



# Sex, race, and the role of relationships in diabetes health: intersectionality matters

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**Abstract** Previous research has seldom used an intersectionality framework to consider how sex and race affect diabetes health, nor has it examined the role of sex and race in the well-established link between romantic relationship quality and health. This study targeted 200 adults with type 2 diabetes (46% Black; 45% female) and examined whether sex, race, and the interaction between sex and race predicted behavioral and psychological health, or moderated the link between relationship quality and health outcomes. Black women reported poorer diabetes self-care and lower self-efficacy compared to other groups. Relationship quality was associated with better self-care, increased self-efficacy, and lower depressive symptoms. The association between relationship quality and medication adherence was stronger for Black women, and the association between relationship quality and self-efficacy was stronger for both Black women and White men. Results suggest that Black women with diabetes experience

more health disadvantages than other groups, but some of these disadvantages might be attenuated by supportive romantic relationships.

**Keywords** Race · Sex · Gender · Relationship quality · Marital quality · Type 2 diabetes

## Introduction

About 1 in every 10 people in the United States has diabetes (Centers for Disease Control and Prevention, 2017)—a number that has more than doubled since 1980 (Geiss et al., 2014) and that could triple by 2050 if the pattern continues (Boyle et al., 2010). To avoid serious complications like nerve damage and kidney failure, persons with diabetes must adhere to a complex self-care regimen that includes medication, diet, physical activity, foot self-examination, blood glucose checking, and more (Hunter, 2016). These lifestyle changes can be difficult to initiate, let alone maintain. As a result, many people with diabetes seek support from romantic partners, who often play a crucial but overlooked role in diabetes self-care. Romantic partners are in a unique position to help with diabetes care and to assuage the physical and emotional fallout that comes with chronic illness (Wiebe et al., 2016).

Diabetes and its management, however, can differ greatly based on a person's demographic background. Sex and race both play an integral role in determining the impact of diabetes on a person's life and the impact that romantic relationships have on health. However, previous diabetes research has often focused on only one identity at a time, examining the individual effects of sex *or* race, but not the intersection between the two. Intersectionality theory (Crenshaw, 1989; Cole, 2009) provides a useful

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framework to understand how the juncture between multiple identities produces unique experiences for each subgroup. A key assertion of this framework is that society affords different privileges to subgroups that are not a function of a single social identity or even the sum of multiple identities. Rather, identities like sex and race interact multiplicatively, creating distinct experiences of advantage and disadvantage for each subgroup. Despite the fact that intersectionality theory has been utilized in academic work for decades, its use in health research has been quite limited (Bauer, 2014).

To address this gap, the current study uses an intersectionality framework to examine a sample of White and Black men and women with type 2 diabetes, focusing on two central aims. First, to establish a general foundation for examining intersectionality in diabetes research, we examine whether sex, race, and the interaction between sex and race predict the behavioral and psychological health of persons with diabetes. Second, to explore a novel area for both diabetes research and intersectionality, we examine the impact of romantic relationship quality on the behavioral and psychological health of persons with diabetes and test whether these associations are influenced by sex, race, or the intersection of the two. Below, we review the research on the effects of sex and race on behavioral health, on the effects of sex and race on psychological health, and on sex and race as moderator variables of the link between relationship quality and health. For each body of research, we examine potential interactive effects between sex and race.

### Sex, race, and behavioral health

Previous research on the behavioral health of persons with type 2 diabetes typically has not examined the intersection between sex and race, but a multitude of studies have indicated that some behavioral health outcomes differ based on either sex or race. In terms of sex, women and men have better adherence to different elements of diabetes self-care. Men engage in more physical activity than women (Chiu & Wray, 2010; Yu et al., 2013), but women maintain a better diet and monitor their blood glucose more frequently than men (Chiu & Wray, 2010; Yu et al., 2013). Sex differences in medication adherence are less clear: one study showed that women were less likely to be adherent to their medication than men (Yu et al., 2013), but another study showed no sex differences in medication adherence (Chiu & Wray, 2010). Though women are better at adhering to some elements of diabetes self-care than men, they actually report lower self-efficacy—that is, they have lower confidence in their ability to engage in the behaviors needed for optimal diabetes health. In two studies, women

reported lower diabetes self-efficacy than men (Chiu & Wray, 2010; Cherrington et al., 2010).

