The Mental Health Research Network (MHRN), funded through a cooperative agreement with NIMH, was established to create a national population-based laboratory to assess and improve access to and quality of mental health treatment. The MHRN cooperative agreement supports an Administrative Core conducting periodic analyses regarding patterns of mental health care, a Methods Core supporting development of new data infrastructure and analytic methods, funding for feasibility/pilot projects, one large pragmatic clinical trial, and two pilot studies. Identifying and addressing racial and ethnic disparities in care, especially regarding care for depression, is a significant focus of recent and current MHRN research. One current pilot trial is evaluating outreach to reduce disparities in initiation of depression treatment. One feasibility pilot project is examining differential performance of the PHQ-9 depression scale by race and ethnicity. A previously funded supplemental project is examining racial and ethnic disparities in the transition to virtual care during the COVID-19 pandemic. To date, MHRN research has focused on disparities following recognition or diagnosis. This supplemental work proposed in this application will extend that research, examining how "upstream" effects on experience and expression of depression contribute to downstream disparities.

SUPPLEMENT SPECIFIC AIMS

This proposed work will examine how place-based characteristics and other social determinants of health contribute to racial disparities in the experience and expression of depression, considering obesity as a mediator and moderator of that relationship. This supplemental work will employ qualitative methods and new quantitative data resources regarding social determinants of health to address two specific aims.

Figure 1

I. Examine the longitudinal relationships among place-based social determinants of health, obesity, and the experience and expression of depression among Black women.
Leveraging the MHRN's mature data infrastructure, supplemented with new data resources regarding place-based social determinants, analyses will examine the role of place on depression experience and expression of depression. Moreover, the longitudinal nature of the data allows for constructing a multi-level, structural equation model to measure reciprocal relationships (cross-lagged effects) between BMI and expressed depression as captured by the PHQ-9 (See Figure 2). Obesity and being overweight may also be considered as dichotomous health states. Place indicators include components of Area Deprivation Index (ADI) such as neighborhood median income, safety features of neighborhoods (like crime statistics), distance to and/or number of local grocery stores, availability, and distance to types of other food establishments, the distance to environmental hazards (e.g., landfills, abandoned buildings, and transportation depots), along with other measures that describe geographic attributes.

Figure 2
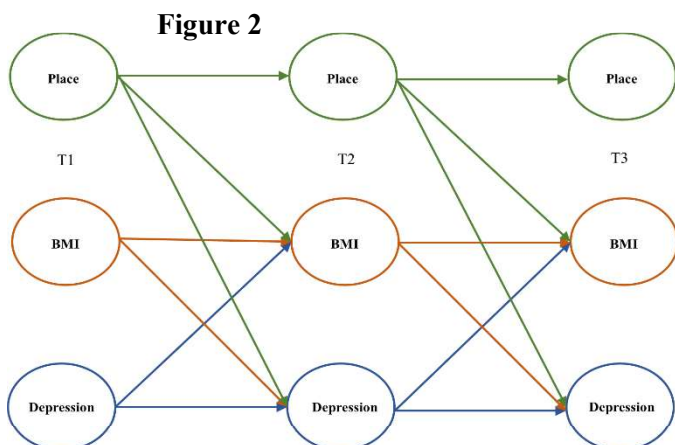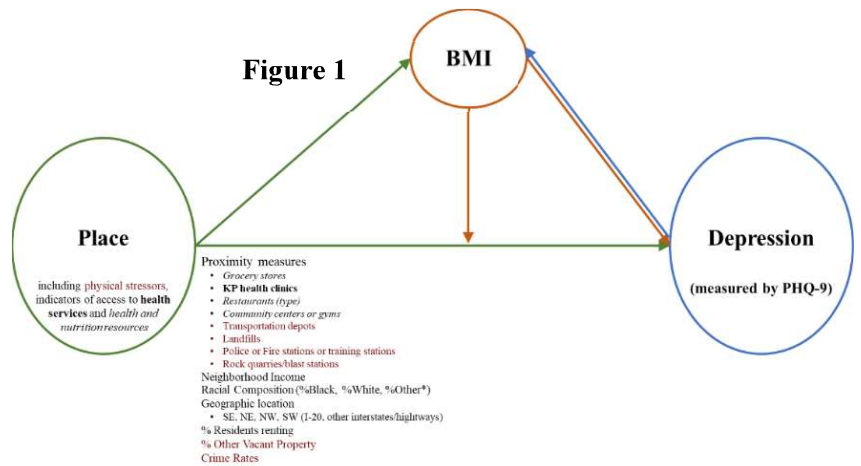
II. Explore pathways for understanding black women's health holistically by analyzing narratives.
Using a grounded theory approach, 20 semi-structured interviews with a subsample of Aim 1's patients will be conducted and analyzed to capture how lived experiences of Black women affect experience of and expression of depression.

