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Discrimination, Family Emotional Climate, and African American Health: An Application of the BBFM

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The Biobehavioral Family Model (BBFM) is a biopsychosocial model of health that has been substantiated across multiple studies. However, the findings of those studies are limited given the lack of representation of Black/African American individuals in the samples. Discrimination is a chronic and pervasive stressor for many African American families, yet little is known about connections between discrimination, family relationships, and health. Using Data from the Midlife Development in the United States (MIDUS) Milwaukee project (n = 592), this study tested the pathways of the BBFM with a sample comprised only of African American individuals Additionally, it tested how discrimination influenced the pathways of the BBFM. Results of model testing found that family support (above and beyond romantic partner relationship quality and family strain) was a key factor in respondents' mental and physical health and that family support mediated the association between discrimination and mental health. The findings suggest the importance of including discrimination when examining family health pathways for African Americans and exploring the influence of relationships beyond the romantic partnership when examining health.

Keywords: discrimination, family functioning, African American health, biopsychosocial

Since its inception, the biobehavioral family model (BBFM; Wood et al., 2008) has been used in numerous studies as a framework to explain the biopsychosocial connections between family and marital relationships and health for children and adults (e.g., Priest et al., 2015; Woods & Denton, 2014; Wood et al., 2008). The theoretical model specifies a mediation relationship, whereby family emotional climate (which includes relationships with spouses, siblings, parents, and/or children) impacts the physical health of individual family members through individuals' biobehavioral reactivity or psychophysiological reactions to stress (Wood et al., 2008) when chronic, biobehavioral reactivity promotes disease activity, including the etiology and potentiation of illness symptoms and disease outcomes. In other words, when the emotional climate of a family is negative and characterized by strain, criticism, hostility, and conflict, the distress of this negativity is experienced psychologically and physiologically by individual family members; this stress reactivity is the critical mediator, which promotes worse physical health over time (Wood, Miller, & Lehman, 2015). Biobehavioral reactivity has regularly been operationalized as depression and anxiety. Both conditions are psychophysiological reactions to stress, such that each include psychological symptoms such as worry, sadness, and irritability, as well as physiological symptoms, including psychomotor agitation/retardation, fatigue, sleep disturbance, nausea, and pain (Priest, Roberson, & Woods, 2019). Depression and anxiety have both been substantiated as operationalizations of biobehavioral reactivity in multiple studies examining adult health outcomes (e.g., Priest et al., 2019; Woods & Denton, 2014; Woods, Priest, & Roush, 2014).

The BBFM and Diverse Populations

Though the preponderance of research examining the hypotheses of the BBFM lacks racial/ethnic diversity among respondents, there are two notable exceptions. First, Priest and Woods (2015) tested the applicability of the BBFM for explaining Latinx health, confirming the association between a negative family emotional climate and physical health outcomes, mediated by biobehavioral reactivity (measured as depression and anxiety symptoms), for this population (Priest & Woods, 2015). Interestingly, the direct pathway between negative family emotional climate and disease ac-

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tivity differed by nativity, such that the association was not fully mediated by biobehavioral reactivity for U.S.-born Latinx adults.

Second, Woods and Denton (2014) tested the relevance of the BBFM for explaining the health of adult primary care patients. The sample surveyed was primarily uninsured and low-income and predominantly African American (59%). The authors operationalized family emotional climate using a measure of family functioning as well as a measure of romantic relationship quality, tested in unique models highlighting similar mediation pathways. Specifically, the authors found that both family emotional climate and romantic relationship emotional climate were linked to measures of disease activity (e.g., role limitations due to physical health, illness symptoms, pain) via biobehavioral reactivity (measured as anxiety and depression symptoms). However, though this test of the BBFM substantiated the applicability of the model's pathways for adult populations and underserved groups in health care, it failed to specifically test unique attributes of race/ethnicity and minority family experiences that likely impact the indirect relationship posited by this theoretical approach.

The ultimate goal of the BBFM is to inform family based interventions designed to treat mental and physical health. However, the lack of Black/African American respondents in the samples testing the hypotheses of the BBFM greatly limits the generalizability of the model. Without testing the assumptions of the model with diverse samples, it is unknown whether treatments developed from the BBFM would be effective for minority families. Therefore, while the purpose of the present study is to utilize the BBFM to specify, a priori, pathways whereby family relationships impact the health of African American adult family members, a secondary benefit of conducting this research is to test the broader applicability of the theoretical model with diverse samples. Results will advance families and health research with African American adults and have the potential to inform future family based interventions for use with African American families.

Family and Marital Relationship Processes and African American Health

Previous research suggests that the link between family and marital processes and health outcomes is unique for African Americans. In particular, Sternthal, Slopen, and Williams (2011) found that Blacks reported significantly greater relationship stressors (e.g., marital stressors, marital abuse, and child-related stressors) than Whites, American-born Hispanics, and foreign-born Hispanics; these relationship stressors were associated with worse health outcomes for African Americans. Scholars have also found that African American adults experience worse physical health than European Americans, as predicted by worse parental relationship quality earlier in life and worse close relationship functioning in adulthood (Doyle, Factor-Litvak, & Link, 2018).

