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Edition 52 – Neighborhood Factors and Physical Activity During the COVID-19 Pandemic for Black Pregnant Individuals - HPHR Journal

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Citation

Judge J, Misra DP, Davis J, Giurgescu C. Neighborhood factors and physical activity during the COVID-19 pandemic for black pregnant individuals. *HPHR*. 2023;52. https://doi.org/10.54111/0001/ZZ4

Abstract

Background

Maternal physical activity is associated with a decreased risk of adverse birth outcomes. Levels of physical activity have been linked to the neighborhood residential environment. This pilot study explored the relationship between neighborhood factors and physical activity during the COVID-19 pandemic for Black pregnant individuals.

Methods

Black individuals enrolled in the Biosocial Impact on Black Births (BIBB) study who were still pregnant at the start of the COVID-19 pandemic were surveyed between May and June 2020. Thirty-three participants completed the online survey. Participants were asked about demographics, perceived neighborhood environment (disorder, crime, walkability, racial composition), housing type, and physical activity changes since the pandemic.

Results

The participants were 20-39 years old with all but one in the third trimester of pregnancy. The majority were unemployed and identified as having “barely enough” or “not enough” money to get by. Sixty-one percent of participants reported decreased physical activity levels during the COVID-19 pandemic. Living in an apartment or residing in neighborhoods with lower levels of walkability or higher levels of disorder and crime were associated with lower physical activity levels. Participants who reported higher levels of perceived neighborhood disorder and crime and lower levels of walkability were less likely to report walking in their neighborhood or park. Relationships were suggestive but were not statistically significant at the 0.05 level.

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Discussion

The results suggest that housing type and neighborhood environment relate to physical activity levels. We are not aware of any published studies on physical activity during the pandemic among pregnant Black individuals. The small sample size limits statistical power to detect statistically significant results.

Conclusion

While already a group reporting a low rate of physical activity, levels may have further decreased for Black pregnant individuals during the COVID-19 pandemic, especially those in apartments and in a worse neighborhood environment.

Introduction

The COVID-19 pandemic is a major and continuing public health crisis. While the pandemic has had almost universal reach, higher rates of SARS-CoV-2 infection as well as increased morbidity and mortality have been reported for Black people in the U.S. compared with nonHispanic White people.[1–4] Pregnant people seem to be particularly susceptible to both the COVID-19 infection and its sequelae, thought to be due to the immunologic changes of pregnancy as has been seen for influenza and other respiratory viruses.[5] Compared with nonpregnant people with COVID-19 infection, pregnant people with COVID-19 infection have double the risk of ICU admission and greater than 70% increased risk of death.[6] Furthermore, COVID-19 infection increases risk for adverse maternal and birth outcomes including cesarean delivery, preterm birth (< 37 completed weeks gestation) and low birth weight infants (<2,500 grams) especially among people with comorbidities.[7–10] Black pregnant people are more likely to have adverse maternal and birth outcomes compared with White pregnant people.[11,12] These racial inequities have been exacerbated by the COVID-19 pandemic, with Black race found to be a risk factor for adverse maternal and birth outcomes in COVID-19 complicated pregnancies.[13] Black pregnant people with COVID-19 also experience greater stress, anxiety, and depression than White pregnant people.[14]

During the first year of the pandemic, physical activity levels for the general population decreased and sedentary behavior increased.[15] Lockdowns led to decreases in physical activity, with step counts in the US decreasing by 15% over the fifteen days after lockdowns were announced.[16] Lifestyle factors, including physical activity, have been found to be protective against infection with COVID-19, even at relatively low levels of activity.[17] Physical activity is important in pregnancy to decrease the risk of gestational diabetes and cesarean deliveries and to prevent postpartum depression.[18] It may also reduce excess gestational weight gain and preeclampsia.[19] However, few pregnant people meet the guidelines for activity levels during pregnancy.[18] The few studies assessing change in physical activity since COVID-19 that focused on the pregnant population have had inconsistent findings. Three studies have reported reduced physical activity among pregnant people during the COVID-19 pandemic[20–22] while evidence from two other studies suggests that physical activity levels remained the same for pregnant people.[23,24] The majority of participants in these studies were Caucasian women[20–23] and general barriers to exercise included lack of space, fatigue, not a priority, and fear of harming the fetus.[20] Women with gestational diabetes reported fear of leaving the house due to COVID-19 as their main reason for reducing physical activity levels.[22] None of the studies investigated the influence of the neighborhood environment on physical activity in pregnancy during the COVID-19 pandemic.

