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Characteristics of a Church-placed Physical Activity Program Associated with Physical Activity Uptake in Church-going African Americans in New York City

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Abstract **Background:** African Americans in New York City (NYC) are more likely to have sedentary lifestyles and lack access to physical activity (PA) opportunities. In 2015, the New York City Department of Health and Mental Hygiene (NYCDOHMH) initiated a church-placed PA program to provide PA opportunities in underserved communities in NYC. **Objective:** To explore whether characteristics of a church-placed PA program such as location, type of exercise equipment used, and timing of classes were associated with PA uptake in church-going African Americans. **Design and setting**: This cross-sectional study used the Posttest Only Design. A sufficiently powered sample size (327) was obtained from NYCDOHMH survey data from church-placed PA program in African American churches. We hypothesized that the location of the church, time of day exercise classes were held and the type of exercise equipment used impacted PA participation. **Participants:** Program participants were drawn from the participating churches. **Intervention:** Weekly exercise classes were led by paid fitness instructors. Churches also received free exercise equipment. **Measures**: Bivariate analyses tested for association between PA uptake and the convenience of the church location, the type of exercise equipment used and time of the day exercise classes were offered. **Results**: We found that there were associations between the convenience of the church location and PA participation (p=0.001) and the time of the day exercises classes were held and PA participation (p = 0.018) but not for the type of exercise equipment used and PA participation (p = 0.209). **Conclusion:** Overall, the church location, and the timing of exercise classes significantly impact PA uptake among church-going African Americans in NYC.

Keywords: *exercise, physical activity, church-placed, African Americans, church-based*

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1. Introduction

One in four New York City residents have high blood pressure while one in ten have diabetes, a third of whom are unaware of this condition [1,2]. A major risk factor for these conditions is obesity, which is on the rise in urban settings [2,3]. In New York City, African Americans make up 25% of the population and have the highest burden of obesity compared to other racial groups [4,5]. In the African American community, the church is a source of social support and community leadership. Many churches embrace health and wellness as an integral part of their stewardship [6,7,8]. About 83% of African American adults in NYC attend religious services at least twice a month [9]. This makes the church, a place of opportunity to reach African Americans for health interventions including physical activity (PA) [10,11,12,13]. While there is no clear empirical evidence that awareness of individual risks translate into health behavior such as increasing PA levels [14], it is clear that African Americans who engage in regular moderate to vigorous PA reduce their risk of hypertension [15]. Yet, in 2005, 27% of New York City's African Americans considered themselves physically inactive [16].

Addressing sedentary life lifestyles in the African American community requires targeted attention from the public health sector [17].

Recognizing that the church offers a good opportunity to bi-directionally engage African Americans, the New York City Department of Health and Mental Hygiene (NYCDOHMH) Office of Faith Based Initiatives initiated a faith-placed PA program in 69 churches and 1 Sikh temple to promote leisure time PA in neighborhoods with some of the highest rates of physical inactivity and chronic disease [18]. Forty-nine churches, which were the focus of this study, were predominantly African American based congregations [18]. The program was implemented from April 2015 through March 2016. The objective of this study was to explore whether characteristics of a church-placed PA program such as location, type of exercise equipment used and timing of classes were associated with PA uptake in church-going African Americans.

2. Methods

2.1. Study Design

The church-placed PA program was initiated in April 2015 in houses of worship in New York City. A request for participation was issued to a network of houses of worship (churches, mosques, temples, synagogues) through NYCDOHM's Office of Faith Based Initiatives. Selection was made on a first come, first served basis. The final list consisted of 69 churches and 1 Sikh temple. Selected institutions signed Memoranda of Agreements (MOAs) agreeing to provide space within their facilities to host exercise classes and store exercise equipment. Out of the 69 churches selected to participate, 49 were African American churches. A cross-sectional convenient sample survey was conducted among program participants from June 15, 2015 through June 30, 2015. The participating churches were in neighborhoods with some of the highest rates of physical inactivity [31].

2.2. Program Participants

The program activities were open to the public, but participants were mostly drawn from the participating churches. Each church designated a coordinator for the program. The role of the coordinator was to advertise, recruit and work with fitness instructors to schedule classes. Coordinators collected names of individuals who were interested in participating. They recruited participants through flyers and church bulletins. All registrants were screened for any pre-existing health conditions through the use of the Physical Activity Readiness Questionnaire [19]. This questionnaire asked of medication use and past medical history. Those who responded "yes" to any past or current medical history had their participation deferred until they sought medical clearance from their medical providers. Participants who were unable to obtain medical clearance were permanently excluded.