SUPPLEMENT RESEARCH STRATEGY
Background. Disparities in access to and quality of care for depression begin upstream. Often, traditional assessments like the PHQ-9 underestimate unmeasured

symptoms of depression for Black women and overlook other pathways distress maybe expressed. Responses to stress can trigger behaviors and physiological responses that undermine health.[1-5] Black women are more likely to experience physical weather, or premature biological aging, of the organs and body. Increasing BMI is one measurable response to behaviors and physiological responses associated with stress processes and depression symptoms. Being obese or overweight predispose individuals to developing diseases that lead to premature aging and death high BMI levels underly the onset of many cardiometabolic diseases. [2,6-8] For the most part, depression and obesity are positively correlated for women; however, within black women, scholars have found diminished or no positive association between higher levels of depression and BMI.[2,7-9]

Psychosocial factors are also important when considering relationships between place and experience or expression of depression. Social norms, resources, and practices are avenues that can affect health for Black women. Place also influences the health behaviors and beliefs of residents in communities. For instance, common forms of coping, such as religious coping,[a] can be protective for (e.g., increased religious attendance) and negatively associated with (e.g. increased prayer) the health of Black women.[+2] Additionally, many social activities related to coping involve gatherings with food, namely comfort foods, which tend to be easily accessible in predominantly Black areas.[27-33] Furthermore, the values, images, and ideologies about femininity held by and/or for Black women affect how women express depression symptoms. Connotations of Black femininity expect women stoic if not angry, and nurturing, which can lead to women associating with the stress of others.[30,33-35] Lastly, common images of Black female bodies may condone thicker body shapes, which likely affect the prevalence of physical conditions associated with depression.[31,33,36,37] Factors related to psychosocial aspects of Black women's lived experiences often fall outside health questionnaires administered to patients. Thus, the need is underscored for mixed method approaches that include opportunities for Black women to express health experiences in their own words.[38-40] This need informs the inclusion of qualitative strategies to understand Black women's needs within KPGA.

Real-world contexts shape patient health outcomes, and where patients live is an important component of exploring mechanisms that prevent health equity.[10-12] Place is a broad concept used to describe locational factors, features, and attributes of the communities where patients reside. Different components of place have consequences and benefits for health. For instance, physical hazards like landfills, transportation depots, and deteriorated, abandoned buildings have negative consequences for mental and physical health.[11,13-16] On the other hand, closer proximity to health clinics and healthy food (e.g., via grocery stores) is preventive for health.[10,12,14-16]

Segregation and its effects are important components of studying place and health.[10,17,18] While segregation has decreased by 23% over the last few decades, Black Americans are still highly segregated from others in terms of residential communities. This trend holds regardless of personal and family-level/household SES characteristics.[17,18] Mechanisms of segregation, such as historical violence, redlining and steering, white flight, differential government and business investment, and the placement of interstates gave rise to geographic inequalities that are not explained solely by poverty.[17,19,20] Predominantly Black residential communities are often areas of scarcity in terms of access to healthy food, health clinics and medical resources, legal livable-wage jobs, and safe, clean environmental spaces. Moreover, physical hazards such as lack of sidewalks, deteriorated and hazardous structures, and transportation depots are more likely to exist in predominantly Black areas.[14,15,17,20,21] Even when controlling for place factors, like lack of access and hazards, Black residents in predominantly Black areas experience more relative disadvantages for experiencing depression compared to White residents who live in predominantly white or non-Black areas.[21] Studies on depression that focus on within-group variations yield mixed results, but some indicators consistently show disadvantages for health.[12,15+] In terms of depression experience, neighborhood factors like crime levels, police surveillance, and deteriorated buildings are health risks for residents.[15,22-24]

