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Research paper



Influence of neighborhood-level social determinants of health on a heart-healthy lifestyle among Black church members: A mixed-methods study

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ABSTRACT

Background: Few church-based health interventions have evaluated the influence of neighborhood-level social determinants of health (SDOH) on adopting heart-healthy lifestyles; none has occurred in Louisiana. We aimed to characterize neighborhood-level SDOH that may influence the ability to adopt a heart-healthy lifestyle among Black community church members in New Orleans, LA.

Methods: This mixed methods study used quantitative data (surveys) and qualitative data (focus groups) to explore SDOH at the neighborhood- and church-area- level, including factors related to the physical (e.g., walkability, accessibility to recreational facilities) and social (e.g., social cohesion, perceived safety) environments. Descriptive analyses were conducted for quantitative data. Qualitative data were coded and analyzed using grounded theory and thematic analysis.

Results: Among survey respondents ($n = 302$, 77 % female, 99 % Black), most reported having walkable neighborhood sidewalks and high neighborhood social cohesion. Two-thirds did not feel violence was a problem in their neighborhood and felt safe walking, day, or night. Focus group participants ($n = 27$, 74 % female, 100 % Black) reported facilitators to heart-healthy living, including social support promoting physical activity, intentionality in growing, buying, and preparing produce, and the neighborhood-built environment. Reported barriers included: crime, the COVID-19 pandemic, individual-level factors limiting physical activity, and city-wide disparities influencing health. Participants discussed strategies to promote healthy living, centered around the theme of establishing and rebuilding community relationships.

Conclusions: Future health interventions aimed at improving cardiovascular outcomes among church communities should continue to inquire about neighborhood-level SDOH and tailor interventions, as appropriate, to address barriers and leverage facilitators within these communities.

1. Introduction

Cardiovascular disease (CVD) is the leading cause of death in the United States (US) [1], and non-Hispanic Black Americans are

disproportionately affected with a 30 % higher likelihood of dying from CVD compared to non-Hispanic White individuals [2]. Inequitable distribution of adverse social determinants of health (SDOH) may underlie this disparity [3,4]. In particular, adverse neighborhood-level SDOH

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(independent of individual-level factors) have been associated with an increased risk of CVD, hypertension (HTN), diabetes (DM), and obesity [5–7]. Local access to nutritious food, availability of safe places for physical activity, neighborhood safety, and social support are examples of neighborhood-level determinants that can impact an individual or a community's ability to adopt and maintain a heart-healthy lifestyle [8].

Louisiana has the highest age-adjusted prevalence of poor cardiovascular health among all US states (17 % compared to the mean age-adjusted prevalence of 10 %) [1]. In New Orleans, Black individuals comprise the largest racial/ethnic group in the city (59 % of residents) and are at increased risk of CVD compared to White New Orleanians [9]. To address local cardiovascular health disparities, it is important to understand the community's priorities and needs. Church members are a notable subgroup of the Black population, particularly in Louisiana, with polling estimates ranking the state 4th highest in self-reported religious service attendance [10]. Black churches play an important role in health promotion among Black communities and can respond to community health needs by offering an array of resources including safe physical infrastructure, educational programs, social support, and social services (e.g., food, housing) [11–13]. Additionally, Black churches are viewed as trusted entities and can help promote culturally-responsive health-related programs [12,14]. Public health and faith-based organization partnerships have resulted in successful church-based health interventions with improvements in fruit and vegetable intake, physical activity levels, and weight loss [14–20]. However, few church-based health interventions have evaluated the influence of neighborhood-level SDOH on adopting heart-healthy behaviors, a critical gap, since these determinants may be addressed with community-based local health interventions or local policy change [21–23]. This mixed-methods study aimed to characterize neighborhood-level SDOH that may influence the ability to adopt a heart-healthy lifestyle among Black community church members in New Orleans, LA.

2. Materials and methods

2.1. Design, setting, and participants

The study was conducted during the planning phase of the Community Health Worker Led Church-Based Intervention for Eliminating Cardiovascular Health Disparities in African Americans (CHERISH; Grant No: UG3 HL151309), a National Heart, Lung, and Blood Institute-funded study aimed at decreasing the risk of CVD among Black community church members residing in New Orleans, Louisiana. CHERISH is part of the Disparities Elimination through Coordinated Interventions to Prevent and Control Heart and Lung Disease (DECIPHeR) Alliance [24]. To inform the design and implementation of the CHERISH intervention, a mixed-methods needs assessment, consisting of surveys and focus groups, was conducted to explore church members' neighborhood-level and church area-level determinants that may influence cardiovascular-related health behaviors. All data were de-identified. The Tulane University Institutional Review Board approved all activities of this study. Participants provided verbal consent before taking part in study activities.

2.2. Quantitative data

2.2.1. Data collection

Surveys were conducted between November 2021 and February 2022 to inquire about community church members' views on key components of the health intervention, previous health behaviors and healthcare use, and readiness for change. Surveys were leveraged to inquire about participants' length of residence in their current neighborhood (defined as a 10 to 15-minute walking distance from the participant's home, as seen in the literature) [25], and aspects of the neighborhood including the physical environment (6 Likert questions) and social environment (6 Likert questions). [Supplemental Item 1]

Questions were obtained and adapted from previously validated instruments [8,25]. Surveys also inquired about demographic information. [Table 1] Purposive sampling was used; participants were recruited by a wellness coordinator (church liaison responsible for promoting health and wellness) designated by each church. Immediately following church service, wellness coordinators distributed self-administered surveys to church members.

2.2.2. Data analysis

Descriptive statistics were obtained using R Statistical Software (v4.1.1; R Core Team 2021) to summarize survey results. Frequencies were determined for categorical survey variables and median and interquartile range (IQR) were calculated for continuous variables.