Racial differences in how families and marriages impact health may be explained, in part, by the historical and contemporary role of family in African American communities. African philosophical orientations identify the centrality of interdependence, a sense of belonging, and a collective identity to the African American ethos (Nobles, 1991). This African ethnic legacy continues to penetrate the experiences of African American families as it has been preserved and passed down across generations through cultural values, customs, norms, and behaviors (Nobles, 1991). A fundamental aspect to this worldview is communalism, where "individuals view themselves as being inextricably linked with others in their social milieu" (Boykin, Jagers, Ellison, & Albury, 1997, p. 410). This is often reflected in social support from extended family and kinship networks as well as egalitarian and flexible family roles (Boyd-Franklin, 1989). As such, African Americans are likely to depend on an extended network of family members for both instrumental and emotional support when dealing with social, mental, and physical health issues (Neighbors, 1997; Warren-Findlow & Prohaska, 2008). Among individuals in intimate partner relationships, we also find that African Americans tend to rely on their partner for social support, which is linked to their and their partner's health. For example, previous research finds that increased levels of social support from one's intimate partner are associated with lowered husband and wives' depressive symptomology (McNeil, Fincham, & Beach, 2014) and better self-reported physical and mental health (McNeil Smith, Williamson, Branch, & Fincham, 2019).

It is worth noting that due to the dependence on family and intimate partners for support, members may feel burdened when resources are overextended or depleted (Neighbors, 1997). Recent evidence suggests that providing daily family support decreases the well-being of African American adults and increases their reactivity to stress; the same effects were not found for the well-being of European American adults (Cichy, Stawski, & Almeida, 2014). Furthermore, African American women in heterosexual romantic partner relationships may experience an additional burden when providing social support to their male counterparts, specifically as it relates to racial discrimination (McNeil Smith et al., 2019). Thus, the overall family emotional climate consisting of both family and intimate partner support and stress likely has a unique influence on health outcomes for African Americans. Therefore, identifying the specific mechanisms whereby family relationships impact the physical health outcomes of African Americans is critical, especially given the unique environmental stress exposures experienced by this group.

Emotional and Mental Health as a Mechanistic Pathway

The process by which family and marital relationships are linked to physical health may be through lowered emotional and mental health—types of psychophysiological responses to stress. Existing evidence provides support for the impact of family relationships on the mental health of African Americans. On the one hand, family emotional closeness and supportive relationships are related to a lower risk for social anxiety disorder (Levine, Taylor, Nguyen, Chatters, & Himle, 2015) and lifetime major depressive disorder (Lincoln & Chae, 2012), fewer depressive symptoms (Lincoln, Chatters, & Taylor, 2003), and lower psychological distress (Lincoln et al., 2003). On the other hand, family conflict is related to more depressive symptoms (Chesla et al., 2004; Lincoln & Chae, 2012; Taylor, Chae, Lincoln, & Chatters, 2015) and a higher risk of social anxiety disorder (Levine et al., 2015).

Similar to physical health, the process by which family and marital relationships affect mental health may operate uniquely for African Americans. In particular, Chapman and Woodruff-Borden (2009) found that family functioning, as measured by the McMaster Family Assessment Device, was a stronger predictor of anxiety symptoms in

their European American sample than in their African American sample. Additionally, Lincoln et al. (2003) found that greater social support from relatives was related to lower psychological distress for African Americans; however, negative interactions with relatives were related to greater psychological distress for Whites.

These poor mental health outcomes may subsequently contribute to physical health disparities for African Americans. Research demonstrates that depressive and anxiety symptoms, in particular, are associated with worse physical health for African Americans. For instance, Gary, Crum, Cooper-Patrick, Ford, and Brancati (2000) found that increased depressive symptomology was associated with elevated blood pressure, cholesterol, and average blood glucose levels in a sample of African American adults with Type 2 diabetes. Similarly, Davidson, Jonas, Dixon, and Markovitz (2000) found that depressive symptoms predicted later hypertension among Blacks, but not Whites, in their coronary artery risk development in young adults study sample. Black adults are also at an increased risk for comorbid depression and chronic pain compared to their White counterparts (Miller & Cano, 2009).

Overall, research supports a pathway from family and marriage to health for African American adults, including impacts on both mental and physical well-being. These pathways appear to operate in unique ways, predicting differential health outcomes for African Americans, especially as compared to their European American counterparts. Moreover, health disparities in mental and physical health are likely mutually influencing, such that worse distress and emotion dysregulation further complicates disease outcomes. However, these processes must be considered in the context of racial discrimination—a part of African Americans' lived experience (McNeil Smith & Landor, 2018).

Discrimination, Family and Marital Relationships, and Health Among African Americans

Discrimination is a chronic and pervasive stressor in the lives of African Americans (Carter, 2007; Clark, Anderson, Clark, & Williams, 1999). Nearly 9 out of 10 African Americans report experiencing discrimination in their day-to-day lives (Kessler, Mickelson, & Williams, 1999), and a substantial body of research finds that these experiences can have deleterious effects on African Americans' psychological and physical health (Paradies, 2006; Pieterse, Todd, Neville, & Carter, 2012; Williams & Mohammed, 2009). In fact, racial discrimination is considered to be an underlying determinant of racial health disparities in the U.S. (Williams & Mohammed, 2009) as it can lead to inequitable access to resources that directly or indirectly affect health (e.g., educational opportunities, social support, mental health treatment) and can produce "downstream health effects" by wearing down the body's regulatory systems (Mays, Cochran, & Barnes, 2007). Furthermore, there are psychological and mental health consequences of racial discrimination such as psychological distress (Ong, Fuller-Rowell, & Burrow, 2009), anger (Pittman, 2011), paranoia (Combs et al., 2006), and anxious arousal (Graham, West, & Roemer, 2013). Scholars have also found that increased levels of racial discrimination are associated with a host of physical health outcomes including obesity (Cozier et al., 2014), diabetes (Bacon et al., 2017), cancer incidence (Taylor et al., 2007), risk of mortality (Barnes et al., 2008), hypertension (Dolezsar, McGrath, Herzig, & Miller, 2014), and diastolic blood pressure reactivity (Guyll, Matthews, & Bromberger, 2001).