Previous research has often not considered these upstream effects. First, many of studies on depression compare depressive symptoms between races, setting white as the norm or normalized experience of depression. Second, many studies are limited by cross-sectional data, which cannot capture the reciprocal effects between depression symptoms and BMI. Lastly, most analyses are based on personal level data only,

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[a] Churches are a frequent landmark in predominantly Black areas. Pew reports that over 90% of Black Americans believe in a God or higher being, which indicates that religion is an important influence in black communities. Religious coping is associated with lower rates of utilization of mental health care services within medical settings (Pew ; Barnes; +).

missing the implication of broader influences that affect the health of groups. More research is needed to understand the mechanisms that drive relationships between depression symptoms and BMI for Black women.

The supplement's focus on Black women aligns closely with the missions of both MHRN and Kaiser Permanente (KP)[b] to uncover new pathways for reaching health equity and improving care for underserved patients. For example, KP's most recent annual report names "identify and close disparities in care and outcomes" as a paramount priority, co-equal with quality and member satisfaction.

Approach

Setting: The health system of Kaiser Permanente Georgia (KPGA) is in region with a large population of Black women,[c] permitting the robust within group analyses needed. In the last 5 years alone, over 147,000 Black women were enrolled and received care within KPGA health system. For this study, data will be extracted from Electronic Health Records and Census-level databases with over 10+ years of linkable data. Black women members of KPGA likely live in segregated areas, even if they are insured and of middle SES. For example, steering and the placement of I-20 divided black and white residential areas such that South and Northwest of the interstate corridor, residents are over 90% Black. [20,25,26] Other mechanisms like government and business investment may give rise to areas with relatively low access to health resources (e.g., medical clinics and healthy food) that disadvantage Black residents even when median income is well above the poverty line.[17,25,26] The breadth of available data[d] from KPGA allows for the inclusion of several place indicators (possibly considered as indices and separately) in future analyses. [For a breakdown of the types of place variables proposed see Figure 1.] The available data permit structural equation modeling (SEM) and additional spatial analyses to isolate the effects of place on health and analyze reciprocity between BMI and depression. Additionally, the potentially large sample sizes across years may allow for the inclusion of analyses using difference in difference frameworks to compare variations between non-movers and movers. Since the span of available data cover a significant portion of adulthood, the inferences drawn from findings are likely significant for informing better healthcare for Black women. Therefore, analyzing the influence of different components of place on depression and BMI should yield useful results for understanding mechanisms driving racial health disparities.

Aim 1 Quantitative Analyses: To address current gaps, this study proposes using multi-level structural equation modeling (SEM) to measure cross-lagged effects of depression symptoms (measured by PHQ-9 and BMI) and analyzing narratives from semi-structured interviews. The SEM approach proposed will use an exploratory model in which place will be treated as latent variables or concepts. It is hypothesized that place factors, e.g., proximity to health clinics, grocery stores, different types of restaurants, and hazards like landfills, either have positive or negative influences on health. For groups of black women, some place factors may matter differently than hypothesized or results may indicate that two categories may not adequately describe the concepts of place. In the regression portion of the model, Wilson will focus on the potential mediating relationships of BMI on place and depression over time. A dichotomous measure indicating change in zip code (signaling a move in location) will be included in the model as well, which indicates that a member moved residential location during the study period. Proximity measures (e.g., to grocery stores and types of restaurants) not available from research data warehouse data will be calculated using GIS mapping. See descriptions in Figure 1. Data for the past 12 years is available for use in analyses.[e] SAS Enterprise, ArcGIS, and Tableau software will be used for statistical analyses.

Aim 2 Qualitative Analyses: A stratified sample of black women with diagnoses of depression without follow-up treatment based on geographic characteristics and BMI categories will be constructed to recruit participants. Recruits will be emailed or asked by phone to participate. Selected participants will participate in a 1 to 1 ½ hour long, semi-structured interview on topics including 1.) stress exposure over the life course, 2.)

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[b] Kaiser Permanente demonstrates a commitment to preventive care and increasing access to health resources outside of patient visits. Its national Community Health department sponsors several programs and grants dedicated to addressing the needs of patients by increasing access to preventive care where patients live. For example, food access is a social need of concern for Community Health partners. The findings from this supplemental work may be useful data for extending the reach of services available in communities where underserved patients KPGA patients live.