2.3. Qualitative data

2.3.1. Data collection

Five focus groups were conducted between July and August 2022. The designated wellness coordinator for each church identified and recruited participants within their church congregation for the study. Most participants were recruited from different churches than those who completed the health needs assessment survey to engage with newly partnered churches. Self-reported demographic information was collected including age, reported gender, sex, and race/ethnicity, in addition to participants' current neighborhood and duration of residence [Table 1]. The moderator guide [Supplemental Item 2] was created after survey results were reviewed by the study team to further characterize factors that may influence participants' ability to be physically active in their neighborhood and church area, and the influence of local crime on healthy living. Focus groups also inquired about the availability of fruits and vegetables in participants' neighborhoods. The moderator guide was piloted by two community members and modifications were made based on feedback. Focus groups were conducted in English via Zoom (@2022 Zoom Video Communications, Inc.), and lasted approximately 60–90 min. Interviews were video-recorded and transcribed verbatim. Field notes were made during and after each focus group. An iterative process

Table 1
Characteristics of study participants.

Characteristic ^a	Participants completing health needs assessment survey	Focus group participants
	N = 302	N = 27
Age in years - median (IQR)	66 (56–71)	63 (56–70)
Female - n (%)	233 (77 %)	20 (74 %)
Race - n (%)		
Non-Hispanic Black	298 (99 %)	27 (100 %)
Non-Hispanic White	3 (<1 %)	
Ethnicity - n (%)		
Hispanic	13 (4 %)	0
Education - n (%)		
≤High school degree	81 (27 %)	3 (11 %)
Some college	71 (24 %)	7 (26 %)
≥Associate/bachelor's degree	150 (50 %)	17 (63 %)
Employment status - n (%)		
Retired	131 (43 %)	–
Currently employed	113 (37 %)	–
Disability preventing employment	30 (10 %)	–
Keeping house	5 (2 %)	–
Other	23 (8 %)	–
Hypertension - n (%)	218 (73 %)	–
Diabetes - n (%)	110 (37 %)	–
Hypercholesterolemia - n (%)	168 (56 %)	–
Current use of tobacco or nicotine products	28 (9 %)	–
Years residing in current neighborhood - Median (IQR)	20 (10–37)	20 (15–30)

^a All characteristics were self-reported by participants.

was used so that probing questions were refined based on the information obtained from earlier focus groups.

2.3.2. Data analysis

All data were de-identified. Interview transcripts were imported and analyzed using NVIVO Release 1.6.1 (© QSR International 2022). Coding and analysis were in accordance with grounded theory and thematic analysis principles [26]. At least two individual coders (A.H., F.A., M.W.) performed line-by-line coding to inductively identify initial concepts, with a third party (F.A., J.G.) available to reconcile differences. Codes were revised and reviewed for each focus group and across focus groups. Concepts were grouped into common themes and subthemes, and then conceptual links among themes were identified. All authors of the study team reached a consensus on the final themes that reflected the full range and depth of the data.

3. Results

3.1. Quantitative analysis

A total of 302 church members completed the health needs assessment survey [Table 1]. Median age of respondents was 66 years old (IQR: 56–71). Most participants were female (77 %), and Black (99 %). Approximately half had an associate degree, bachelor's, or graduate-level degree. There was a large retiree population (43 %), and approximately 37 % were currently employed. Most participants were previously diagnosed with HTN (73 %) and hypercholesterolemia (56 %) by a health professional.

Survey questions inquiring about the neighborhood's physical environment revealed that approximately 75 % of participants reported having walkable sidewalks in their neighborhood [Table 2]. Close to half of the participants agreed they had facilities to bicycle near their neighborhood, nearby free or low-cost recreation facilities, and stores within walking distance. Forty-three percent reported there was a large selection of fresh fruits and vegetables in their neighborhood. In terms of the neighborhood social environment, approximately 80 % of

participants believed people in their neighborhood generally got along and were willing to help their neighbors, and the majority agreed that people in their neighborhood shared the same values (51 %) and could be trusted (59 %). Regarding perceived safety, about one-third of participants believed violence was a problem in their neighborhood, and about 50 % felt safe walking, day, or night.

3.2. Qualitative analysis

Twenty-seven church members participated in a total of five focus group sessions. The last focus group was conducted to increase male representation. The median age of participants was 63 years old (IQR: 56–70), 74 % were female, and all participants were non-Hispanic Black [Table 1]. Sixty-three percent obtained an associate degree, bachelor's, or graduate-level degree. Most participants reported that their neighborhoods and church areas were different and that they did not mind driving to church.

Most themes resulting from the qualitative analysis conveyed neighborhood or church-area facilitators and barriers to adopting a heart-healthy lifestyle; however, individual-level factors were also highlighted. Among facilitators promoting heart-healthy living, participants discussed the following themes: social support promoting physical activity, intentionality in growing, buying, and preparing produce, and the neighborhood-built environment. Among barriers and challenges to participating in heart-healthy living, themes discussed included: crime, the COVID-19 pandemic, individual-level factors limiting physical activity, and city-wide disparities influencing health. Lastly, participants discussed strategies to promote healthy living, centered around the theme of establishing and rebuilding relationships (particularly those lost over the last few years as a consequence of the pandemic). Themes and respective subthemes are described in the subsequent sections and Fig. 1 with selected supporting quotations provided in Table 3.

Table 2
Responses for neighborhood^a survey questions.