Although there is a wealth of knowledge about the influence of racial discrimination on the psychological and physical health of African Americans, we know far less about whether racial discrimination contributes to a process by which family relationships are linked to physical health outcomes. This connection seems plausible based on prior research that links racial discrimination with family relationship processes among African American adults. For instance, Doyle and Molix (2014) found that higher levels of perceived discrimination were associated with greater levels of relationship strain with family, friends, and spouses. Furthermore, using a sample of African American mothers, Murry, Brown, Brody, Cutrona, and Simons (2001) found that for mothers experiencing higher levels of racial discrimination, stressor-pileup was associated with increased psychological distress and in turn lower quality of relationships with their children and intimate partners. At the bivariate level, Lincoln and Chae (2012) found that unfair treatment was inversely related to marital satisfaction in a national sample of African American and Caribbean Black adults. Most recently, Doyle et al. (2018) found that physical health disparities for African American adults were predicted by minority status through the experiences of perceived discrimination as well as worse parental relationship functioning in adolescence. Moreover, though not a hypothesis of the study, the authors found evidence that perceived discrimination was linked to impaired close relationship functioning and subsequently worse physical health in adulthood.

Taken together, research shows that racial discrimination is spilling over into the family and marital domain and affecting functioning for African Americans (Bryant et al., 2010; Murry et al., 2001). Scholars are finding that racial discrimination is associated with both poor health outcomes and compromised family and marital functioning (e.g., Doyle et al., 2018). Emerging research also demonstrates that it is possible that supportive intimate partner relationships can reduce the negative effects of racial discrimination (Guyll, Cutrona, Burzette, & Russell, 2010; McNeil et al., 2014; McNeil Smith et al., 2019). Nonetheless, examinations of relational functioning in the family emotional climate as a pathway of linking racial discrimination and health outcomes are underdeveloped. Therefore, in addition to identifying the pathways by which family and marital relationships affect the health outcomes of African Americans, it is imperative to understand the influence of racial discrimination on these family health pathway given that it is a prevalent stressor for African Americans. Such findings will further elucidate the role of racial discrimination in creating and maintaining existing racial health disparities. Especially important is the use of an evidence-based theoretical model to specify a priori family health pathways, providing specific areas amenable to family-based intervention with the potential to reduce health disparities experienced by African American adults. The BBFM is such an evidence-based model and is the most empirically supported approach to theorizing family and health associations (Woods, 2019); thus it is prime for guiding families and health research.

Present Study

The BBFM specifies a mediation relationship whereby biobehavioral reactivity (i.e., worse mental and emotional health in the

face of stress) mediates the effects of family emotional climate (i.e., the quality and intensity of family relationships) on individual family members' disease activity. Therefore, this study will replicate and extend prior research using the BBFM as a theoretical guide. We hypothesize: a) a direct pathway between family and intimate partner emotional climates and biobehavioral reactivity, such that a more negative emotional climate (i.e., low levels of support and high levels of strain) will be associated with worse mental-emotional health; b) a direct pathway between biobehavioral reactivity and disease activity, such that worse mental-emotional health will be associated with increases in disease activity; and c) an indirect relationship between family and intimate partner emotional climate and disease activity that is mediated by biobehavioral reactivity (thereby rendering the direct pathway between family emotional climate and disease activity nonsignificant).

Given the role that discrimination plays in the family emotional climate and health of African Americans, we also postulated how discrimination may affect the pathways of the BBFM. Specifically, we hypothesized that greater racial discrimination will be linked to worse health indirectly through family and intimate partner emotional climates and biobehavioral reactivity (thereby rendering the direct pathway between discrimination and disease activity nonsignificant).

Method

Sample

Data for this study comes from the Midlife in the United States (MIDUS) 2: Milwaukee African American sample (Ryff et al., 2012). A data agreement was obtained between the authors of this study and the National Archive of Computerized Data on Aging; the authors IRB deem this study nonhuman research due to the de-identified and public nature of the data. This sample was recruited to specifically examine health issues in African American populations. Responses were gathered between 2004 and 2006. A stratified probability sampling design was used to sample households in Milwaukee County, Wisconsin. Specifically, census tracts where at least 40% of residents were Black/African American were identified, and then census blocks were stratified by income so that about half of the respondents came from tracts where the median household income was greater than $40,000, and the other half came from tracts where the median household income was less than $40,000. Respondents were interviewed in their homes using two methods—a computer assisted personal interview and a self-administered questionnaire. These two methods asked about intimate partner and family relationships, mental-emotional health, and physical health. The response rate was 70.7% for the in-person interviews.

This sampling procedure resulted in a sample of 592 African American adults (62.5% female). The average age of the sample was 51.64 (SD = 11.90), which is somewhat older that existing research (e.g., Murry et al., 2001; Ong et al., 2009; Taylor et al., 2015); 94.2% of the sample identified their primary racial origins as Black/African American. The average household income was $38,772 ($SD$ = 37,873), and 19.3% did not graduate from high school, 36.3% reported having a high school diploma or a GED, 26.2% reported attending at least 1 year of college, 4.7% graduated from a 2 year college, 6.3% had a bachelor's degree, and 7.1% had attended graduate school or held a master's degree or PhD. In this sample, 70.1% reported experiencing some form of discrimination at least once throughout their lifetime. Of those who reported experiencing discrimination, 77.8% reported that the main reason they reported experiencing discrimination was because of their race/ethnicity. These percentages are in line with more recent reports of the frequency of discrimination (Pew Research Center, 2019).