[c] After Texas, Florida, and New York, Georgia has the fourth largest population of black residents by state (Dec. refs)

[d] Researchers have the capacity to capture full EHR records and Census data for patients going back 12 years (from 2020). Aim I's analysis will likely include enrolled members before the range specified in this proposal.

[e] Depending on sample sizes needed for spatial analyses, the investigator will likely choose to use data before 2017.

current (self-reported) mental and physical health status, 3.) 24-hour dietary recall, 4.) past and current interactions with the health system, including mental health professionals, 5.) coping behaviors, and 6.) values and beliefs about health. All interview participants will receive a $50 gift card incentive. Results from Aim II will better inform future measurement and treatment strategies for measuring Black women's health outcomes. Wilson will conduct all interviews in the 4th quarter of 2023. After transcription, Wilson will analyze data using NVivo, for which KP currently holds licenses for use in qualitative analyses. To create the sample for interview recruitment, Black women members will be stratified by categories from BMI and PHQ-9 scores. Preliminary statistics show that of those enrolled in KPGA the last 5 years, 33% of Black women have a history of a depression diagnosis. Over 70% of Black women members are overweight (BMI of 25% or above), over 3 times the national average. 48% of black women are considered obese with BMI of 35% or above, which is lower than the national average for black women but higher than averages for other racial and ethnic groups.[41]

Timeline for research activities:

	YEAR 2023									YEAR 2024					
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
AIM I:															
Data available			█												
Quant Analytic Period			█	█	█	█	█	█	█	█	█	█	█	█	
Quant Abstract/Manuscript Drafting							█			█	█	█	█		
AIM II:															
Sample for Recruitment Available				█											
Recruit Participants						█	█	█							
Interview Participants							█	█	█						
Interviews Sent for Transcription							█	█	█						
Qual Analytic Period							█	█	█	█	█				
Qual/Mixed Methods Abs/Manuscript Drafting													█	█	█
CAREER DEVELOPMENT: Disseminating Findings															
Manuscript 1: Abstract/Conference Submission						█	█								
Manuscript 1: Publication Submission													█	█	█
Manuscript 2: Abstract/Conference Submission								█							
Manuscript 2: Publication Submission												█	█		
Presentations: Special Interest Group Meetings							█			█				█	

Notes:
Color gradient distinguishes yearly quarters
Targeted Submission Deadlines

TRAINING PLAN AND CAREER DEVELOPMENT

Training Goals: Wilson will undergo extensive training to 1) develop Geographic Information Systems (GIS) mapping and spatial analysis skills, 2) increase knowledge and familiarity of the research tools available from VDW and MHRN, and 3) enhance grant writing skills including identifying appropriate NIMH grants at her career stage. The last set of training will also include staying current on public health frameworks. Dr. Wilson's overall career development will be enhanced by the increased proficiency and knowledge of tools for using EHR and census-based databases gained from mentorship and research activities. Moreover, this period of mentorship will serve to improve grant writing skills and prepare Dr. Wilson for seeking future independent funding. The training and analytic plan described can be reasonably accomplished in 15 months, which coincides with the end of the current MHRN funding cycle in June 2024.

Mentorship:

Name	Institution	Description of Expertise	Area of Mentorship	Meeting Schedule
Dr. Courtney McCracken (Primary Mentor)	Kaiser Permanente Georgia	Dr. McCracken, a biostatistician with experience investigating patient health outcomes. She has over 170 peer review publications and statistical expertise in longitudinal modeling. Dr. McCracken has provided mentorship to Dr. Wilson this past year at KPGA as Dr. Wilson supported studies where McCracken is primary or site PI. Additionally, during her time at Emory, she supported many training grants and provided statistical mentorship to several NIH K awardees, post-doctoral fellows, medical students, and graduate public health students.	Statistical tools and MHRN/VDW Manuscript/Publication strategies Grant Writing	Bi-weekly (1-hour)
Dr. Gregory Simon	Kaiser Permanente Washington	Dr. Simon, the PI of MHRN, has extensive knowledge of the MHRN and expertise analyzing EHR and VDW data. Dr Simon has served as primary mentor for 3 postdoctoral fellows and 4 early career investigators, all of whom have successfully competed for R01 awards..	Statistical tools and the MHRN/VDW Infrastructure and the MHRN/VDW Grant Writing (including targeting NIMH)	Monthly (1-hour)
Dr. Robert Penfold	Kaiser Permanente Washington	Dr. Penfold is a mental health geographer who currently studies how location affects mental health treatment within MHRN systems.	GIS and Spatial Analysis Mental Health, GIS, and MHRN Grant Writing	Bi-weekly (1-hour)