Physical activity is influenced by the neighborhood and built environment.[25] Walkability and access to nearby parks[26] and recreation areas[27] has been associated with increased physical activity during pregnancy in research prior to the pandemic. Black adults have been found to engage in less physical activity than their White counterparts.[28] During pregnancy, non-White participants were less likely to engage in moderate-to-vigorous physical activity.[29] Barriers to physical activity during pregnancy for Black people have included living in an unsafe neighborhood environment.[30] Therefore, the purpose of this study was to explore the relationship between neighborhood factors and physical activity during the COVID-19 pandemic for Black pregnant people.

Methods

Design and Sample

We conducted a pilot study with Black pregnant people enrolled in the Biosocial Impact on Black Births (BIBB) study. The BIBB study is a prospective, longitudinal cohort study that examines the role of maternal factors on birth outcomes among Black people across pregnancy. Pregnant people were included in the BIBB study if they were Black or African American, were 18–45-years of age, had singleton pregnancies, and were between 8- and 29-weeks gestation. Pregnant people were excluded if they had multiple pregnancies

(e.g., twins). The participants were recruited from prenatal clinics from metropolitan Detroit, MI and Columbus, OH areas. A sample of 650 participants were enrolled in the BIBB study from December 18, 2017 through March 13, 2020. Recruitment for the BIBB study was placed on hold on March 13, 2020 when the President of the United States declared a nationwide emergency for the COVID-19 pandemic. A sample of 66 participants from the BIBB study who were still pregnant in May through June 2020 were invited to participate in an online survey about women's experiences during the COVID-19 pandemic. Thirty-three participants completed the survey and were included in this pilot study.

Procedure

Participants in the BIBB study completed online surveys (through Qualtrics) and provided biospecimens (blood, saliva) up to 3 times during pregnancy. A supplemental survey about experiences during the COVID-19 pandemic was administered to the subsample who were still pregnant during the early phase of the pandemic. Participants were reimbursed with a $25 online store gift card for completing this supplemental survey.

Measures

Sociodemographic Characteristics

The participants completed self-reported questionnaires as part of the BIBB study (e.g., maternal age, employment status, and financial status).

The survey asked participants about their neighborhood environment. Participants indicated their home type: (1) apartment, (2) townhome, (3) house, (4) shelter, or (5) other.

Neighborhood Racial Composition

The participants were asked to describe the racial composition of their neighborhoods by indicating if the people in their neighborhood are: (1) All Black, (2) More than half Black, (3) More than half white, (4) Almost all White, (5) Almost all Hispanic, and (6) Other

Perceived Neighborhood Disorder

The Perceived Neighborhood Disorder Scale was used to assess the perceived physical and social disorder in one's community.[31] We used 9 items (e.g., *My neighborhood is noisy*, *There is too much drug use in my neighborhood*) rated on a 4-point scale (1= *Strongly disagree* to 4= *Strongly agree*). Two items were reverse coded. The total score ranges from 9 to 36 with higher scores indicating higher levels of perceived neighborhood disorder. Construct validity was established in sample of adults from Illinois (16% Black).[31] The tool was reliable among pregnant Black participants (Cronbach's α =0.82).[32]

Perceived Neighborhood Crime

The crime subscale of the Perceived Neighborhood Scale was used to assess participant's perceptions of crime in their neighborhood.[33,34] This subscale consists of 6 items (e.g., *It's not safe to walk alone in my neighborhood at night*, *People are scared of being robbed in my neighborhood*) rated on a 5-point scale (1= *Strongly disagree* to 5= *Strongly agree*). The total score ranges from 6 to 30 with higher scores indicating higher levels of perceived neighborhood crime. Construct validity was supported among Black women.[34] The crime subscale was reliable among pregnant Black participants (Cronbach's α=0.90).[35]

Participants were also asked about the walkability of their neighborhoods.[36] The neighborhood walkability tool consisted of 6 items (e.g., *It is pleasant to walk in my neighborhood*, *I often see other people exercise in my neighborhood*) rated on a 5-point scale (1= *Strongly agree* to 5= *Strongly disagree*). The total score ranged from 6 to 30 with higher scores indicating lower level of neighborhood walkability. The walkability scale was reliable among pregnant Black participants (Cronbach's α=0.78).[37]

Physical Activity during the COVID-19 pandemic

Participants were asked about their physical activity levels during the COVID-19 pandemic with the question 'During the COVID-19 pandemic, have you done any of the following?' followed by the options to select any of the following activities they engage in: (1) walking in their neighborhood, (2) walking in a park close to their house, (3) walking in their yard, (4) gardening or yard work, and (5) exercising in the house. For each activity, they were asked the number of days per week: once, 2-4 times a week, 5-6 times a week, or every day. They were also asked if their physical activity level overall has increased, decreased, or stayed the same since the COVID-19 pandemic.