Variables

Family emotional climate was measured using a family strain scale and a family support scale, both which have been used in previous tests of the BBFM (e.g., Priest et al., 2015, 2019). The family strain measure included 4 items that asked respondents to indicate how much members of their family, excluding their spouse/partner, criticized them, got on their nerves, let them down, and made too many demands on them. Responses were on a scale ranging from 1 (*a lot*) to 4 (*not at all*) and were recoded such that higher scores indicated greater strain. Item responses were averaged to create a family strain scale score. Cronbach's alpha of the family strain scale for the sample was $\alpha = .78$.

The family support scale also included 4 items and asked respondents to indicate how much members of their family, excluding their spouse/partner, cared about them, understood the way they feel, would help them if they had a serious problem, and could listen about their worries. Similar to the family strain scale, responses ranged from 1 (*often*) to 4 (*never*) and were reverse coded prior to being averaged to create a family support scale score. Cronbach's alpha for the sample was $\alpha = .83$.

Intimate partner emotional climate was assessed using two scales, both which have been used in previous tests of the BBFM (e.g., Priest et al., 2015, 2019). The first was an intimate partner strain scale. This measure included 6 items that asked respondents to indicate how often their spouses or partners made too many demands on them, argued with them, made them feel tense, got on their nerves, criticized them, and let them down. Responses ranged from 1 (*often*) to 4 (*never*), with higher scores representing greater strain. Item responses were reverse coded and averaged to create an intimate partner strain scale score whereby higher scores indicated greater strain. Cronbach's alpha for the sample was $\alpha = .83$.

The second measure included was an intimate partner support scale. This scale also included 6 items that asked respondents to indicate how much their partner really cares about them, how relaxed they could be around their partner, and how much their partner understands the way they feel, appreciates them, could listen to their worries, and could be relied on for a serious problem. Responses similarly ranged from 1 (*a lot*) to 4 (*not at all*) and were reverse coded, with higher scores indicating greater support. Item responses were averaged to create an intimate partner support scale score. Cronbach's alpha for the sample was $\alpha = .87$.

Biobehavioral reactivity was operationalized as worse mental and emotional health, a psychological consequence of stress. Mental health measures have been previously used to assess levels of biobehavioral reactivity when testing the BBFM model (Priest et al., 2019; Woods & Denton, 2014; Woods et al., 2014). Mental and emotional health was assessed using a single item. This item asks respondents to self-evaluate their mental–emotional health. Re-

sponses ranged from 1 (*excellent*) to 5 (*poor*). As noted by Ahmad, Jhajj, Stewart, Burghardt, and Bierman (2014), there is evidence that single item mental health questions are strongly associated with more multiitem measures of mental health, and it is recommended that single item measures should continue to be used in population-based studies.

Disease activity was operationalized using a chronic conditions variable and a prescription medications variable. Respondents were asked to indicate whether they had experienced any of 39 possible chronic conditions during the past 12 months, including high blood pressure, high blood sugar, stroke, heart disease, diabetes, or ulcers, as examples. The chronic conditions variable reflects the total number of chronic conditions endorsed.

The prescription medications variable reflects the total number of prescription medications respondents reported taking in the last 30 days, including medications for health problems such as diabetes, hypertension, high cholesterol, lung problems, ulcers, arthritis, or headaches. Replicating previous research (e.g., Priest et al., 2015; Priest & Woods, 2015), these two variables were used as observed variables for the latent disease activity construct.

Experienced racial discrimination was measured using two composite scales, as well as two additional items; these four measures were used to create a latent discrimination construct. The first scale measured lifetime discrimination. This scale consisted of 11 questions that asked respondents to indicate how many times in their lives that they had been discriminated against in different domains (e.g., "hassled by the police," "not given a promotion," "denied a bank loan," and "provided inferior medical care"). Respondents indicated how many times each instance had occurred, and these instances were added together to create a composite score of the number of times they had experienced these events in their lives. Cronbach's alpha for the sample was $\alpha = .99$.

The next scale measured daily discrimination. This scale consisted of 9 items that assessed how often on a daily basis respondents experienced things such as being "treated with less courtesy than other," "[given] poorer service than other people at restaurants and stores," "called names or insulted," and "threatened or harassed." Responses ranged from 1 (*never*) to 4 (*often*). Responses were summed to create a composite variable. Cronbach's alpha for the sample was $\alpha = .65$.

Additionally, two single items were used to assess the impact of discrimination on quality of life. The first item asked respondents to indicate how much "discrimination interfered with having a full life?" The second item asked respondent to indicate how much their "[lives] have been harder because of discrimination." Responses ranged from 1 (*a lot*) to 4 (*not at all*).

Data Analysis

Data analysis was conducted following the process used in previous tests of the BBFM (e.g., Priest et al., 2015; Priest & Woods, 2015; Woods et al., 2014; Woods & Denton, 2014). We tested two structural equation models: a family emotional climate model and an intimate partner emotional climate model (Priest et al., 2015; Priest & Woods, 2015). Previous research testing the BBFM has also shown the importance of examining family and intimate partner support and strain as distinct variables (Priest et al., 2019). In addition, we ran *t* tests comparing means of those who were partnered versus those who were not. Results suggested that there were no differences. In addition, we also test partnership status as a predictor in the family emotional climate model. Partner status was not related to family emotional climate or biobehavioral reactivity. As such, it was determined that we could include all participants in the family emotional climate model. The family emotional climate model includes all MIDUS 2 Milwaukee participants ($n = 592$), while the intimate partner emotional climate model includes only the subset of participants who reported being in a committed romantic relationship ($n = 220$).