A person's race is also implicated in some behavioral health outcomes for persons with diabetes. A recent systematic review of race differences in self-care found that non-Hispanic Black adults monitor blood glucose more frequently and perform foot self-exams more regularly than non-Hispanic White adults (Mayberry et al., 2016), but that there are no race differences in diet or exercise adherence. However, the same study showed that non-Hispanic Black adults are less adherent to medication than non-Hispanic White adults. Again, despite the fact that Black adults appear to be better at some elements of self-care than White adults, data from the California Health Interview Survey showed that non-Hispanic Black adults report lower diabetes self-efficacy compared to non-Hispanic White adults (Kim et al., 2015).

Unfortunately, previous research has not given much attention to the intersection between sex and race on diabetes behavioral health. However, theoretical work on intersectionality has highlighted the distinct type of marginalization that Black women face compared to other groups. Despite Black women having more societal resources than Black men in some domains (e.g., education; Williams et al., 2010), Black women occupy the lowest social position in terms of both gender and race (Crenshaw, 1989; Cole, 2009), which may result in being overlooked or treated as “invisible” by society, as well as discrimination on the basis of both sex and race (e.g., Sesko & Biernat, 2010). These unique societal barriers could considerably impair Black women's efforts at self-care and their self-efficacy, such that Black women would experience the highest difficulty in caring for diabetes and the lowest confidence in doing so compared to other groups.

In the present study, we made the following predictions. Because of the contradictory findings regarding individual aspects of diabetes self-care, we predicted that there would be no main effects of sex or race on overall diabetes self-care behavior, but that there would be an interaction between sex and race, such that Black women would have the lowest levels of self-care. We also predicted that there would be main effects of both sex and race on self-efficacy, as well as an interaction between sex and race. Women would have lower self-efficacy than men, Black adults would have lower self-efficacy than White adults, and Black women would report the lowest self-efficacy of all four groups.

### Sex, race, and psychological health

Psychological health is a critical area of study for persons with diabetes, as this population is at increased risk of experiencing clinical depression and depressive symptoms

compared to the general population (Nouwen et al., 2010; Vancampfort et al., 2015). Women with diabetes report higher levels of depressive symptoms (Chiu & Wray, 2010) and have a higher rate of major depression (Li et al., 2008) than men with diabetes. However, it is unknown whether this sex difference in depression represents a unique feature of diabetes, as the overall prevalence of depression in the general population is also higher among women than men (Brody et al., 2018). Diabetes-specific distress appears to be higher among women than men (McGuire et al., 2010), even among a large, ethnically diverse community sample (Fisher et al., 2008).

The account of race differences in depression and diabetes distress is less straightforward. Surprisingly, most studies examining the general population report lower rates of depression among non-Hispanic Black adults than non-Hispanic White adults (Barnes & Bates, 2017). Among persons with diabetes, results are mixed: some studies show that non-Hispanic Black adults have lower rates of major depression than non-Hispanic White adults, yet others show no differences between the two groups (Roy & Lloyd, 2012). Further complicating matters, non-Hispanic Black adults report higher levels of diabetes-related distress than non-Hispanic White adults (Hausmann et al., 2010; Peyrot et al., 2014).

It is possible that race differences in psychological health are unclear because previous work has not examined the intersection of sex and race. Thus far, only one study seems to have examined the intersection in terms of diabetes distress and found no interaction between sex and race (Fisher et al., 2008). However, as highlighted previously, Black women face unique barriers in terms of their invisibility in society and discrimination against them (Sesko & Biernat, 2010). Because of the emotional hardship associated with these barriers, Black women with diabetes might experience a greater detriment to their psychological health than other groups.

In the present study, we predicted that women would report higher levels of depressive symptoms than men. Because of conflicting findings in past research, we did not predict a main effect of race on depressive symptoms but predicted an interaction between sex and race, such that Black women would report the highest level of depressive symptoms. In addition, we predicted that there would be main effects of both sex and race on diabetes distress, as well as an interaction between sex and race. Women would have higher diabetes distress than men, Black adults would have higher diabetes distress than White adults, and Black women would report the highest diabetes distress of all four groups.