Data analysis

Data analysis was conducted using IBM SPSS statistics version 27. Descriptive statistics were used to describe the distributions of categorical variables (e.g., home type, physical activity level) in the sample. Continuous variables (e.g., crime scale) were described in terms of mean, median, and quartiles. The relationship between neighborhood factors and physical activity during the COVID-19 pandemic was evaluated with cross-tabulations and Pearson chi-square tests of proportions.

Results

All 33 participants were Black and pregnant with a mean gestational age at the time of the survey of 32.0 ± 3.4 weeks (range 24.1-38.0 weeks). The majority (all but one) were in their third trimester of pregnancy. More than two-thirds were less than 30 years of age. Twentythree of the 33 participants were unemployed at the time of survey collection. All participants were insured with the majority (n=24) on Medicaid (see Table 1).

Table 1. Demographics and Descriptive statistics (N=33)

Variable/Measure	N (%)
Demographics	
Maternal Age	
20-24	6 (18.18)
25-29	14 (42.42)
30-34	8 (24.24)
35-39	5 (15.15)
Gestational Age by Estimated Due Date	
1st Trimester	0 (0)
2nd Trimester	1 (3.03)
3rd Trimester	32 (96.96)
Employment Status	
Employed	10 (30.30)
Unemployed, maternity leave	5 (15.15)
Unemployed, due to COVID-19 pandemic	3 (9.09)
Unemployed, laid off	5 (15.15)
Unemployed, other	10 (30.30)
Financial status	
Very poor, not enough to get by	11 (33.33)
Barely enough to get by	22 (66.67)
Enough to get by but no extras	0
More than enough to get by	0
Well to do	0
Home Type	
Apartment Building	5 (15.15)

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Townhome	7 (21.21)
House	20 (60.60)
Hotel	1 (3.03)
Neighborhood Composition	
All Black	6 (18.18)
More than half Black	15 (45.45)
Almost all white	1 (3.03)
More than half white	8 (24.24)
Other	3 (9.09)
During the COVID-19 pandemic, have you done any of the following?	
Walked in my neighborhood	
No	11 (33.33)
Yes, how often:	22 (66.67)
Once per week	8 (36.36)
2-4 times per week	13 (59.09)
5-6 times per week	0
Everyday	1 (4.54)
Walking in park close to my house	
No	20 (60.60)
Yes, how often:	13 (39.39)
Once per week	10 (76.92)
2-4 times per week	3 (23.07)
5-6 times per week	0
Everyday	0
Walked in my yard	
No	11 (33.33)
Yes, how often:	22 (66.67)
Once per week	3 (13.63)
2-4 times per week	7 (31.81)
5-6 times per week	6 (27.27)
Everyday	6 (27.27)
Did some gardening or yardwork	
No	20 (60.60)
Yes, how often:	13 (39.39)
Once per week	8 (61.53)
2-4 times per week	4 (30.77)
5-6 times per week	0

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Everyday	1 (7.69)
Exercised in the house	
No	20 (60.60)
Yes, how often:	13 (39.39)
Once per week	3 (23.07)
2-4 times per week	9 (69.23)
5-6 times per week	0

Everyday 1 (7.69) 6

Mean ± sd: 12.5±4 9

25th percentile score: 9

Perceived Neighborhood Crime50th percentile score: 1475th percentile score: 17Mean ±- sd: 12.8 ±3 9

25th percentile score: 9

How would you describe your physical activity during the COVID-19 pandemic?