The family emotional climate model examined the associations between the family emotional climate variables (support and

Table 1
Correlation and Descriptive Statistics of All Variables Used in Both Structural Models

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Family support	—										
2. Family strain	−.36**	—									
3. Partner support	.24**	.00	—								
4. Partner strain	−.11	.26**	−.49**	—							
5. Lifetime discrimination	−.12**	.13**	.00	.13*	—						
6. Daily discrimination	−.18**	.16**	.00	.20**	.51**	—					
7. Discrimination interfered with having full life	−.14**	.15**	−.01	.13	.55**	.74**	—				
8. Life has been harder because of discrimination	−.14**	.13**	.01	.16*	.53**	.75**	.90**	—			
9. Mental-emotional health	−.28**	.16**	−.13*	.12	.02	.08	.10*	.09*	—		
10. Chronic conditions	−.19**	.13**	−.20**	.21**	.10*	.14**	.12**	.11*	.36**	—	
11. Prescriptions	−.06	−.01	−.10	.04	−.07	.01	.00	.02	.26**	.59**	—
Variable distribution											
Mean	3.43	2.23	3.65	2.08	2.44	13.50	1.35	1.39	2.41	3.35	1.46
Standard deviation	.68	.80	.55	.72	2.54	5.77	1.38	1.42	1.10	2.88	1.57
Skewness	−1.43	.22	−2.11	.37	1.02	1.26	.48	.46	.21	1.09	1.18
Kurtosis	1.72	−.64	4.74	−.57	.32	.55	−1.18	−1.25	−.89	.93	1.19

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

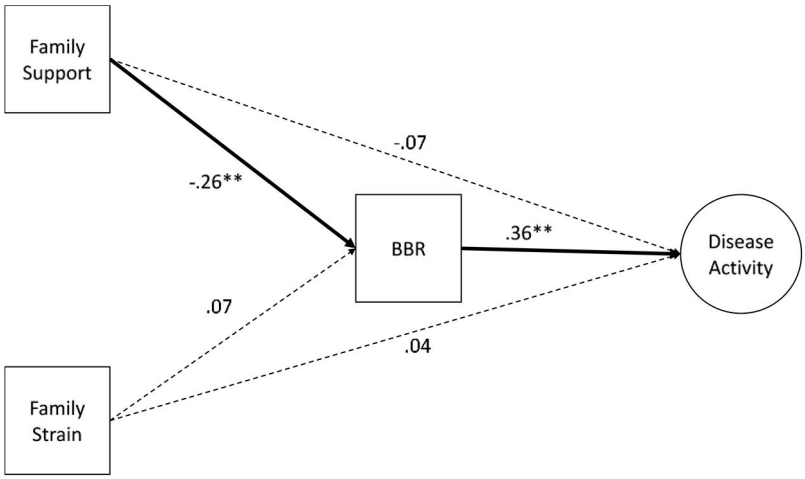

Figure 1. Family emotion climate model, $\chi^2(2) = 10.19$, $p < .01$, RMSEA = .08, CFI = .97, TLI = .89, and SRMR = .02. BBR = biobehavioral reactivity. ** $p < .01$.

strain), biobehavioral reactivity (mental and emotional health item), and the disease activity latent variable. Additionally, this model examined whether biobehavioral reactivity mediated the association between the family emotional climate variables and the disease activity latent variable.

The intimate partner emotional climate model included each of the variables of the previous model, but also included the intimate partner support and strain measures. This model examined the associations between the family and intimate partner emotional climate support and strain measures, the mental and emotional health item, and the disease activity latent variable. Additionally, this model examined whether the biobehavioral reactivity variable mediated the association between the family and intimate partner emotional climates.

Once the BBFM models were tested, a latent variable measured by the four discrimination variables was added to the model. Specifically, in the discrimination–family emotional climate model ($n = 592$), discrimination was modeled as a predictor of both family support and family strain, biobehavioral reactivity, and disease activity. Then this model tested whether the family emotional climate variables mediated the association between discrimination and biobehavioral reactivity and if the family emotional climate variables and the biobehavioral reactivity variable mediated the association between discrimination and disease activity. An identical process was used in the discrimination–intimate partner emotional climate model ($n = 220$).

All of the structural models were tested in Mplus (Muthén & Muthén, 2012). In order to account for the non-normality of the data, maximum likelihood with robust standard errors was used as the estimator (Asparouhov, 2005). Model fit was examined using five fit statistics: the χ^2 statistic, the root mean square of the approximation (RMSEA), the Tucker-Lewis Index (TLI), the comparative fit index (CFI), and the standardized root-mean-square residual. Models that demonstrated good fit for the data had small, nonsignificant χ^2 values, RMSEAs less than .10, TLIs and CFIs greater than .90, and a SRMR value less than .10 (Kline, 2011). Mediation tests were also conducted in Mplus using the delta method. This method is commonly used in structural equation modeling and is recommended as a test that can produce accurate standard errors (MacKinnon, 2012).