Item	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
Physical environment					
Physical activity and walkability					
There are walkable sidewalks on most of the streets in my neighborhood (n = 300)	39 (13 %)	26 (9 %)	14 (5 %)	86 (29 %)	135 (45 %)
There are facilities to bicycle in or near my neighborhood, such as special lanes, separate paths or trails, shared use paths for cycles and pedestrians (n = 300)	83 (28 %)	40 (13 %)	23 (8 %)	61 (20 %)	93 (31 %)
My neighborhood has free or low-cost recreation facilities, such as parks, walking trails, bike paths, recreation centers, playgrounds, public swimming pools, etc. (n = 300)	58 (19 %)	48 (16 %)	24 (8 %)	82 (27 %)	88 (29 %)
There are many shops, stores, markets, or other places to buy things I need within easy walking distance (n = 300)	100 (33 %)	53 (18 %)	13 (4 %)	64 (21 %)	70 (23 %)
Availability of healthy foods					
A large selection of fresh fruits and vegetables is available in my neighborhood (n = 299)	88 (29 %)	46 (15 %)	32 (11 %)	67 (22 %)	66 (21 %)
Social environment					
Social cohesion					
People around here are willing to help their neighbors (n = 300)	16 (5 %)	17 (6 %)	49 (16 %)	107 (36 %)	111 (37 %)
People in my neighborhood generally get along with each other (n = 300)	10 (3 %)	13 (4 %)	4 (14 %)	98 (33 %)	138 (46 %)
People in my neighborhood can be trusted (n = 300)	19 (6 %)	22 (7 %)	81 (27 %)	97 (32 %)	81 (27 %)
People in my neighborhood share the same values (n = 299)	24 (8 %)	35 (12 %)	86 (29 %)	93 (31 %)	61 (20 %)
Safety					
I feel safe walking in my neighborhood, day, or night (n = 298)	46 (16 %)	48 (16 %)	48 (16 %)	92 (31 %)	64 (22 %)
Violence is a problem in my neighborhood (n = 300)	81 (27 %)	68 (23 %)	47 (16 %)	62 (21 %)	42 (14 %)

^a Neighborhood was defined as a 10 to 15-minute walking distance from the participant's home.

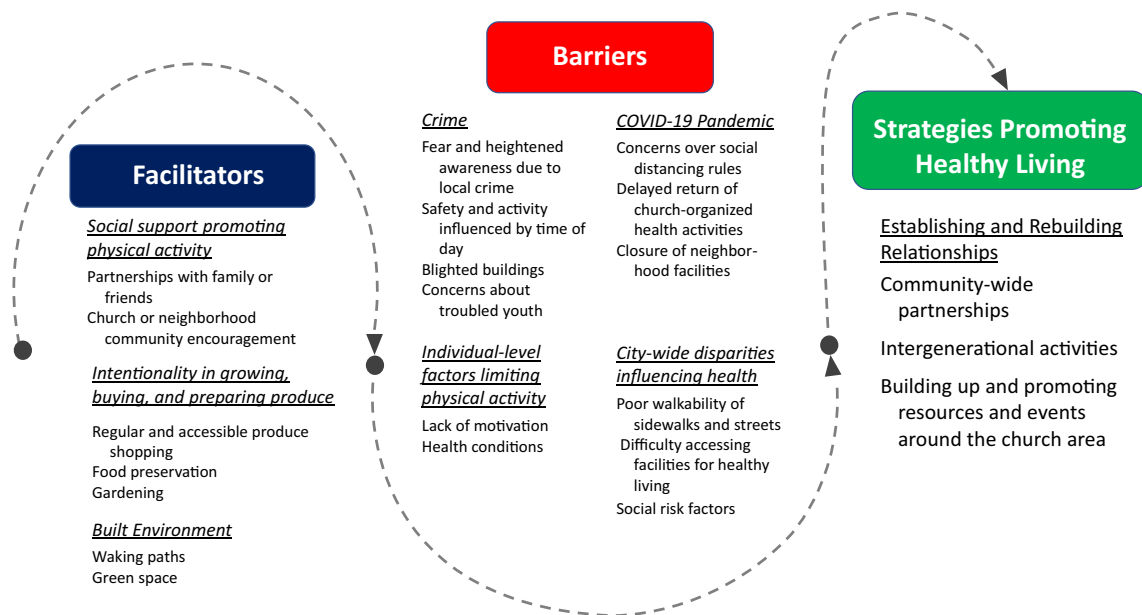


Fig. 1. Thematic schema. Facilitators and barriers influencing participants' ability to adopt a heart-healthy lifestyle, and strategies promoting healthy living.

3.2.1. Facilitators of heart-healthy living

3.2.1.1. Social support promoting physical activity. Social support motivated participants to be physically active, whether the encouragement came from a partner, neighbor, church member, church-organized group activities, or seeing others in the community be physically active. One participant shared that in his neighborhood, “There are a lot of people also doing their own walks, [cycling], or running...[it creates] a community effect.”

3.2.1.2. Intentionality in growing, buying, and preparing produce. Most participants reported regular shopping for fruits and vegetables, with 17 out of 27 reporting going to the store at least once weekly. Most reported having at least one grocery store within driving distance of their homes. Participants reported several ways to make food last, such as buying canned or frozen foods. Two participants stated they grew vegetables in their home garden. One participant shared that her neighborhood had a community garden.

3.2.1.3. Built environment. Several participants reported having neighborhood spaces to be physically active. A few participants reported having a waking path, particularly those living close to the levee. Participants also reported walking at local parks, and a few stated it was pleasant to walk in areas with many trees, “The neighborhood is very walkable, there's a lot of trees so it's really shady... it's not [too] hot.”

3.2.2. Barriers to heart-healthy living

3.2.2.1. Crime. The most reported local crimes were car break-ins and shootings. Blighted buildings were thought to be associated with crime, given that unknown individuals (referred to as “squatters”) would move in, and a few participants expressed concern that crime was committed by the youth. Participants had varying responses in terms of perceived safety due to local crime. While some participants reported feeling safe in their neighborhood or at church, most reported they were most cautious at night, and almost all reported being attentive to their surroundings independent of the time of day, one male participant stated, “I don't feel unsafe but I definitely keep my head on a swivel when I'm walking... At the end of the day, this is New Orleans. You got to keep your head on.”

3.2.2.2. COVID-19 pandemic. Many participants reported continued caution, with one stating, “I live less than two blocks away from a [community recreational] site. Prior to the pandemic, I was very used to [going]. I like group fitness activities, so I did utilize that [site] and a couple [others]. And so, the pandemic, it took that away from me.” Participants also reported delayed return of church-organized health activities such as exercise and education classes, as well as delayed reopening of neighborhood facilities.