## Relationships and health

The link between romantic relationship quality and health has been examined extensively, focusing primarily on the role of marital quality in both behavioral and psychological health. A meta-analysis of 126 studies showed a strong association between marital quality and health, with greater marital quality being associated with higher self-rated health, lower mortality, and better psychological well-being (Robles et al., 2014). Several studies have also linked marital quality to diabetes outcomes: a systematic review found that better marital quality was associated with higher diabetes-related satisfaction, better quality of life, and better blood glucose control (Rintala et al., 2013).

Despite extensive research on this topic, it is surprisingly unclear whether there are sex or race differences in the link between relationship quality and health. The previously noted meta-analysis found equivocal evidence for a sex difference (Robles et al., 2014). Studies that included a greater proportion of women showed a stronger association of relationship quality to health for women than men, but studies that directly tested sex differences in the association between relationship quality and health did not find a significant difference. Sex differences in the link between relationship quality and health have not been explored in the context of diabetes.

Few studies have examined whether there are differences between Black and White adults in the association between relationship quality and health. The relevant research does not lead to a clear prediction. On the one hand, a nationally representative sample of Black adults showed that marital satisfaction buffers the effects of racial discrimination and financial strain on psychological distress (Lincoln & Chae, 2010), suggesting that relationship quality might be particularly important for the health of Black adults. On the other hand, Black adults are known to utilize multiple sources of social support, such as extended family, the church community, and fictive kin (Brown, 2008), suggesting that the health of Black adults may depend less on the quality of their romantic relationships and more on the quality of their social network.

Again, the interactive effects of both sex and race on the association between relationship quality and health has yet to be explored. There is reason to believe that the experience of Black women may differ from other groups, but the direction is unclear. Banks (2011) suggests that Black women have needed to become more independent and self-sufficient than their White counterparts due to a shortage of Black men available to pool resources as marital partners (caused in part by incarceration or choosing interracial relationships). Thus, relationship quality may have little impact on Black women's health because they have learned

**Table 1** Demographic characteristic means and t-tests/chi square *p* values for potential covariates

Demographic variable	Overall ( <i>n</i> = 200)	Female	Male	Sex <i>p</i>	Black	White	Race <i>p</i>
Sex; <i>n</i> (% female)	89 (45%)	–	–	–	–	–	–
Race; <i>n</i> (% Black)	93 (46%)	–	–	–	–	–	–
HbA1c; mean (SD)	7.20 (1.82)	–	–	–	–	–	–
Age (years); mean (SD)	53.41 (11.13)	52.53	54.11	n.s.	50.25	56.15	***
Education level; <i>n</i> (% with 4-year degree)	102 (51%)	–	–	n.s.	–	–	n.s.
Income (median range)	\$40–\$59,000	–	–	+	–	–	***
Years since diagnosis; mean (SD)	1.89 (1.69)	1.84	1.93	n.s.	2.18	1.63	*
On insulin; <i>n</i> (% yes)	51 (26%)	–	–	n.s.	–	–	**
Marital status; <i>n</i> (% married)	146 (73%)	–	–	n.s.	–	–	***
Relationship length (years); mean (SD)	36.72 (29.84)	33.42	39.36	n.s.	23.07	48.58	***
Number of children; mean (SD)	1.34 (1.61)	2.42	2.51	n.s.	2.33	2.55	n.s.

No means are shown for categorical or imputed variables

+*p* < .10; \**p* < .05; \*\**p* < .01; \*\*\**p* < .001

to take care of diabetes on their own. Alternatively, relationship quality might have an especially meaningful impact on Black women's health because support from a partner may be an unexpected benefit.

Given the contradictory literature on sex and race as moderators of the link between relationship quality and health and the lack of research on the interaction between sex and race, we did not make a prediction as to whether sex, race, or the interaction between sex and race would moderate the association of relationship quality to behavioral and psychological health outcomes among persons with diabetes. A fundamental aim of the study was to explore whether sex, race, or the interaction between sex and race would moderate the link of relationship quality to health among persons with type 2 diabetes.