Less physically active	20 (60.60)
More physically active	2 (6.06)
No change	11 (33.33)

Mean ± standard deviation (sd): 17.9 ± 5

25th percentile score: 14

Perceived Neighborhood Disorder

50th percentile score: 18

75th percentile score: 22

Neighborhood walkability

50th percentile score: 13

75th percentile score: 16

Table 1. Demographics and Descriptive statistics (N=33)

Variable/Measure	**N (%)**
Demographics	6 (18.18)
Maternal Age	14 (42.42)
20-24	8 (24.24)
25-29	
30-34	
35-39	

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Gestational Age by Estimated Due Date	5 (15.15)
1st Trimester	0 (0)
2nd Trimester	1 (3.03)
3rd Trimester	32 (96.96)
Employment Status	10 (30.30)
Employed	5 (15.15)
Unemployed, maternity leave	3 (9.09)
Unemployed, due to COVID-19 pandemic	5 (15.15)
Unemployed, laid off	10 (30.30)
Unemployed, other	11 (33.33)
Financial status	22 (66.67)
Very poor, not enough to get by	0 (0)
Barely enough to get by	0 (0)
Enough to get by but no extras	0 (0)
More than enough to get by	
Well to do	
Home Type	
Apartment Building	5 (15.15)
Townhome	7 (21.21)
House	20 (60.60)
Hotel	1 (3.03)
Neighborhood Composition	
All Black	6 (18.18)
More than half Black	15 (45.45)
Almost all white	1 (3.03)
More than half white	8 (24.24)
Other	3 (9.09)
During the COVID-19 pandemic, have you done any of the following?	11 (33.33)
Walked in my neighborhood	22 (66.67)
No	8 (36.36)
Yes, how often:	13 (59.09)
Once per week	0 (0)
2-4 times per week	1 (4.54)
5-6 times per week	20 (60.60)

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Everyday	
Walking in park close to my house	
No	
Yes, how often:	13 (39.39)
Once per week	10 (76.92)
2-4 times per week	3 (23.07)
5-6 times per week	0 (0)
Everyday	0 (0)
Walked in my yard	11 (33.33)
No	22 (66.67)
Yes, how often:	3 (13.63)
Once per week	7 (31.81)
2-4 times per week	6 (27.27)
5-6 times per week	6 (27.27)
Everyday	20 (60.60)
Did some gardening or yardwork	13 (39.39)
No	8 (61.53)
Yes, how often:	4 (30.77)
Once per week	0 (0)
2-4 times per week	1 (7.69)
5-6 times per week	20 (60.60)
Everyday	13 (39.39)
Exercised in the house	3 (23.07)
No	9 (69.23)
Yes, how often:	0 (0)
Once per week	1 (7.69)
2-4 times per week 5-	
6 times per week	
Everyday	
How would you describe your physical activity during the COVID-19 pandemic?	
	20 (60.60)
Less physically active	
	2 (6.06)
More physically active	
	11 (33.33)
No change	
	Mean ± standard deviation (sd): 17.9 ± 5
	25th percentile score: 14
Perceived Neighborhood Disorder	50th percentile score: 18

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	75th percentile score: 22 Mean ± sd: 12.5±4.7
Perceived Neighborhood Crime	25th percentile score: 8 50th percentile score: 14
	75th percentile score: 17 Mean ±- sd: 12.8 ±3.9
Neighborhood walkability	25th percentile score: 10 50th percentile score: 13
	75th percentile score: 16

All 33 participants reported some physical activity during the COVID-19 pandemic. We focused on three physical activity behaviors as outcomes: physical activity overall, ever walked in the neighborhood or nearby park, and ever exercised at home. Approximately twothirds (n=22) reported walking in the neighborhood or their yard. Less than half (n=13) reported walking in a nearby park (40%), gardening (40%), or exercising in the house (40%). Most activities were done 1-4 times per week with only 7% of participants reporting everyday activity. Walking in the yard was done more frequently per week than the other activities, with 36% of women (n=12) reported walking in the yard either 5-6 times a week (18%) or every day (18%). This is in stark contrast to walking in a park (none reporting 5 or more times a week) or walking in the neighborhood (1 woman reporting 5 or more times a week).

All the participants were sheltered, with 20 (15%) living in homes, 7 (21%) in townhomes, 5 (15%) in apartments, and 1(3%) in a hotel. Most participants lived in neighborhoods primarily composed of Black residents (64%), while 27% lived in neighborhoods composed of mostly White residents. We examined whether housing type or self-reported racial/ethnic composition of the neighborhood (e.g., mostly Black) related to physical activity (Table 2). There were a number of suggestive results (those residing in apartments were more than half as likely to exercise at home compared to those in houses or townhomes) but none reached statistical significance in this small sample.