3.2.2.3. Individual-level factors limiting physical activity. Lack of motivation and limited time were reported as barriers to participating in physical activity; lack of motivation was a common response among men (endorsed by 4 of the 7 male participants). “My case is more [lack of] motivation. I've never enjoyed exercising. I went through the expense of building an exercise room. I just open the blinds and close the blinds.” Health limitations including arthritis-related pain, recent surgeries, and other injuries were reported in all groups.

3.2.2.4. City-wide disparities influencing health. While some participants reported having nearby access to safe places for walking and other types of physical activity, this was not the case for others. Rather, the conditions of sidewalks and streets near some participants' homes limited the extent to which they could participate in physical activity, as reported by one participant, “The streets are not [well] paved, so walking isn't something that I would necessarily enjoy.” Moreover, even though most participants reported having easy access to grocery stores, almost all participants still drove to get there. Social risk factors were discussed by one participant, specifically the impact of poverty on the accessibility of resources that would enable healthy living and separately, gentrification, and feeling comfortable with disparate groups in the neighborhood.

3.2.3. Strategies promoting healthy living

3.2.3.1. Community-wide partnerships. Participants encouraged partnerships between churches as well as with other community organizations and businesses. One participant expressed, “I think the idea of bringing together a church coalition, to bring people together, to [share] ideas... I think that would be an excellent resource.”

Table 3
Selected supporting quotations.

Theme/subtheme	Supporting quotations [self-reported gender, age in years]
Facilitators of heart-healthy living	
Social support promoting physical activity	
Partnerships with family or friends	[Woman, 56]: "I do go walking with my husband." [Woman, 51]: "On occasion, I will walk around the [apartment] complex, and I have seen other people do the same as well. I'll even meet a neighbor sometimes. [We] support one another and we'll walk." [Man, 70]: "A couple of the neighbors [and me] ride our bikes through the neighborhood. So, we get a lot of fun and joy out of that."
Church or neighborhood community encouragement	[Woman, 76]: "We recently had a [an annual walk that's part of the church anniversary] a couple of Saturdays ago at [the] park" [Woman, 51]: "Years ago we [had a weight-loss competition. It] really motivated a group of people to get involved to lose weight... If you lost the weight, great, but it brought together teams of people for the same goal, to become healthier." [Woman, 72]: "I find myself being more active when I'm around younger people because they have a tendency to you know to motivate me... you just need that that young blood [to tell you] 'come on, let's roll, let's go,' you know."
Intentionality in growing, buying, and preparing produce	
Regular and accessible produce shopping	[Woman, 46]: "I do have availability, there's a neighborhood grocery store that's about a 20-minute walk, maybe a 5-minute drive, from my home. And then within a one-mile radius in my car I can get to [another store] with a better selection." [Woman, 59]: "I'm pretty close to [stores], driving distance, like 7 min or so." [Woman, 63]: "I can walk to [the store on my] corner."
Food preservation	[Woman, 46]: "I'll spend time picking and choosing to see which [fruits and vegetables have] the longest shelf life. Then as time goes on, I'll cook and maybe put [them in the freezer] or refrigerator." [Woman, 70]: "Most of the vegetables I buy are canned." [Woman, 56]: "I buy a lot of frozen blueberries, strawberries most of the time, because we do a lot of smoothies."
Gardening	[Man, 71]: "I've been attempting to grow tomatoes; I've been a little more successful with bell peppers and okra." [Woman, 64]: "We have [a] Community garden... we got a grant for the property and we built the community garden. Each person in the neighborhood gets their own space and grows their vegetables and fruit. It's like \$50 a year. The children have a separate garden; we let them plant the fruits and vegetables and then they take them home to eat."
Built environment	
Walking paths	[Woman, 59]: "Well, I will say my area is pretty walkable too. I'm not far from the levee. So, when I get back to walking, I'm hoping to start walking on the levee because it's nice. It's a nice walking path." [Woman, 60]: "My favorite walks [are along our streets]. Our streets are long

Table 3 (continued)

Theme/subtheme	Supporting quotations [self-reported gender, age in years]
Green space	streets; walking from one end to the other is [about a] mile. I also like to walk on the levee." [Woman, 57]: "In my neighborhood, we have a park that was actually completed during the pandemic. There is not necessarily a walking path, but there is [a] sidewalk that you can walk. My husband and I will walk that." [Woman, 64]: "We have the community garden for adults as well as the children, so that gives us a little activity. And what I do is I walk around there."
Barriers to heart-healthy living	
Crime	
Fear and heightened awareness due to local crime	[Woman, 63]: "It's carjacking and shootings... [When] we first moved around here, it wasn't like that." [Woman, 51]: "I would say yes, definitely yes, [crime around the church is] a major concern... We're so grateful that we have security and protocols to assist, but [some members are still] afraid to come to service; [I'm] just being honest, you know." [Man, 58]: "For me, it's the gunfire that you hear [from a nearby neighborhood]. Some nights, it's like we are in a war zone, you hear so much gunfire. I didn't realize how much gunfire we had around here until I went [to visit my] daughter [out-of-state] and realized for a whole week I didn't hear one gunshot. Didn't realize how normalized it had become." [Man, 59]: "[Crime] hasn't affected me, but it has affected a friend of mine who said he doesn't even go to the mailbox unless he's got his gun on him." [Man, 63]: "I'm just as concerned with crime in my neighborhood as I am near church. So, you know, anywhere I am, it's just something on my mind. That's the way I would say it."
Safety and activity influenced by time of day	[Woman, 76]: "Just like about everybody has said, it's almost a universal thing, nobody goes out at night. If you can take care of all your gardening, your groceries, and errands that you have to do, if you can take care of it during the day, it's pretty good." [Woman, 65]: "When it's dark, I am inside. I try to be home like Cinderella," [Man, 59]: "I feel very safe, basically, walking in the neighborhood because [I walk] in the early morning... In the evening time, I probably would question it. You got a few little more characters out on the street, so I will be kind of looking over my shoulder"
Blighted buildings	[Woman, 56]: "A lot of people didn't come back and [since Hurricane] Katrina a lot of the houses are abandoned, or the water might have washed them away, or they sold [the houses] to FEMA, or they gave up the land, we don't know what's going on. But they have [squatters] moving in ... the police saying they can't do [anything]. So, you don't know what to do with stuff like that." [Man, 27]: "The only thing I'll pick at is [the blighted] buildings nearby. I think that could always be a place that breeds crime."