## Method

### Participants

These analyses were conducted as part of a larger study that examined individuals with type 2 diabetes and their romantic partners. Only the findings for individuals with diabetes are reported in this paper. Study participants (*n* = 200) were recently diagnosed with type 2 diabetes (average of 1.89 years), mean age of 53 years, and had a median education of a 2-year college degree. Median household income was \$40,000–\$59,000.<sup>1</sup> Average hemoglobin A1c (HbA1c) was 7.20, which is slightly

above the American Diabetes Association's (2018) recommendation of less than 7.0.

About three-quarters (73%) of participants were married, and the remainder were cohabiting with partners. The majority (95%) of both participants and partners were of the same race. Results were largely the same whether interracial couples were included or not; thus, we opted to retain these couples in the analyses.<sup>2</sup> For data analytic purposes, couples were categorized based on participant race: 54% White and 46% Black. As we were specifically interested in the effects of patient sex and race on relationships and health, we excluded homosexual couples (*n* = 4) and mixed-race participants (*n* = 3) from these analyses. Table 1 includes all participant demographic information.

### Procedure

#### Recruitment

Participants were recruited from the community (i.e., health fairs, mass media advertising, brochures in physician offices). Black adults were oversampled to facilitate analyses examining race differences. Interested individuals contacted the research team and were screened for eligibility. To be eligible, individuals had to have been diagnosed with type 2 diabetes within the past 5 years, not have another illness that affected their daily life more than diabetes (e.g., cancer), have a partner who did not have diabetes, and be married or cohabiting with their partner in a marital-type relationship for at least 2 years.

<sup>1</sup> Household income was not measured during the initial assessment, but was measured during the 6-month follow-up interview. The average of patient and partner responses was taken. Missing data were imputed.

<sup>2</sup> When we conducted the analyses excluding interracial couples, findings largely remained the same: the marginal effect of sex on diabetes distress became significant,  $F(1,182) = 5.14$ ,  $p = .03$ .

Of the 658 individuals who contacted us, 419 were determined not to be eligible for participation, largely because they reported being diagnosed more than 5 years ago. Of the remaining 239, 4 refused before we were able to determine eligibility, 22 refused after screening, and 3 were found to be ineligible after signing the consent form and thus did not complete the protocol. Of the 210 couples who completed the study, three couples were dropped from analyses. One couple was removed because they were intoxicated during the study, another couple was removed because the interviewer learned the two people were not romantic partners, and the third couple was removed because the researchers learned upon verification of medical records that the participant had type 1 diabetes instead of type 2 diabetes.

After participants were consented and interviewed, the research team verified the participant's date of diagnosis with their physicians and found that 11 participants had been diagnosed more than 5 years prior to study participation (ranged from 5 to 9 years). Results were largely the same whether participants with a less recent diagnosis were included or not; thus, these couples were retained in the analyses.<sup>3</sup>

#### *In-person interview*

Participants had the choice of being interviewed in their homes (71%) or at the University in exchange for mileage reimbursement (29%). Participants and partners were interviewed separately. The interview consisted of several health and relationship questionnaires described below. Couples were paid US\$50 for the interview.

### **Behavioral health measures**

#### *Diabetes self-care*

Diabetes self-care behavior was measured with the Summary of Diabetes Self-Care Activities (Toobert & Glasgow, 1994), which reflects dietary intake, exercise/energy expenditure, blood glucose checking, and medication adherence ( $\alpha = .86$ ).

#### *Medication adherence*

Participants' adherence to diabetes medication was measured using the 4-item Medication Adherence Scale (Morisky et al., 1986), which reflects the following reasons for nonadherence: forgetting, carelessness, stopping medi-

cation when feeling better, and starting medication when feeling worse ( $\alpha = .71$ ). Participants who were not taking diabetes medication ( $n = 18$ ; 9%) did not complete this measure.

#### *Diabetes self-efficacy*

Diabetes self-efficacy, or participants' confidence in their ability to handle their diabetes, was measured using the self-efficacy subscale of the Multidimensional Diabetes Questionnaire (Talbot et al., 1997). This measure consisted of 7 items (e.g., diet, keeping blood sugar under control), in which participants rated how confident they were in executing each behavior on a scale from 0 to 100% ( $\alpha = .86$ ).

