breast density notifications, and thus its influence on attitude and intentions, may have diminished over time, whereas the relatively more enduring influence of race-related perceptions persisted, thus attenuating the favorability of intentions. The negative association between race-related suspicion and African American women's behavior, in the absence of direct effects of intentions, supports this speculation.

The goal-directed nature of behavioral attitudes and intentions in the context of TPB, and the possibility that these goals were met via alternate methods, should also be considered. Specifically, favorable evaluations that a behavior will fulfill a relevant goal lead to more favorable behavioral cognitions [42, 65, 66]. Some of the goals of physician communication may have been to gain information and insight into breast density and subsequent behaviors, and African American women may have satisfied these goals by other routes (e.g., talking to family members or non-clinicians about the notification). Some limited data show that African Americans are more likely to trust such informal sources of health information (e.g., friends and family, church) and less likely to trust physicians compared to Caucasian Americans [67]; hence, favorable physician communication intentions may have been satisfied via informal sources, more so among African American women with relatively greater race-related suspicion. Interestingly, despite no significant associations between confusion and the precursors of intentions and behavior, confusion also directly predicted physician communication for African American women. Informal health resources may not have satisfied communication goals of the African American women who were more confused, and consequently, they may have been more motivated to further follow up with their physicians.

Differences in Influences of Emotional and Cognitive Responses

For African American women only, increased breast density anxiety directly facilitated discussing the breast density notifications, whereas increased worrying about breast cancer directly inhibited such discussion. This is probably related to the nonlinear effect of emotional responses on behaviors related to breast cancer screening; specifically, moderate levels of breast cancer anxiety and worry facilitate, whereas high levels hamper, breast cancer screening intentions and behaviors [68–70]. From an assessments standpoint, more extreme responses to the breast cancer worry item may reflect levels of emotional responses that hamper relevant behavioral engagement, whereas more extreme responses to the breast density anxiety item may reflect emotional response that facilitate relevant behavioral engagement. Nonetheless, further examination is warranted to understand why emotional responses uniquely affected behavior independent of intentions for African American women, but not for Caucasian American women.

Limitations and Future Directions

A limitation of the present study is differences due to attrition between baseline and follow-up. Differences in sample characteristics between respondents and nonrespondents were largely due to Caucasian American women being

more likely to respond than African American women. Caucasian American respondents and nonrespondents did not differ on any study variables; however, some differences for African American respondents warrant discussion. First, African American respondents were underrepresented in the lowest income category, indicating that African Americans in the analysis sample may not have been as disadvantaged as those in the primary study. However, the full range of income was well represented among both African American and Caucasian American respondents and nonrespondents, suggesting that the response bias would not significantly affect the study results. Second, African American respondents were somewhat more likely to be aware that they had dense breasts; however, the between-group differences were of degree, and not of kind—African American women were much less likely to know they had dense breasts regardless of whether they responded to follow-up. Altogether, we argue that these group differences among African American women represent, at most, a benign influence on the external validity of the present study.

A second limitation concerns our singular focus on physician communication as the outcome variable. Although an important behavioral outcome in its own right, there are other breast cancer screening guideline-supported behaviors that women could engage in as a consequence of receiving breast density notifications—for example, supplemental breast cancer screening with MRI or ultrasound; seeking formal breast assessment to understand personal risk [16, 18, 71]—though most of these behaviors would probably be mediated by physician conversation nonetheless. Some responses to open ended items also indicated a variety of unsupported behaviors that women intended to engage in (e.g., change diet, exercise more, wear different bra). Future research should expand the scope of behaviors under investigation to increase the understanding of between-race differences in the predictors and outcomes of potentially correlated behaviors. Attempts should also be made to adjudicate self-reported behaviors via medical records or independent informants where possible. Finally, given the importance of physician communications when it comes to women's breast cancer screening behaviors [72, 73], the influence of physician characteristics (e.g., specialty, years since training, type of practice, etc.) on women's outcome should be incorporated in future studies.

Conclusion

There were no between-race differences in self-reported physician communication about breast density notifications; however, there were significant between-race differences in the decision-making processes related to physician communication. Whereas processes for Caucasian American women were in line with

well-validated theoretical predictions, the same was not true for African American women. Specifically, African American women's behavioral intentions did not correspond well with their actual behavioral; rather, race-related medical suspicion and emotional responses to breast density notifications predicted their behavior. The results highlight the need to focus on racially distinct psychological targets when designing interventions to support guideline concordant behavioral decisions among women who receive breast density notifications.

Supplementary Material

Supplementary material is available at *Annals of Behavioral Medicine* online.

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Compliance with Ethical Standards

Authors' Statement of Conflict of Interest and Adherence to Ethical Standards Authors Mark Manning, Terrance L. Albrecht, Louis Penner, and Kristen Purrington declare that they have no conflict of interest. All procedures, including the informed consent process, were conducted in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.

Primary Data The findings reported have not been previously reported, published, and the manuscript is not being simultaneously submitted elsewhere. The authors have full control of all primary data and agree to allow the journal to review their data if requested.

Authors' Contributions All authors were involved in the preparation of this manuscript and read and approved the final version.

Ethical Approval The study was approved and conducted in accordance with the Helsinki declaration.

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