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Table 3 (continued)

Theme/subtheme	Supporting quotations [self-reported gender, age in years]
Concerns about troubled youth	[Woman, 55]: "A lot of these crimes that's going on is with younger kids, with these teenagers. And I think [it starts from the] home, from the parents, or the company that they're keeping." [Woman, 73]: "We have to work with our young people, but it is the young people that are committing crimes... our children and our children's children, our friends' children. They are not all strangers to us. It may even be some of the members' children, we don't know."
COVID-19 pandemic Concerns over social distancing rules	[Woman, 70]: "I [had a gym membership] too, but I discontinued that. Not everybody was willing to follow the [safety] protocols that [were] set in place." [Woman, 65]: "I [participated in an] exercise class, but when the pandemic came, they closed [the facility]. They've just begun to open it back up, but I'm not too comfortable right now, even though I have my shots. I still want to wait a little while." [Woman, 72]: "I'm 72 years old and I've had COVID and praise God that you know I've been healed from that. And I don't try to put myself in a place where I can get it again."
Delayed return of church-organized health activities	[Man, 76]: "I did do the [church's aerobics] exercise class and did the health class for diabetics... [The classes] have not come back." [Woman, 59]: "At one point, as part of our health and wellness ministry, we had a program [called] 'Strategies to reduce high blood pressure and weight' and we would meet twice a week... We had several classes. Since Covid, we haven't reinstated [this], so that may be something we could think about." [Man, 71]: "[At the church], we had line dancing. I didn't participate but my wife did quite frequently."
Closure of neighborhood facilities	[Woman, 59]: "I used to go to water aerobics, but since they shut down [due to the pandemic], I have not been able to [go]." [Man, 70]: "Before the pandemic, there was a walking trail in Gretna. I was walking five miles every morning but when the pandemic came, it basically shut down."
Individual-level factors limiting physical activity Lack of motivation	[Woman, 59]: "There is a gym right here in the [apartment complex] property, I just need to be motivated, it needs to happen. I guess the discipline, I [need to] build my capacity in that area." [Man, 63]: "I would say, for myself, just trying to be more disciplined, you know, that would really be helpful." [Man, 76]: "Well, I have to agree with the lack of motivation."
Health conditions	[Woman, 65]: "I am in therapy for my hip, I pulled a muscle. But I used to walk, and I enjoy walking." [Woman, 70]: "Tomorrow I'm going to take a stress test because I told my doctor that I'm kind of winded." [Man, 71]: "I have some physical limitations, I'm about to have hip surgery on the right, and following that will [have the left hip replaced]. I've already had

Table 3 (continued)

Theme/subtheme	Supporting quotations [self-reported gender, age in years]
City-wide disparities influencing health Poor walkability of sidewalks and streets	both knees replaced, so my activities are limited now." [Woman, 76]: "Many of us live within the city limits, and I think it is difficult for us to walk because of the conditions of the street. The repairs aren't supposed to [take] so long." [Woman, 46]: "The streets are not all that greatly paved so walking isn't something that I would necessarily enjoy." [Woman, 72]: "I don't have anything in my neighborhood that motivates me. I go to Lakeside [Mall], Oakwood [Mall] and I walk there."
Difficulty accessing facilities for healthy living	[Woman, 46]: "Since I've lived in this community, I've seen increased options for healthy foods, but not necessarily in terms of [medical] care. People have to travel a while." [Man, 71]: "Yes, not really a walking community as far as shopping." [Woman, 68]: "I don't have any large supermarkets or anything in walking distance."
Social risk factors	[Woman, 59]: "There are two demographics that [visit] the park [near church]. You're going to have young African American men playing basketball at certain times. And then you're going to have mainly all White families with their young children or their dogs. There is a racial disconnect. You will not see the [groups] together... And of course, there's this big discussion on why that happens, it's because the area is gentrified... People will not be active, because they can't connect with their community." [Woman, 59]: "The elephant in the room is the issue of poverty in the city of New Orleans, which begins at childhood, for a large percentage of people... How do you address this poverty issue, because that's really where it all begins."
Strategies promoting healthy living Establishing and rebuilding relationships Community-wide partnerships	[Woman, 51]: "There are some walking groups that are very active within the Community. One of them is 'Girl Trek' and I bring them up because they tend to have pop-ups, and actually I think they have one in [park near the Church]. Maybe being proactive and trying to build up that camaraderie." [Woman, 60]: "There was a health club [near the church], but they've closed up. They actually did a partnership with the [church] and offered discount membership and things like that, so that's one of the things I'm hoping one day comes back, or I'm not sure what [other] health clubs are close by."
Intergenerational activities	[Woman, 64]: "It took us a while to get [the community garden] together. Now we're getting ready to start a business and the children are going to work and they're going to make money, they'll make minimum wage." [Woman, 73]: "That is why I love what our pastor is doing, trying to implement programs that will help provide income for young men, so they don't feel like they have to sell drugs and other kinds of

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Table 3 (continued)

Theme/subtheme	Supporting quotations [self-reported gender, age in years]
Building up and promoting resources and events around the church area	<p>things that will divert them. If they can have jobs in [new] businesses that pay a decent wage, that is another thing.”</p> <p>[Woman, 64]: “I like the idea about the resources [list] and definitely we need more healthy food places like marketplaces and different things of that nature. We just need more activities going on in the day.”</p> <p>[Woman, 59]: “So maybe again it's just going to take some time and planning. It could happen at our church, to make [activities] available for our church community.”</p>

3.2.3.2. Intergenerational activities. Ensuring that younger generations were involved in activities and programs promoting healthy living was advocated. Ideas to involve youth ranged from simple activities such as “Teach me how to shop” demonstrations, to more ambitious programs, including developing farmer's markets at schools across the city, “[If we] create a farmer's market in every school [for] these children, then we're starting somewhere. Then we are starting [a new] culture with those children, you know, early.”