### **Psychological health measures**

#### *Depressive symptoms*

The Center for Epidemiological Depression Scale (Radloff, 1977) was administered to participants to measure depressive symptoms ( $\alpha = .91$ ).

#### *Diabetes distress*

The 17-item Diabetes Distress Scale (Polonsky et al., 2005) measured participants' experience of diabetes-related problems in several domains, including emotional burden, physician distress, regimen distress, and interpersonal distress ( $\alpha = .74$ ).

### **Relationship measures**

#### *Relationship quality*

We used the 5-item Quality of Marriage Index (QMI;  $\alpha = .94$ ; Norton, 1983), which we adapted for use with cohabiting couples (e.g., "Our marriage is strong" was changed to "Our relationship is strong"), and the 6-item Emotional Intimacy subscale from the Personal Assessment of Intimate Relationships scale (PAIR;  $\alpha = .86$ ; Schaefer & Olson, 1981). QMI and PAIR items are scored on 7-point scales, and average scores were high: 6.13 QMI and 5.49 PAIR. Because the two measures were strongly correlated ( $r = .76$ ,  $p < .001$ ), we standardized the scales and took the average to form a relationship quality index.

### **Overview of the analysis**

Because sex and race were primary predictor variables in this paper, we first examined whether any demographic or illness background variables were correlated with sex and/

<sup>3</sup> When we conducted the analyses excluding couples with a less recent diagnosis, the significant interaction between sex and race on diabetes self-care became marginal,  $F(1,181) = 3.71$ ,  $p = .06$ .



or race. After determining covariates of sex and race, two sets of analyses were conducted. First, two-way analyses of covariance were conducted to explore the effects of sex and race on participant health and relationship outcomes. When the sex by race interaction was not significant, it was dropped from the model and only main effects are reported. Second, a set of hierarchical multiple regressions were conducted to examine whether participant relationship quality was linked to participant health and whether this association was moderated by participant sex and/or race. Step 1 included the covariates, as well as main effects for sex, race, and relationship quality. Step 2 included two-way interaction terms between sex, race, and relationship quality. Step 3 included the three-way interaction term between sex, race, and relationship quality. Before creating the interaction terms, continuous variables were centered for interpretability. Sex was coded as 0 = Male, 1 = Female, and race was coded as 0 = White, 1 = Black. In the absence of a three-way interaction, the results of Step 2 are reported; in the absence of the three-way or any two-way interactions, the results of Step 1 are reported. This statistical approach is appropriate for analyses regarding the intersectionality of multiple identities—the interaction term between sex and race represents the idea of multiplicative intersectionality (Bauer, 2014).

## Results

### Background analysis

Prior to conducting the main statistical analyses, we examined whether all of the variables shown in Table 1 as possible covariates (see Table 1). There was a marginal sex difference in household income, such that men had a higher household income than women. There were race differences in age, household income, years since diagnosis, whether the participant was on insulin, marital status, and

relationship length. Black adults were younger, had a lower household income, had been diagnosed less recently, and were more likely to be on insulin than White adults. Black adults were also more likely to be unmarried and had been married for less time than White adults. Because we thought there might be overlap among these variables linked to race, we sought to limit the redundancy by entering all six potential covariates into a multiple logistic regression to predict participant race. Results showed that participant race was predicted by income,  $B = -.20$ ,  $p < .01$ , marital status,  $B = -.99$ ,  $p < .05$ , relationship length,  $B = -.004$ ,  $p < .01$ , and years since diagnosis,  $B = .18$ ,  $p < .10$ , but not by age  $B = -.01$ ,  $p = .60$ , or being on insulin,  $B = .29$ ,  $p = .48$ . Thus, income, years since diagnosis, marital status, and relationship length were used as covariates in all subsequent analyses.

### Effect of sex and race on health and relationship outcomes

Table 2 presents the results of sex by race ANCOVAs on all outcomes.