2.3. Intervention

Participating churches were provided with free exercise equipment. The exercise equipment included exercise balls, flexi-bands, mats, dumbbells, stationary bicycles and treadmills. Weekly paid certified fitness instructors were assigned to lead exercise classes in each church. Twenty-four certified fitness instructors were contracted to conduct exercise classes within the premises of participating churches. Two consultants were hired to manage the assignment of the fitness instructors to the churches, class scheduling, and related administrative tasks. Each church received an average of 2 hours of exercise instruction per week. Schedules of exercise classes were tracked by the consultants while attendance in exercise classes was tracked by the fitness instructors. Fitness instructors incorporated the use of the donated exercise equipment into the exercise classes where appropriate. The exercise classes included Zumba, Afro-dance, body conditioning, strength training and cardio kickboxing [20]. Even though they varied in content, all exercise classes were designed to promote moderate to vigorous intensity PA as recommended by the Centers of Disease Control and Prevention (CDC) [21].

Exercise classes were scheduled on weekdays and weekends. They were also offered at different times of the day including mornings: 8:00am to 11am, midday, 11:00am to 2:00pm; afternoons: 2:00pm to 5:00pm; and evenings: 5:00pm to 8:00pm. All fitness instructors were required to maintain their own liability insurance to cover any injuries sustained during the classes.

2.4. Sampling Methodology

A sample of 327 responses from 49 African American Churches that participated in the program was obtained from NYCDOHMH survey data. The sample for this study represented the number of participants who self-identified as African Americans who attended the exercise class on the day of the survey and voluntarily participated. In order to assess whether the study had sufficient power, a power calculation was performed using an online power calculator: G*Power software version 3.1 [22] With a two-tailed margin of error set at 0.05% and power set at 80%, the calculation showed that a sample size of 292 was needed to produce sufficient power for the analysis. A sensitivity power analysis was also performed which resulted in an expected effect size of .24 [23]. The sample size in this study was therefore considered sufficiently powered.

2.5. Data Collection

Data was collected through a brief voluntary, anonymous, self-administered participant survey during the last two weeks of the program from participants who were 18 years and older. The goal of the survey was to determine if the program offered participants increased opportunities to be more physically active. Data collection staff consisted of 24 fitness instructors and 2 college interns of the Office of Faith Based Initiatives, who helped arrange logistics and assisted with distribution and collection of surveys. All data collection staff were trained by the research and evaluation unit of the Center for Health Equity.

Given that different churches held their exercise classes on different days of the week, data collection was scheduled to be completed within 2 weeks. This occurred from June 15, 2015 through June 30, 2015. The surveys were distributed to participants before the start of the class on the designated

day. The form explained the purpose of the survey including the right to refuse to participate and instructions for returning them. This constituted informed consent.

Participants self -identified their race by answering the question: "Which best describe your race?". Participants also identified their gender by the question: "What is your gender?" For self-reported their health status, participants were asked: "How would you rate your health?" Data on the age of participants was collected by asking the question: "How old are you?" Prior PA participation was assessed by the following question: "Prior to attending the PA classes at this site, had you attended a fitness class?" Participants were also assessed for their past gym or recreational PA facility membership by the following question: "In the past year were you a member of a gym or recreational physical activity facility?" As a measure of satisfaction, participants were asked whether they would recommend the program to others by the question: "I would recommend this fitness class at this faith-based organization to my family or friends"

The convenience of the church location as enabler of PA participation was a dichotomous variable scored from yes (1) to no (2). The question asked was: "Is this organization a convenient location for you to be physically active?"

Participants were also asked of their preferred time to exercise by the following question: "What time of day is most convenient for you to be physically active?" with the option to provide multiple responses. On the type of equipment used, participants were asked: "Which of the following types of equipment did you use for exercise" with the option of selecting all that applied.

Data on the dependent variable in this study was obtained by asking the question: "PA program in this organization has made it possible for me to be more physically active". It assumed a nominal level of measurement scored from 1 to 5 on the Likert scale ranging from: strongly disagree (1), disagree (2), neither (3) agree (4) strongly agree (5).