Models were originally tested with gender and age as control variables to account for the consistent variance explained in health by gender and age. Including these variables in the model resulted in poor model fit. We then ran the models without the controls, and the model fit improved. Additionally, the magnitude of associations remained similar in both the models with and without con-

Table 2
Factor Loading for Latent Variables

	Factor loadings	
Disease activity	B (*SE*)	β (*SE*)
Family emotional climate model		
Number of chronic conditions	1.000 (–)	.934 (.074)
Number of prescription medications	.369 (.064)	.634 (.059)
Intimate partner emotional climate model		
Number of chronic conditions	1.000 (–)	.917 (.110)
Number of prescription medications	.338 (.084)	.606 (.080)
Discrimination-family emotional partner model		
Number of chronic conditions	1.000 (–)	.973 (.110)
Number of prescription medications	.343 (.086)	.610 (.080)
Discrimination		
Lifetime discrimination	1.000 (–)	.577 (.032)
Daily discrimination	3.098 (.221)	.788 (.019)
Discrimination interfered with full life	.893 (.061)	.947 (.012)
Life been harder because of discrimination	.910 (.065)	.943 (.011)
Discrimination - intimate partner emotional climate model		
Number of chronic conditions	1.000 (–)	.922 (.111)
Number of prescription medications	.333 (.084)	.597 (.082)
Discrimination		
Lifetime discrimination	1.000 (–)	.597 (.047)
Daily discrimination	2.883 (.310)	.762 (.034)
Discrimination interfered with full life	.805 (.086)	.956 (.016)
Life been harder because of discrimination	.817 (.092)	.943 (.022)

Table 3
Results of the Mediation Analysis for the Family Emotional Climate Model

Family support → Disease activity	Estimate	Standard error	*p*-value
Total	−.17	.05	.001
Indirect			
Support → BBR → DA	−.09	.05	.000
Direct			
Support → DA	−.07	.05	.14

Note. BBR = biobehavioral reactivity; DA = disease activity.

trols. Given the improved model fit without the controls and the similar conclusions from the hypothesized relationships, results are presented for the models that did not include gender and age as controls.

Results

Variable means, standard deviations, skewness, kurtosis, and correlations between all variables used in the analyses are presented in Table 1. Of the four family emotional climate variables, only partner strain was not significantly associated with the discrimination variables and the biobehavioral reactivity variable. The discrimination variables were significantly linked with the biobehavioral reactivity variable and with the number of chronic conditions. The biobehavioral reactivity variable was linked to both of the disease activity variables.

Family Emotional Climate Model

The family emotional climate model fit the data well ($\chi^2(2) = 10.19$, $p = .01$, RMSEA = .08, CFI = .97, TLI = .89, SRMR = .02). Standardized pathway estimates for the significant structural paths are shown in Figure 1. Factor loadings for the latent variables of the model are reported in Table 2. A significant pathway was found between family support and biobehavioral reactivity, such that less support was associated with worse mental and emotional wellbeing. The association between family strain and biobehavioral reactivity was nonsignificant. A significant association was also found between biobehavioral reactivity and disease activity, such that worse mental and emotional wellbeing was associated with a greater number of chronic conditions and prescription medications. This model explained 15.6% of the variance in the disease activity construct.

The results of the mediation analysis for only the significant relationships are shown in Table 3. Biobehavioral reactivity partially mediated the association between family support and disease activity. Since the family strain variable was not significantly linked to biobehavioral reactivity, the mediation test was also nonsignificant.

Intimate Partner Emotional Climate Model

The intimate partner emotional climate model also fit the data well ($\chi^2(4) = 4.17$, $p = .38$, RMSEA = .01, TLI = .99, CFI = .99, SRMR = .02). Standardized pathway estimates for the structural paths are shown in Figure 2. Factor loadings for the latent variables are reported in Table 2. No significant association was found between intimate partner emotional climate measures and biobehavioral reactivity. However, similar to the family emotional climate model, family support (but not strain) was significantly associated with biobehavioral reactivity, such that less support was associated with worse mental and emotional well-being. Biobehavioral reactivity was, in turn, associated with greater disease activity. This model explained 21.2% of the variance in the latent disease activity construct.

Table 4 reports the results of only the significant mediation analysis. Biobehavioral reactivity partially mediated the associa-

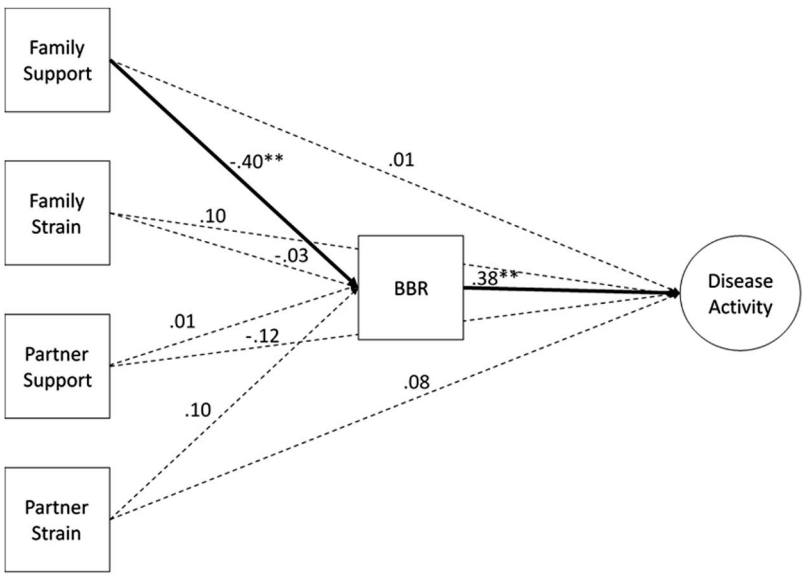

Figure 2. Intimate partner emotion climate model, $\chi^2(4) = 4.17$, $p < .38$, RMSEA = .01, CFI = .99, and SRMR = .02. BBR = biobehavioral reactivity. ** $p < .01$.