#### Behavioral health

As shown in Table 2, there was a main effect of race on diabetes self-care behaviors that was qualified by an interaction with sex,  $F(1,192) = 5.05$ ,  $p < .05$  (Supplemental Figure 1a). Black women appeared to exhibit the poorest self-care compared to all other groups; the other three groups seemed to exhibit similar levels of self-care. There were no sex or race differences in medication adherence. There was also an interaction between sex and race on diabetes self-efficacy,  $F(1,192) = 5.16$ ,  $p < .05$ , such that Black women also appeared to have the lowest self-efficacy compared to all other groups (Supplemental Figure 1b).

**Table 2** Sex by race analyses of covariance (ANCOVAs) on participant health and relationship quality (estimated marginal means, standard errors, and  $p$  values)

	Participant characteristics				$p$		
	Black		White		Sex	Race	Sex $\times$ race
	Male	Female	Male	Female			
Self-care	.05 (.08)	– .25 (.09)	.07 (.08)	.14 (.08)	.17	.04*	.03*
Medication adherence	4.36 (.08)	4.42 (.09)	4.51 (.08)	4.57 (.08)	.45	.16	–
Self-efficacy	69.90 (2.95)	60.11 (3.38)	68.05 (2.80)	71.56 (3.02)	.28	.16	.02*
Depressive symptoms	11.97 (1.26)	12.51 (1.40)	12.27 (1.24)	12.81 (1.27)	.70	.86	–
Diabetes distress	2.02 (.12)	2.26 (.13)	2.12 (.12)	2.37 (.12)	.06+	.49	–
Relationship quality	5.83 (.14)	5.59 (.16)	6.00 (.14)	5.76 (.15)	.13	.34	–

+ $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

### Psychological health

There were no sex or race differences in depressive symptoms. However, women reported marginally more diabetes-related distress than men,  $F(1,193) = 3.48$ ,  $p < .10$ . There was no race difference or sex by race interaction on diabetes distress.

### Relationship quality

There were no sex or race differences in relationship quality.

### Links of relationship quality to health

Table 3 presents the standardized betas, change in  $R^2$ , and total  $R^2$  for the regression analyses that involve relationship quality and health.

### Behavioral health

Relationship quality was associated with self-care, such that higher relationship quality was associated with better diabetes self-care, but there were no interactions involving sex or race. For medication adherence, there was a sex by race by relationship quality interaction. Higher relationship quality was related to better medication adherence for Black women but not the other groups (Supplemental Figure 2).

Relationship quality was associated with increased self-efficacy, and this effect was qualified by a significant interaction with sex and a marginal interaction with race, both of which were qualified by a three-way sex by race by relationship quality interaction. Relationship quality was linked to higher diabetes self-efficacy for White women, White men, and Black women, but the association was stronger for Black women and White men (Supplemental Figure 3). Relationship quality was unrelated to self-efficacy for Black men.

### Psychological health

Higher relationship quality was linked to lower depressive symptoms, but this effect was qualified by a significant interaction with race. A stronger association between relationship quality and lower depressive symptoms was found for White participants than for Black participants (Supplemental Figure 4). Higher relationship quality was also linked to lower diabetes distress, and there were no interactions with sex or race.

## Discussion

Numerous studies have established that sex and race are important factors to consider in the health and relationships of persons with type 2 diabetes, but the effects of sex and

**Table 3** Multiple regressions to predict participant health (standardized  $\beta$ s,  $\Delta R^2$ , and total  $R^2$ )

	Self-care $\beta$	Medication adherence $\beta$	Self-efficacy $\beta$	Depressive symptoms $\beta$	Diabetes distress $\beta$
<i>Step 1</i>					
Income	.09	.11	-.09	-.28***	-.10
Years since diag.	-.10	-.12+	-.10	.01	-.002
Marital status	-.13	-.09	.02	-.10	-.003
Relationship length	.11	.18*	.06	-.17*	-.14
Sex	-.06	.06	.13	-.01	.10
Race	-.14+	-.14	.08	-.05	-.08
Relationship quality	.23***	.11	.45**	-.36**	-.28***
$\Delta R^2$	.14	.16	.13	.28	.14
<i>Step 2</i>					
Sex $\times$ RQ	—	-.03	-.14	-.15	—
Race $\times$ RQ	—	-.18	-.26+	.19*	—
Sex $\times$ race	—	.10	-.24*	-.003	—
$\Delta R^2$	—	.05	.03	.03	—
<i>Step 3</i>					
Sex $\times$ race $\times$ RQ	—	.46**	.31*	—	—
$\Delta R^2$	—	.05	.02	—	—
Total $R^2$	.14	.26	.18	.31	.14