Dr. Roland Thorpe	Johns Hopkins University Bloomberg School of Public Health	Dr. Thorpe is a social epidemiologist who examines how race, segregation, and place factors affect health for Black Americans. He is a professor in the department of Health, Behavior, and Society and Deputy Director of the Center for Health Disparities Solutions.	Place and Race Disparities Public Health, Race, and Gender Manuscript/Publication Strategies Grant Writing (including targeting NIH/NIMH)	Monthly (1-hour)
Dr. Courtney Thomas Tobin	University of California Los Angeles	Dr. Tobin is a medical sociologist whose areas of study include stress, coping and psychophysiological health of Black women. She has a split appointment in the Department of Community Health Sciences on the Bunche Center or African American Studies	Public Health, Race, Gender including influence of stress on health Manuscript/Publication Strategies Grant Writing	Monthly (1-hour)
All Mentors	These meetings will focus on project updates, manuscript/abstract co-authorships, and future grant collaborations			Quarterly (1-hour)

GIS and spatial analysis training: To prepare for conducting place analyses independently, Wilson will work with mentors, Drs. Penfold and Thorpe, and enroll in Esri/ArcGIS[f] online courses on GIS mapping and spatial analysis as specified in Table 1. Wilson will hold bi-weekly 1-hour meetings with Dr. Penfold 1.) to digest learned content from online courses, 2.) adjust online learning course load accordingly, and 3.) learn from Penfold's expertise as a leading mental health geographer. She will hold monthly, 1-hour long meetings with Dr. Thorpe to review new skills learned learn and apply skills to race and place analyses in health.

VDW and MHRN training: The parent MHRN grant has several existing resources to assist Dr. Wilson during training for effectively using linked data from the VDW and MHRN. Dr. Wilson will attend relevant T32 courses and meetings, as needed, to increase knowledge and familiarity with the research tools of the VDW and MHRN. Content areas include 1.) the structure 2.) codes and descriptions 3.) collection and 4.) limitations of data available. She will consult MHRN members managing T32 resources as needed. The T32 fellowship, funded by a separate award, is a structured program of didactic training and works-in-progress consultations Wilson has access to through MHRN. Along with T32 resources, Dr. Wilson will use the resources available online through MHRN[g] as supplemental guides during training. Additionally, Dr. Wilson will attend and occasionally present updates at MHRN special interest group meetings on the VDW, Statistics, infrastructure, and Mental Health Equity, which each recur monthly. Drs. Simon and McCracken will also provide mentorship on the statistical resources associated with VDW and MHRN research tools.

Grant Writing: Dr. Wilson will dedicate a portion of recurring meetings with each mentor to strengthen grant writing skills. Given the extensive awardee and PI experience of the mentorship committee, all mentors can provide examples of grants from their previously funded studies. In particular, Drs. Simon and Thorpe will help mentor Dr. Wilson as she prepares to submit to appropriate NIMH grant announcements in the future. To become a stronger grant candidate, Dr. Wilson must increase her number of peer reviewed publications. To help achieve this goal, Dr. Wilson will use a portion of her meetings with Drs. McCracken, Tobin, and Thorpe to learn efficient strategies for boosting publications. To continue education in race, gender, and public health, she will utilize a portion of meetings with Drs. Thorpe and Thomas keep current on these topics as they are relevant to this project and future work. Wilson may incorporate a few content-specific readings per month into her training plan, not to exceed a couple hours a month, that arise from these discussions. Lastly, group and separate meetings with mentors will serve as spaces to share ideas about potential abstracts, manuscripts, and future relevant studies. Please see the Table below for a proposed training and mentorship schedules, followed by a short description table of proposed mentorship.