Table 4
Results of the Mediation Analysis for the Intimate Partner Emotional Climate Model

Family support → Disease activity	Estimate	Standard error	*p*-value
Total	−.15	.08	.08
Indirect			
Family support → BBR → DA	−.15	.04	.001
Direct			
Family support → DA	.01	.08	.93

Note. BBR = biobehavioral reactivity; DA = disease activity.

Table 5
Results of the Mediation Analysis for Discrimination—Family Emotional Climate Model

	Estimate	Standard error	*p*-value
Discrimination → BBR			
Total	.10	.04	.02
Indirect			
Discrimination → Support → BBR	.04	.01	.01
Direct			
Discrimination → BBR	.05	.04	.23
Discrimination → DA			
Total	.12	.05	.01
Indirect			
Discrimination → Support → BBR → DA	.01	.005	.01
Direct			
Discrimination → DA	.07	.04	.09

Note. BBR = biobehavioral reactivity; DA = disease activity.

tion between family support and disease activity. Similar to the family emotional climate model above, direct and indirect effects linking family strain to disease activity were nonsignificant.

Discrimination–Family Emotional Climate Model

Our next set of analyses incorporated our discrimination measures into the modeling to estimate the effects of this contextual stressor on the core pathways specified by the BBFM. Results for the family emotional climate model including the effects of discrimination demonstrated a good fit to the data ($\chi^2(20) = 43.80$, $p = .002$, RMSEA = .05, CFI = .99, TLI = .98, SRMR = .03). Standardized pathway estimates are shown in Figure 3. Factor loadings for the latent variables are reported in Table 2. Discrimination was significantly linked to both family support and family strain, such that greater discrimination was associated with less support and more strain. Replicating results from our first model, family support (but not family strain) was significantly linked to greater biobehavioral reactivity, and biobehavioral reactivity was significantly linked to disease activity, in the hypothesized directions. This model accounted for 15.4% of the variance in disease activity.

The results of only the significant mediation analysis are reported in Table 5. Family support, but not family strain, partially mediated the association between discrimination and biobehavioral reactivity. The only significant mediation pathway between discrimination and disease activity, was the discrimination → family support → biobehavioral reactivity → disease activity pathway. In other words, the link between discrimination and disease activity is partially explained by lower family support and greater biobehavioral reactivity.

Discrimination–Intimate Partner Emotional Climate Model

Similarly, building discrimination into our intimate partner emotional climate model demonstrated a good fit to the data ($\chi^2(32) = 67.97$, $p = .0002$, RMSEA = .07, CFI = .95, TLI = .92, SRMR = .05). Standardized pathway estimates are shown in Figure 4. Factor loadings for the latent variables are reported in Table 2. Significant pathways were found between discrimination and intimate partner and family strain, such that reports of greater discrimination were associated with greater strain in both types of relationships. Additionally, a significant pathway was found between family support and biobehavioral reactivity and between biobehavioral reactivity and disease activity. Further, 20% of the variance in disease activity was accounted for in this final model. No significant mediation pathways were found.

Discussion

The present study provides support for the utility of the BBFM for theorizing associations between close family relationships and health for African Americans. Critically, the results highlight unique aspects of such a modeling approach with this population.

First, unlike prior tests of the BBFM's pathways for adult health, family support was found to be the most meaningful

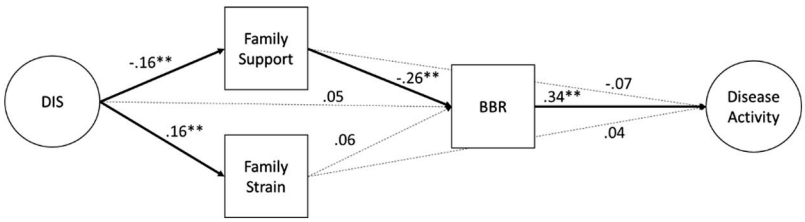

Figure 3. Discrimination-family emotion climate model, $\chi^2(20) = 43.80$, $p < .01$, RMSEA = .05, CFI = .99, TLI = .98, and SRMR = .03. DIS = discrimination, BBR = biobehavioral reactivity. ** $p < .01$.

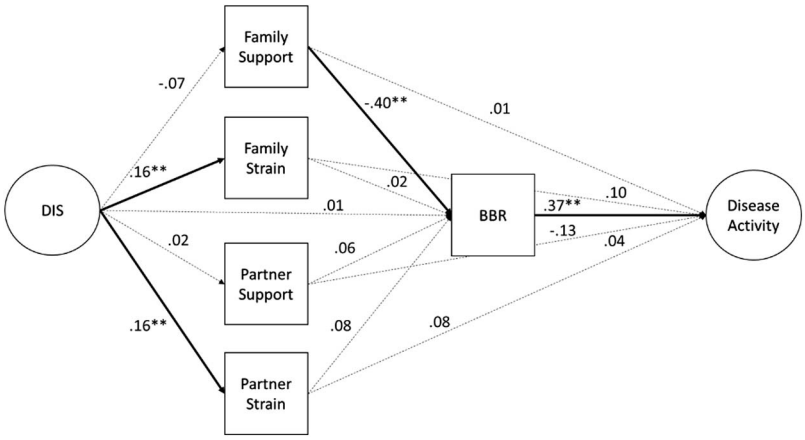

Figure 4. Discrimination-intimate partner emotion climate model, $\chi^2(32) = 67.97$, $p < .01$, RMSEA = .07, CFI = .95, TLI = .92, and SRMR = .05. DIS = discrimination, BBR = biobehavioral reactivity. ** $p < .01$.