RQ relationship quality

+ $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

race cannot be understood in isolation from each other. The experience of Black men in the world is not the same as White men, nor is the experience of Black women the same as White women. The current study underscores the importance of an intersectionality framework (Crenshaw, 1989; Cole, 2009), particularly when examining health outcomes and the link between relationships and health. This study uncovered several key findings that would remain hidden if the effects of sex and race were examined independently, but that emerge when examining their interaction.

The first study aim was to examine the effects of sex, race, and the interaction between the two on the behavioral health of persons with type 2 diabetes. We predicted that men would have higher self-efficacy than women and White adults would have higher self-efficacy than Black adults. We did not see these effects in our study. However, we also predicted that Black women would report the lowest self-care, medication adherence, and self-efficacy. We found that Black adults had lower self-care than White adults, and that Black women reported the lowest self-care and self-efficacy of all four groups.

One theory that explains why Black women might exhibit a behavioral profile that is distinct from other sex or racial groups is the “weathering” hypothesis (Geronimus, 2001), whereby the unique and multiple forms of adversity that Black women experience have a compounding effect on health behaviors. On top of the societal disadvantages that Black adults experience (Williams et al., 2010), Black women incur additional economic and social responsibilities that may make it more difficult to care for a chronic illness like diabetes. For instance, many Black women have multiple caregiving responsibilities as mothers, wives, and daughters, which can be an added source of stress and a barrier to diabetes self-care (Leeman et al., 2008). Although the current study cannot address the exact reasons for poorer self-care and self-efficacy among Black women, the correspondence of our findings with previous literature indicates that studying the intersection of sex and race is critical to better understand disparities in behavioral health.

Our results also shed light on the psychological health of persons with type 2 diabetes. We predicted that women would report higher levels of depressive symptoms and diabetes distress than men. However, we did not observe a sex difference in depressive symptoms, which contradicts a large literature showing that women report more depressive symptoms than men (Chiu & Wray, 2010; Li et al., 2008). With respect to diabetes distress, we found a marginally significant finding suggesting that women reported greater diabetes distress than men. Though we do not wish to overinterpret this finding, these combined results may suggest that the higher level of diabetes distress observed

in women cannot simply be explained by greater depressive symptoms. In fact, the sex difference in diabetes distress may be larger among the general population of adults with diabetes, as compared to those who were recently diagnosed.

We did not observe a race difference in psychological health or an interaction between race and sex on psychological health. Previous research regarding race differences in depression is equivocal (Li et al., 2008; Barnes & Bates, 2017), but Black adults typically report higher diabetes distress than White adults (Hausmann et al., 2010; Peyrot et al., 2014). The reason why Black adults, and particularly Black women, do not report higher depression despite exhibiting worse physical health within the general population is unknown and has yet to be reconciled with the weathering hypothesis. Substantive explanations of the “Black–White depression paradox”, which highlight protective factors like religiosity and strong social support among Black adults, have not received much support through empirical work (Barnes & Bates, 2017). Rather, the most promising explanation thus far is that typical measures of depressive symptoms focus on psychological rather than somatic aspects of depression, and Black adults express depression more somatically than White adults.

The second study aim was to explore the link between relationship quality and health among persons with type 2 diabetes, as well as whether this link was moderated by sex, race, or the interaction between the two. Consistent with previous research, higher relationship quality was associated with better behavioral and psychological health (Robles et al., 2014). People with higher relationship quality may experience more partner involvement in diabetes care, making it easier for the person with diabetes to adjust to their disease.