3.2.3.3. Building up and promoting resources and events around the church area. Although most participants did not live close to their church, there was still a strong need to build up the surrounding church communities. A few participants noted the importance of participating in the church neighborhood's community events, “Getting a resource list of what's available to us within the church community... whenever there is some type of health event going on, to make sure we are aware of it.”

4. Discussion

In this mixed-methods study we characterized neighborhood- and church area-level determinants that may influence participants' ability to adopt a heart-healthy lifestyle. Survey responses revealed that almost three-quarters of respondents reported walkable sidewalks in their neighborhood, but only about half reported having nearby cycling facilities, inexpensive recreation facilities, or stores. Most respondents reported high levels of social cohesion in their neighborhoods. About half of respondents reported violence was not a problem in their neighborhood and felt safe walking, day, or night. We subsequently organized focus groups to further investigate the influence of crime (violent and non-violent) on perceived safety, and to further identify factors in participants' neighborhoods or church areas facilitating or hindering their ability to adopt a heart-healthy lifestyle. There were several themes we identified related to facilitators and barriers to adopting a heart-healthy lifestyle. The last theme was centered on establishing and rebuilding relationships to promote healthy living in the community. Our findings add to the literature by providing perspectives regarding physical and social neighborhood-level determinants among Black church members in the South. There is currently no study evaluating the influence of neighborhood-level factors on adopting a heart-healthy lifestyle among church members residing in New Orleans, a city with predominantly Black residents.

Social support was viewed as an important motivator for physical activity among focus group participants, adding to existing literature demonstrating positive associations between social support and physical activity among adults of varying ages [21,27–29]. Creating safe and inexpensive spaces where participants can come together to be physically active will be particularly important for the upcoming CHERISH intervention; these spaces will help address the limited accessibility of free or low-cost recreation facilities reported by survey respondents, and

the safety concerns related to local crime, a barrier to participating in physical activity reported during focus group sessions. Focus group responses were mixed regarding the influence of crime on participants' ability to engage in a heart-healthy lifestyle. Previous studies suggest crime and neighborhood-level safety likely influence blood pressure changes and adiposity, but more research is needed to evaluate the associations with long-term cardiovascular risks [30–32].

Among strategies to promote healthy living, focus group participants highlighted the importance of creating or strengthening partnerships between the church and other community organizations. Indeed, it is well-known that faith-based organizations are ideally positioned to advance community-based health promotion initiatives, particularly in communities that lack the social and economic capital to overcome persistent health disparities [13,33]. Our qualitative findings, further underscore the existence of social capital within faith-based organizations, as focus group participants were eager to restart church-organized health initiatives that had been on hold due to the COVID-19 pandemic, not just for their own well-being, but for that of fellow congregants and surrounding communities.

4.1. Limitations and next steps

Our study has several limitations. The study population was composed of older, mostly female, and highly educated Black church members. Moreover, the participants were mostly retired or currently employed, limiting generalizability to other Black individuals living in New Orleans and other urban cities. All data were self-reported and could encourage response bias (participants may feel pressure to give socially acceptable answers), which may have affected the validity of findings. We were limited in the number of neighborhood questions we could include in the health needs assessment survey as there were other domains related to the CHERISH intervention requiring evaluation, and we wanted to minimize survey response fatigue. As such, we were unable to inquire about other aspects of the neighborhood environment including residential segregation and disinvestment, which have previously been tied to cardiovascular and other health outcomes [3,6,34]. Nevertheless, the complementary survey results and qualitative analysis allowed for a more robust description of the participants' neighborhood and church-area environments. We will incorporate findings into the design and implementation of our church-based health intervention (e.g. by leveraging strong social support among church members, creating spaces for educational sessions and group physical activities, stimulating community partnerships, etc.) Next steps will also include quantitatively assessing the association between neighborhood-level SDOH and important cardiovascular-related health behaviors such as the likelihood of obtaining regular medical care, medication adherence, etc. Prospective analyses should continue to assess the longitudinal influence of the neighborhood environment on the health of Black communities, as others have highlighted [35–37], as these will help inform future community-based clinical trials and local policy change. Importantly, iterative community input is critical to the success of community-based health interventions, more generally, since community partnership and collaborations help promote trust, and provide researchers and clinicians with a nuanced understanding of the community needs and priorities [38–40].

4.2. Conclusions

Several determinants in church members' neighborhoods and church areas may facilitate heart-healthy living, particularly the encouragement provided by social support. Crime and its effects on perceived safety were viewed as barriers to physical activity among several participants. There were disparities in terms of access to walkable sidewalks, inexpensive recreation facilities, and stores within walking distance. Future health interventions aimed at improving cardiovascular outcomes among church communities should investigate neighborhood-

level SDOH and tailor interventions, as appropriate, to address barriers and leverage facilitators within these communities.

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Flor Alvarado: Conceptualization, Methodology, Software, Validation, Formal analysis, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration. **Amanda Hercules:** Conceptualization, Methodology, Software, Formal analysis, Data curation, Writing – review & editing. **Melanie Wanigatunga:** Conceptualization, Methodology, Software, Formal analysis, Data curation, Writing – review & editing. **Jodie Laurent:** Conceptualization, Methodology, Data curation, Writing – review & editing, Project administration. **Marilyn Payne:** Conceptualization, Methodology, Writing – review & editing. **Farah Allouch:** Methodology, Software, Formal analysis, Data curation, Writing – review & editing. **Deidra C. Crews:** Methodology, Writing – review & editing. **Katherine T. Mills:** Methodology, Data curation, Writing – review & editing, Supervision. **Jiang He:** Conceptualization, Methodology, Resources, Data curation, Writing – review & editing, Supervision, Funding acquisition. **Jeanette Gustat:** Conceptualization, Methodology, Formal analysis, Data curation, Writing – review & editing, Supervision. **Keith C. Ferdinand:** Conceptualization, Resources, Data curation, Writing – original draft, Writing – review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ahjo.2023.100273>.