Table 2. Relationships between Neighborhood Factors and Physical Activity

	Physical Activity levels since COVID-19 N (%)	
Home Type:		
	Decrease	Increase/ Same
Apartment	5 (100)	0 (0)
Townhome	7 (71.4)	2 (28.6)
Home	9 (45)	11 (55)
Neighborhood Composition:		
Mostly Black	12 (57.1)	9 (42.9)
Mostly white	6 (66.7)	3 (33.3)
Mostly Hispanic	2 (66.7)	1 (33.3)
Perceived Neighborhood Disorder:		
	Decrease	Increase/ Same
Equal to/ Above 75th Percentile	7 (70)	3 (30)
Below 75th Percentile	13 (56.5)	10 (43.5)
Perceived Neighborhood Crime:		

			Ever walked in neighborhood or nearby park?		p	Ever exercised in home?		p
			N (%)			N (%)		
	Judge et al		No	Yes		No	Yes	
	Decrease	Increase/ Same	1 (20)	4 (80)		4 (80)	1 (20)	0.50
Equal to/ Above 75th Percentile	6 (66.7)	3 (33.3)	2 (28.6)	5 (71.4)	0.09	4 (57.1)	3 (42.9)	0.93
Below 75th Percentile	14 (58.3)	10 (41.7)	5 (25)	15 (75)		12 (60)	8 (40)	
Neighborhood Walkability:			6 (28.6)	15 (71.4)		14 (66.7)	7 (33.3)	
0.09 15 (62.5)			1 (11.1)	8 (88.9)	0.87	5 (55.6)	4 (44.4)	0.55
			1 (33.3)	2 (66.7)		1 (33.3)	2 (66.7)	
			No	Yes		No	Yes	
			4 (40)	6 (60)	0.45	6 (60)	4 (40)	0.16
			4 (17.4)	19 (82.6)		14 (60.9)	9 (39.1)	
			No	Yes		No	Yes	
			4 (44.4)	5 (55.6)	0.66	5 (55.6)	4 (44.4)	0.96
			4 (16.7)	20 (83.3)		9 (37.5)	9 (37.5)	0.72
	Decrease	Increase/ Same	No	Yes		No	Yes	
Below 25th percentile	4 (50)	4 (50)	4 (50)	4 (50)	0.48	4 (50)	4 (50)	**0.05**
Equal to/ Above 25th percentile	16 (64)	9 (36)	4 (16)	21 (84)		16 (64)	9 (36)	0.48

The participant's perception of disorder, crime, and walkability of their neighborhood was then compared to whether their physical activity changed with the onset of the pandemic. While 33% of participants reported no change in physical activity during the COVID-19 pandemic, 61% were less physically active and 6% were more physically active. Change in physical activity was not significantly related to any of the neighborhood scales (disorder, crime, walkability). High perceived neighborhood walkability (i.e., equal to/above 25% percentile) was borderline significantly (p=0.05) related to ever walking in the neighborhood or park during the COVID-19 pandemic. Overall, participants were less likely to report walking in their neighborhood or park if they scored above the 75th quartile for perceived neighborhood disorder or crime, or below the 25th quartile for walkability.

Discussion

Black pregnant people in this study were overall less physically active than before the COVID-19 pandemic. This is an exploratory analysis, so we need to exercise caution in interpreting the results. There seemed to be a relationship between the type of housing and activity. Participants living in apartments were more likely to decrease their physical activity levels since COVID-19, and were also less likely to exercise in their home than those living in townhomes or houses. Neighborhood racial composition also had a relationship with physical activity, with participants residing in mostly Black neighborhoods less likely to walk in their neighborhood or park or to exercise in their home than those in majority White neighborhoods. Conversely, those in majority Black neighborhoods were more likely to increase or maintain physical activity during the pandemic. While none of these comparisons reached statistical significance, we might speculate as to why differences were seen.

It is unknown why in this study Black neighborhoods resulted in less overall walking or exercising at home, but increased physical activity than White neighborhoods. One possible explanation is participants in Black neighborhoods having a lower baseline activity level, so the increase in unemployment or work-from-home that came with the pandemic allowed more flexibility for activity. Future studies should investigate the reason for this discrepancy. Participants who reported higher perceived neighborhood disorder, crime, and low walkability walked less in their neighborhood or parks and were more likely to decrease physical activity since the pandemic

than those living in neighborhoods with less disorder and crime and better walkability. Perceived disorder and crime seemed to have a closer relationship to if someone walked in their neighborhood or park than walkability.