measure of family emotional climate, with direct connections to biobehavioral reactivity and indirect associations with disease activity. Previous research with MIDUS and other population based data sets has found powerful connections between a negative family emotional climate, especially family strain, and individual family members' physical health outcomes (e.g., Priest et al., 2015; Priest & Woods, 2015). However, our findings align with alternate research that emphasizes the potentially unique effects of family support on wellbeing for African Americans. Though Cichy et al. (2014) found that daily reports of receiving family support were not associated with well-being for African American adults using a sample of MIDUS participants, they also found that providing family support was associated with worse well-being (i.e., greater daily negative affect and greater stress reactivity) for African Americans compared to European Americans. The present study did not incorporate a White comparison group; however, it adds to a growing literature examining the distinct demands of close family relationships for African American adults (e.g., Budescu, Taylor, & McGill, 2011; Cichy & Lee, 2018; Suitor et al., 2018). Research is increasingly highlighting the power of family support for bolstering mental health (Taylor, 2015) and protecting against the negative effects of contextual stressors on emotional wellbeing (Taylor, Budescu, Gebre, & Hodzic, 2014) among African American samples.

Second, the current research demonstrates the relevance of incorporating both discrimination and close family relationships as determinants of health in a singular model. Similar to Doyle et al. (2018), close relationship support mediated the effects of discrimination on disease activity. However, an innovative edge of this study was its specific focus on distinct types of close relationships, an incorporation of mental health, and utilizing measures of lifetime and daily discrimination, as well as impact of discrimination on quality of life. Evidence for the effects of discrimination in the current models extend prior findings that reveal the impact of this stressor and consistent predictor of health disparities on close family relationships (e.g., Doyle & Molix, 2014; Lincoln & Chae, 2012). These results also suggest that modeling family health associations for African Americans without including the impact of discrimination may fail to fully explain health outcomes for a population that continually suffers health disparities. Further, incorporating contextual, extrafamilial stressors, as well as intrafamilial relationship processes, in models explaining physical wellbeing may be a truly meaningful conceptualization of social determinants of health.

Contrary to our hypotheses, the present intimate partner emotional climate models demonstrated nonsignificant pathways between the quality of these relationships and mental or physical health. This is contrary to prior research with African American samples (e.g., Barton, Beach, Bryant, Lavner, & Brody, 2018). It may be that estimating the effects of intimate partnerships alongside family emotional climate serves to render these associations nonsignificant. Previous research testing the BBFM's pathways with other MIDUS samples have increasingly found greater effects of family relationships on health than intimate partner relationships (e.g., Priest et al., 2019). Given the centrality of extended family and kinship networks in African American communities (Boyd-Franklin, 1989; Chatters, Taylor, & Jayakody, 1994), it is also possible that the effects of family emotional climate are more pronounced because there is a broader range of sources of social support to draw from.

Lastly, as the BBFM evolved out of theoretical approaches connected to family-based treatments for health (Wood, 1993; Wood et al., 2015), and African American families are uniquely and powerfully connected to family networks (Boyd-Franklin, 1989; Chatters et al., 1994), the results of the present study may begin to inform areas of intervention to ameliorate health disparities. Recent research highlights the potential power of intervening with African American couples to buffer the quality of their close relationships from contextual stressors in order to protect against physical health declines (Barton et al., 2018). Research also demonstrates the unique impacts of discrimination on relationships between African Americans and their health care providers as well as treatment adherence (e.g., Forsyth, Schoenthaler, Chaplin, Ogedegbe, & Ravenell, 2014), such that interventions are also needed to buffer the impact of racism on health via alternate mechanisms. One possibility may include physician education and training specific to building trust among these communities and potentially leveraging supportive family networks within treatment regimens

in order to improve African American health and self-management (Abel, Joyner, Cornelius, & Greer, 2017). In addition, as would be indicated by the BBFM (e.g., Wood et al., 2008), the present findings, and alternate research on pathways linking discrimination and health (e.g., Forsyth et al., 2014), stress reactivity and depression likely serve as an important area to enhance relevant coping skills. Though it is probable it is important to both enhance and support positive family relationships as well as buffer against the stressful impacts of discrimination, research on interventions targeting the latter area is lacking (Kang, Dulin, Nadimpalli, & Risica, 2018). As improving health disparities poses an enormous public health challenge, determining the impact and intertwining nature of areas amenable to change, such as the quality of close relationships, the quality of the patient/family physician relationship, or self-care strategies to minimize stress reactivity, will be critical for further development of family-based interventions for African Americans' physical health.

Finally, there are limitations to this study that should be considered when interpreting the findings of this research. First, this is a cross-sectional study, so inferences about causality in the mediational models must be made with caution. Longitudinal designs are needed to further support and clarify the direction of these pathways. Second, the measurements were limited: (a) the constructs were assessed using self-report measures, thereby leaving the possibility for participants to respond with an element of social desirability; (b) the measures assessed retrospective accounts, which could have led to recall bias; and (c) emotional and mental health variables were single-items measures and therefore may not have effectively captured the complexity of this variable. Third, family processes were examined from a single-informant. Having multiple family members' perspectives about family processes may provide additional information about the dynamic and interpersonal nature of family relationships. Thus future researchers are encouraged to replicate the applicability of the BBFM model with African Americans using multimethods and multiple respondents.

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