References

- [1] S.S. Virani, A. Alonso, H.J. Aparicio, et al., Heart disease and stroke statistics-2021 update: a report from the American Heart Association, *Circulation* 143 (8) (2021) e254–e743, <https://doi.org/10.1161/cir.0000000000000950>.
- [2] CDC, National Vital Statistics Report, Vol. 69, No. 13. Table 10, 2021. <https://www.cdc.gov/nchs/data/nvsr/nvsr69/nvsr69-13-508.pdf>. (Accessed 24 August 2022).
- [3] T.M. Powell-Wiley, Y. Baumer, F.O. Baah, et al., Social determinants of cardiovascular disease, *Circ. Res.* 130 (5) (2022) 782–799, <https://doi.org/10.1161/circresaha.121.319811>.
- [4] S. Stringhini, S. Sabia, M. Shipley, et al., Association of socioeconomic position with health behaviors and mortality, *JAMA* 303 (12) (2010) 1159–1166, <https://doi.org/10.1001/jama.2010.297>.
- [5] E.P. Havranek, M.S. Mujahid, D.A. Barr, et al., Social determinants of risk and outcomes for cardiovascular disease, *Circulation* 132 (9) (2015) 873–898, <https://doi.org/10.1161/CIR.0000000000000228>.
- [6] A.V. Diez Roux, M.S. Mujahid, J.A. Hirsch, K. Moore, L.V. Moore, The impact of neighborhoods on CV risk, *Glob. Heart* 11 (3) (Sep 2016) 353–363, <https://doi.org/10.1016/j.gheart.2016.08.002>.
- [7] A.V. Diez Roux, C. Mair, Neighborhoods and health, *Ann. N. Y. Acad. Sci.* 1186 (Feb 2010) 125–145, <https://doi.org/10.1111/j.1749-6632.2009.05333.x>.
- [8] M.S. Mujahid, A.V. Diez Roux, J.D. Morenoff, T. Raghunathan, Assessing the measurement properties of neighborhood scales: from psychometrics to ecometrics, *Am. J. Epidemiol.* 165 (8) (2007) 858–867, <https://doi.org/10.1093/aje/kwm040>.
- [9] Centers for Disease Control and Prevention, About Underlying Cause of Death, 1999–2022. CDC WONDER Online Database, Centers for Disease Control and Prevention, Atlanta, GA, 2022. <https://wonder.cdc.gov/ucd-icd10.html>. (Accessed 24 August 2022).
- [10] Newport F. Gallup, Social and Policy Issues. Frequent Church Attendance Highest in Utah, Lowest in Vermont. <https://news.gallup.com/poll/181601/frequent-church-attendance-highest-utah-lowest-vermont.aspx>. (Accessed 8 June 2022).
- [11] K. Felix Aaron, D. Levine, H.R. Burstin, African american church participation and health care practices, *J. Gen. Intern. Med.* 18 (11) (2003) 908–913, <https://doi.org/10.1046/j.1525-1497.2003.20936.x>. Nov.
- [12] K.P. Derose, M.V. Williams, C.A. Branch, et al., A community-partnered approach to developing church-based interventions to reduce health disparities among african-americans and latinos, *J. Racial Ethn. Health Disparities* 6 (2) (Apr 2019) 254–264, <https://doi.org/10.1007/s40615-018-0520-z>.
- [13] J. Levin, Partnerships between the faith-based and medical sectors: implications for preventive medicine and public health, *Prev. Med. Rep.* 4 (Dec 2016) 344–350, <https://doi.org/10.1016/j.pmedr.2016.07.009>.
- [14] C.M. Tucker, S. Kang, N.A. Okonu, et al., A culturally sensitive church-based health-smart intervention for increasing health literacy and health-promoting behaviors among black adult churchgoers, *J. Health Care Poor Underserved* 30 (1) (2019) 80–101, <https://doi.org/10.1353/hpu.2019.0009>.
- [15] E.M. Arredondo, J.P. Elder, J. Haughton, et al., Fe en Acción: promoting physical activity among churchgoing latinas, *Am. J. Public Health* 107 (7) (Jul 2017) 1109–1115, <https://doi.org/10.2105/ajph.2017.303785>.
- [16] J. Berkley-Patton, C. Bowe Thompson, A.G. Bauer, et al., A multilevel diabetes and CVD risk reduction intervention in african american churches: project faith influencing transformation (FIT) feasibility and outcomes, *J. Racial Ethn. Health Disparities* 7 (6) (Dec 2020) 1160–1171, <https://doi.org/10.1007/s40615-020-00740-8>.
- [17] D.R. Young, K.J. Stewart, A church-based physical activity intervention for African American women, *Fam Community Health* 29 (2) (2006) 103–117, <https://doi.org/10.1097/00003727-200604000-00006>. Apr-Jun.
- [18] S. Wilcox, A. Parrott, M. Baruth, et al., The faith, activity, and nutrition program: a randomized controlled trial in african-american churches, *Am. J. Prev. Med.* 44 (2) (Feb 2013) 122–131, <https://doi.org/10.1016/j.amepre.2012.09.062>.
- [19] K. Resnicow, M. Campbell, C. Carr, et al., Body and soul. A dietary intervention conducted through African-American churches, *Am J Prev Med.* 27 (2) (2004) 97–105, <https://doi.org/10.1016/j.amepre.2004.04.009>. Aug.
- [20] C.C. Voorhees, F.A. Stillman, R.T. Swank, P.J. Heagerty, D.M. Levine, D.M. Becker, Heart, body, and soul: impact of church-based smoking cessation interventions on readiness to quit, *Prev Med.* 25 (3) (1996) 277–285, <https://doi.org/10.1006/pmed.1996.0057>. May-Jun.
- [21] N. Heredia, N. Nguyen, L.H. McNeill, The importance of the social environment in achieving high levels of physical activity and fruit and vegetable intake in African American church members, *Am. J. Health Promot.* 34 (8) (Nov 2020) 886–893, <https://doi.org/10.1177/0890117120925361>.
- [22] M. Baruth, S. Wilcox, R.P. Saunders, S.P. Hooker, J.R. Hussey, S.N. Blair, Perceived environmental church support and physical activity among black church members, *Health Educ. Behav.* 40 (6) (2013) 712–720, <https://doi.org/10.1177/1090198113477110>.
- [23] L.C. Brewer, S. Jenkins, S.N. Hayes, et al., Community-based, cluster-randomized pilot trial of a cardiovascular Mobile health intervention: preliminary findings of the FAITH! Trial, *Circulation* 146 (3) (2022) 175–190, <https://doi.org/10.1161/CIRCULATIONAHA.122.059046>.
- [24] A. Kho, G.L. Daumit, K.P. Truesdale, et al., The National Heart Lung and Blood Institute disparities elimination through coordinated interventions to prevent and control heart and lung disease alliance, *Health Serv Res.* 57 Suppl 1 (Suppl 1) (Jun 2022) 20–31, <https://doi.org/10.1111/1475-6773.13983>.
- [25] J.F. Sallis, H.R. Bowles, A. Bauman, et al., Neighborhood environments and physical activity among adults in 11 countries, *Am. J. Prev. Med.* 36 (6) (Jun 2009) 484–490, <https://doi.org/10.1016/j.amepre.2009.01.031>.
- [26] J. Corbin, A. Strauss, *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, Sage Publications, 2015.
- [27] G. Lindsay Smith, L. Banting, R. Eime, G. O'Sullivan, J.G.Z. van Uffelen, The association between social support and physical activity in older adults: a systematic review, *Int. J. Behav. Nutr. Phys. Act.* 14 (1) (2017) 56, <https://doi.org/10.1186/s12966-017-0509-8>, 2017/04/27.
- [28] E.C. Ho, L. Hawkey, W. Dale, L. Waite, M. Huisingh-Scheetz, Social capital predicts accelerometer-measured physical activity among older adults in the U.S.: a cross-sectional study in the National Social Life, Health, and Aging Project, *BMC Public Health* 18 (1) (2018) 804, <https://doi.org/10.1186/s12889-018-5664-6>. Jun 27.
- [29] A.A. Eyler, R.C. Brownson, R.J. Donatelle, A.C. King, D. Brown, J.F. Sallis, Physical activity social support and middle- and older-aged minority women: results from a US survey, *Soc Sci Med.* 49 (6) (Sep 1999) 781–789, [https://doi.org/10.1016/S0277-9536\(99\)00137-9](https://doi.org/10.1016/S0277-9536(99)00137-9).
- [30] E.L. Tung, R.F.M. Chua, S.A. Besser, et al., Association of rising violent crime with blood pressure and cardiovascular risk: longitudinal evidence from Chicago, 2014–2016, *Am. J. Hypertens.* 32 (12) (2019) 1192–1198, <https://doi.org/10.1093/ajh/hpz134>.
- [31] S.L. Mayne, K.A. Moore, T.M. Powell-Wiley, K.R. Evenson, R. Block, K.N. Kershaw, Longitudinal associations of neighborhood crime and perceived safety with blood