Findings on physical activity for pregnant individuals during the COVID-19 pandemic have been few. Whitaker et al., (2021) examined activity changes in a U.S. sample of 746 pregnant women in which a sizable proportion were Black women (~44 percent). Less than 25% of participants changed their level of physical activity since the COVID-19 pandemic. A statistically significant decrease in physical activity was associated with loss of income, decreased social support, and pregnancy complications. Results specific to pregnant Black women were not reported. Physical activity behaviors were also examined in a small survey of 114 participants (46 pregnant, 68 postpartum) in a single county within Kansas; this sample included a smaller proportion of Black participants (~19%, n=22). Among the 46 pregnant participants, Ahlers-Schmidt et al., (2020) did not find statistically significant changes in physical activity levels. However more than half of the women reported either increasing (30%) or decreasing (~22%) physical activity during the pregnancy after the pandemic began. As with our study, small samples limited the ability to detect even sizable effects. In a large international survey of 520 pregnant women, Davenport et al., (2020) found that a statistically significant proportion (64%) of participants had a decline in physical activity since the pandemic. While this sample was much larger than the others reviewed here, very few participants were African-American (~1 percent) in the pool of 900 potentially eligible participants so generalizability is limited. Biviá-Roig et al., (2020) similarly found that physical activity significantly declined in a small (n=90) cohort of pregnant patients in Spain. The findings from both Davenport et al., (2020) and BiviáRoig et al., (2020) are remarkably consistent with our results in which 61% of our (pregnant) participants were less physically active since COVID-19. None of these four studies investigating physical activity in the pandemic among pregnant women explored the influence of neighborhood factors on physical activity changes so we cannot examine consistency with those findings from our sample.

While our results suggest relationships among variables, the results were not statistically significant. Although the sample was small, Black pregnant people, our sole focus, represent a vulnerable population especially during the COVID-19 pandemic. A larger sample size is needed to better estimate the impact of neighborhood factors on physical activity levels. Due to the small sample size, we were also unable to adjust for confounders in our analyses. Socioeconomic status, occupation, gestational age, and anxiety and depression scores are examples of potential confounders that may need to be controlled for when considering how neighborhood factors influence activity levels, especially during the pandemic.

Inequities in maternal morbidity and mortality were already present between Black and White mothers[11,12] and have only been worsened by the pandemic.[13,14] Physical activity is important for the health and well-being of both mom and baby during pregnancy.[38–41] Yet Black women in general are already less physically active than White women.[42] Black neighborhoods tend to have worse walkability than White neighborhoods,[43] and lower walkability could partially explain the lower physical activity levels among Black people.[44] Black women are more likely than non-Black women to live in neighborhoods with high violent crime and experience stress.[45] The current study explores how neighborhood factors amidst the pandemic may further limit physical activity during pregnancy. Future studies are warranted to further characterize this relationship and address how inequities in the lived environment can contribute to maternal health outcomes for Black pregnant individuals.

Conclusion

Physical activity levels during the COVID-19 pandemic decreased overall for Black pregnant individuals in our small sample. This was especially true for participants living in apartments, or neighborhoods with high disorder, high crime, or low walkability. However, participants identifying as living in neighborhoods with majority Black populations were more likely to maintain or increase their physical activity during the COVID-19 pandemic. More research is needed to characterize these differences and address racial inequities in neighborhood environment and physical activity to determine implications for Black pregnant people during pandemics. This is particularly important as inequities have been worsened by the COVID-19 pandemic, and climate change is predicted to increase the likelihood of pandemics[46]. Thus, it is imperative that we understand the environmental factors associated with changes in physical activity. Further studies should explore the preliminary relationship our results suggest between physical activity and neighborhood environment for the benefit of maternal and fetal health in Black pregnant individuals.

Acknowledgements

This study was funded by the National Institutes of Health, National Institute of Minority Health and Health Disparities, NIH Grant # R01MD011575. We have no known conflicts of interest to disclose. We would like to acknowledge all the women who participated in this study. We would like to thank Michigan State University's Public Health Certificate program for providing training in the importance of public health.

Disclosure Statement

The author(s) have no relevant financial disclosures or conflicts of interest.

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