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[f] ArcGIS is software used to analyze spatial data and it is the software available to Wilson through KP. She will sign up for a monthly subscription which allows access to coursework in GIS and spatial analysis. ArcGIS is online software used to create maps, analyze, and store spatial and geographic data. ArcGIS is the software Kaiser Permanente currently uses for spatial analysis. Dr. Wilson will take advantage of free or maintenance[f] courses available through the yearly subscription to Arc GIS. Specifically, she anticipates first enrolling introductory courses[f] followed by up to 45 hours of coursework under "Spatial Analysis and Data Science"[f] listed in the Esri Academy course offerings.

[g] https://mhresearchnetwork.org/resources/mhrn-data-resources/useful-tools/

TIMELINE: Training and Career Development	YEAR 2023									YEAR 2024					
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
TRAINING: GIS Mapping and Spatial Analysis Skills (and applying to place based research)															
Mentorship: Penfold		▓	▓	▓	▓	▓	▓	▓	▓				▓	▓	
Mentorship: Thorpe		▓	▓	▓	▓	▓	▓	▓	▓					▓	
ArcGIS/Esri Online Course Training	▓	▓	▓	▓	▓	▓									
TRAINING: Research Tools Associated with MHRN and VDW															
Mentorship: Simon	▓	▓		▓		▓	▓	▓	▓	▓			▓	▓	▓
Mentorship: McCracken	▓	▓	▓	▓	▓	▓	▓	▓	▓					▓	
T32 Resources	▓		▓												
Special Interest Group Meetings	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓			▓	▓	
TRAINING: Enhancing Grant Writing															
Grant Writing *Mentorship: All*							▓	▓	▓	▓	▓	▓	▓	▓	▓
Publication Boosting *Mentorship: McCracken, Thorpe, Tobin*						▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Race, Gender, and Public Health Frameworks *Mentorship: Thorpe, Tobin*						▓	▓	▓	▓	▓	▓	▓	▓	▓	▓

Note:
Color gradient distinguishes yearly quarters

Career Development: Dr. Wilson will submit abstracts to at least two professional conferences, likely the annual 2024 Health Care Systems Research Network (HCSRN) and the Society of Southern Sociologist (SSS) conference. The first submission will focus on the findings from Aim I's data-only analyses and will be submitted to HCSRN conference. The second conference submission will highlight mixed method or preliminary findings from Aim II only. Wilson will submit to a sociology conference, which is her home discipline.

Wilson will submit at least one co-authored manuscript before June 30, 2024. This manuscript will draw on quantitative findings from Aim I. All mentors will be involved in the drafting of the quantitative manuscript. Wilson and co-authors will also begin drafting a second manuscript on mixed-methods or qualitative findings over the project period. If time permits, Wilson will submit this article for publication before the end of the project term.

The scope of the supplemental work and proposed training will enhance Dr. Wilson's ability to write future grants. Dr. Wilson's long-term goals are to lead large, multi-site, national studies aimed at understanding how lived experiences of Black Americans affect health patterns in the US. She plans to consistently incorporate place and spatial analysis in future work given the salience of location for health outcomes. If findings from this supplemental work prove that place factors are salient for black women, immediate avenues for building off this pilot project could include are 1.) expanding quantitative analyses to include additional MHRN sites and other racial and ethnic groups experiencing disparities in depression care (a topic for a future small R01 application) or 2.) development of tailored screening and engagement strategies informed by findings of this supplemental work (a topic for a future R34 application). Given the compressed timeline for this work, we do not propose to submit a grant application during the period of supplemental funding; that step would likely occur six or more months later. During this time, Wilson will foster relationships and continue conversations other MHRN researchers and members of the Community Health department at KP with interest in studying food access to address disparities among patients. Such collaborations will enhance the ability of Wilson to dress specific needs of the KP organization in future grants.

Hypotheses predict that cross-lagged effects between depression and BMI will further elucidate how BMI and depression symptoms are interrelated for black women in the South. Expanded findings would prompt expanding future studies to include other regions with large populations of black women. If these effects are non-existent or weak, however, other important pathways such as psychological disorders and directly including cardiometabolic conditions in ways that align with weathering hypotheses may need to be explored.