- pressure: the multi-ethnic study of atherosclerosis (MESA), *Am. J. Hypertens.* 31 (9) (2018) 1024–1032, <https://doi.org/10.1093/ajh/hpy066>.
- [32] T.M. Powell-Wiley, K. Moore, N. Allen, et al., Associations of neighborhood crime and safety and with changes in body mass index and waist circumference: the multi-ethnic study of atherosclerosis, *Am. J. Epidemiol.* 186 (3) (2017) 280–288, <https://doi.org/10.1093/aje/kwx082>.
- [33] E. Idler, J. Levin, T.J. VanderWeele, A. Khan, Partnerships between public health agencies and faith communities, *Am. J. Public Health* 109 (3) (Mar 2019) 346–347, <https://doi.org/10.2105/ajph.2018.304941>.
- [34] I. Motairek, E.K. Lee, S. Janus, et al., Historical neighborhood redlining and contemporary cardiometabolic risk, *J. Am. Coll. Cardiol.* 80 (2) (2022) 171–175, <https://doi.org/10.1016/j.jacc.2022.05.010>.
- [35] A.V.D. Roux, S.S. Merkin, D. Arnett, et al., Neighborhood of residence and incidence of coronary heart disease, *N. Engl. J. Med.* 345 (2) (2001) 99–106, <https://doi.org/10.1056/NEJM200107123450205>, 2001/07/12.
- [36] A.F. Brown, L.J. Liang, S.D. Vassar, et al., Neighborhood disadvantage and ischemic stroke: the cardiovascular health study (CHS), *Stroke* 42 (12) (Dec 2011) 3363–3368, <https://doi.org/10.1161/strokeaha.111.622134>.
- [37] S. Barber, D.A. Hickson, X. Wang, M. Sims, C. Nelson, A.V. Diez-Roux, Neighborhood disadvantage, poor social conditions, and cardiovascular disease incidence among African American adults in the Jackson heart study, *Am. J. Public Health* 106 (12) (2016) 2219–2226, <https://doi.org/10.2105/AJPH.2016.303471>.
- [38] T.M. Powell-Wiley, Centering patient voices through community engagement in cardiovascular research, *Circulation* 147 (2) (2023) 105–107, <https://doi.org/10.1161/CIRCULATIONAHA.122.061112>.
- [39] T.M. Powell-Wiley, Y. Baumer, F.O. Baah, et al., Social determinants of cardiovascular disease, *Circ. Res.* 130 (5) (2022) 782–799, <https://doi.org/10.1161/CIRCRESAHA.121.319811>.
- [40] K.C. Ferdinand, Overcoming barriers to COVID-19 vaccination in African Americans: the need for cultural humility, *Am. J. Public Health* 111 (4) (2021) 586–588, <https://doi.org/10.2105/ajph.2020.306135>.