However, the link of relationship quality to health was not the same for all groups. Similar to our previous findings, Black women demonstrated a pattern of results that distinguished them from other groups: relationship quality was more strongly connected to medication adherence and self-efficacy of Black women than of other groups. Previous work has suggested that Black women have been socialized to become more self-sufficient to cope with the societal disadvantages they face, as well as the shortage of Black male partners (Banks, 2011). Our findings appear to suggest that Black men who are able to overcome their own societal barriers may play an especially important role in ameliorating certain aspects of the diabetes regimen for Black women. A supportive partner might provide Black women with more resources than they typically expect to have, helping to create space for Black women to contend with their own diabetes in spite of the other social and economic responsibilities they must bear.



Interestingly, relationship quality mattered most for the self-efficacy of Black women *and* White men. Though these two groups demonstrate a similar pattern, there may be a different explanation for the finding for White men. Some research has shown that husbands perceive more support from their wives than wives do from their husbands (Goldzweig et al., 2009), which may indicate that the support and resources that White female partners provide play a critical role in increasing White men's confidence in managing their diabetes. However, other studies have shown a stronger effect of social support on health for women than for men (Rosland et al., 2012). More research is needed to better understand the reasons why Black women and White men exhibit similar patterns in the link between relationship quality and self-efficacy, but not in other health domains we examined.

The influence of race on the link between relationship quality and psychological health revealed a different pattern of findings. Relationship quality was more strongly related to improved depressive symptoms for White adults than for Black adults. This finding might be explained by differences in the sources of support for White and Black adults. It is possible that White adults may rely more on romantic partners for support with psychological health issues, whereas Black adults may rely more on extended family and community for support (Brown, 2008). More research on the use of extended social support networks when dealing with depressive symptoms is needed to determine whether there are indeed race differences in coping.

Several study limitations should be noted before concluding. First, average relationship quality was high for all groups, which may indicate that participants in more supportive relationships self-selected to participate or had concerns about self-presentation. The study did utilize a community sample, which bolsters the generalizability of the findings. Second, the cross-sectional design of the study does not allow for causal claims about the association between relationship quality and health, as it is possible that a person's health affects their relationship quality. Future longitudinal research can help disentangle the causal direction.

As sex by race interactions on health outcomes and on the link between relationships and health have seldom been investigated in the past, we hope our findings motivate future researchers in this area to consider taking an intersectionality approach to studying health and relationships. It is paramount that future research determines whether these newly identified interactive effects found in the current study can be replicated. Subsequently, future work will be able to shift from focusing on the intersection of sex and race on health and relationships toward understanding the intersectional processes that underlie these group differ-

ences. We also urge investigators to reflect on previous research that has examined sex or race in isolation with caution. Our results raise questions regarding whether differences between Black and White adults in diabetes health found in previous studies were driven primarily by Black women.

Future research should also seek to determine the mechanisms that would explain why the effect of relationship quality on health depends on a person's identity. Researchers in this area should examine the reasons why relationship quality is especially important for the behavioral health of Black women with diabetes, and whether the importance of a romantic relationship for behavioral health extends to Black women in the general population as well. It is possible that Black male partners provide tangible assistance specifically related to diabetes self-care; alternatively, relationship quality might be important for the behavioral health of Black women, regardless of whether they have a chronic illness. Similarly, researchers should explore why relationship quality might be more important for the psychological health of White adults with diabetes. There may be cultural differences in who is determined to be the most appropriate person to call on for support—a romantic partner or a member of one's extended network.

The current study highlights a critical need to consider the intersection between sex and race when examining the health of persons with type 2 diabetes and the impact that close relationships have on health. Our findings suggest that Black women with diabetes are disproportionately affected in terms of taking care of their diabetes and feeling able to do so, but that the behavioral health disadvantages Black women experience might be attenuated by having supportive romantic relationships. Similar findings may be masked in previous studies that only focused on the effects of sex or race. Applying an intersectionality framework to relationships and health not only uncovers these hidden differences, but also provides a lens for considering the distinct life experiences that affect how individuals cope with diabetes.

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#### Compliance with ethical standards

**Conflict of interest** Jeanean B. Naqvi, Vicki S. Helgeson, Tiffany L. Gary-Webb, Mary T. Korytkowski, and Howard J. Seltman declare that they have no conflict of interest.

**Human and animal rights and Informed consent** All procedures followed were in accordance with ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

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