2.6. IRB Human Subjects Approval

Institutional Review Board approval was obtained from the NYCDOHMH's and the State University of New York, University at Albany's Institutional Review Boards.

2.7. Data Analysis

The data was analyzed using IBM SPSS Version 25.0. (Armonk, NY: IBM Corp). Descriptive analyses were performed to describe the characteristics of participants surveyed such as participants' age, gender, self- reported health status, prior PA participation, prior gym membership and intention to recommend program to others.

Bivariate analyses were used to test for independence of association between the dependent variable and the independent variable. The dependent variable was PA participation. The independent variables were the preferred times of the day to exercise, the convenience of the church location, and types of exercise equipment used during exercise.

The Chi-square test was used to test for independence of association as follows:

(a) participants being more physically active and the convenience of the church location; (b) participants being more physically active and the use of exercise equipment; (c) participants being more physically active and the time of the day that exercise classes were scheduled. As a result of non-response or clerical data entry errors, there were missing data (reported in tables). In order to maintain power at alpha set a .05%, and maximize available data, all missing data were handled with the pairwise deletion method.

3. Results

3.1. Characteristics of Participants

Table 1 present a summary of study participants' characteristics. Participants self-identified as African American (100%). Participants who identified their race as other were excluded from the analysis as there was no way to verify their ethnic/racial backgrounds. Nearly half (48%) of participants were 56 years or older, with the majority being women (83%). Sixty-five percent of participants rated their overall health as very good or good, 23% rated their health as excellent and 11% rated their health as fair or poor. Sixty-two percent of participants had no past gym membership while 37% reported some past gym membership. Prior to program participation, 13% of participants indicated that they were not physically active at all and 48% described themselves as being somewhat active. Only 39% described themselves as being very active. Overall program satisfaction was high as 14% agreed and 85% strongly agreed that they will recommend the program to others.

Table 1. Self-reported demographics and other characteristics of participants (N=327)

Characteristic	No	Percent (%)	SD*
Race			.000
African American	327	100	
Age			.995
Under 35	37	11.3	
36-55	91	27.8	
56-65	82	25.1	
Over 66	75	22.9	
Missing	42	12.8	
Gender			.364
Male	50	15.3	
Female	270	82.6	
Missing	7	2.1	
Health Status			.995
Poor or Fair	37	11.3	
Good or Very good	213	65.1	
Excellent	75	22.9	
Missing	2	.6	
Prior Gym membership			.485
Yes	121	37	
No	202	61.8	
Missing	4	1.2	
Past physical activity			.674
Not very active	43	13.1	
Somewhat active	158	48.3	
Very active	126	38.5	
Will recommend program			.363
Neither agree nor disagree	1	3	
Agree	45	13.8	
Strongly agree	275	84.1	
Missing	6	1.8	

* SD=standard deviation.

3.2. Convenience of Church Location and PA Participation

As shown in Table 2a, 25% of participants who agreed that they were more physically active because of their participation in the program reported the church as a convenient location to exercise, while 74% of those who strongly agreed that they were physically active because of their participation in the program, reported the church location to be convenient to exercise. The Chi-square test (χ 2 = 13.748, df = 2, P =. 001) showed that there was a significant relationship between convenience of the church location and PA participation. An estimate of the effect size further suggested that the relationship was moderately strong (Cramer's V =. 342).

3.3. Type of Exercise Equipment and PA Participation

A summary of the estimates of the association between the use of exercise equipment during exercise and PA participation is presented in Table 2b.

For participants who neither agreed nor disagreed that they were more physically active because of their participation in the program, 2.5% used flexi band, 3.8% used exercise balls, 1.8% used exercise mats, 3% used dumb bells, 1.9% used treadmill and 2% used stationary bikes. For those who agreed that they were more physically active because of their participation in the program, 28.4% used flexi band, 26.2% used exercise balls, 19.8% used exercise mats, 22.8% used dumb bells, 20.2% used treadmill and 18.6% used stationary bikes. Finally, for those who strongly agreed that they were more active because of their participation in the program, 69.3% used flexi band during exercise, 70% used exercise balls, 78.4% used exercise mats, 74.2% used dumb bells, 77.9% used treadmill and 79.4% used stationary bicycles. The Chi-square test (χ 2 = 15.618, df = 12, P = .209) showed that the type of exercise equipment used was not associated with PA participation.

3.4. Exercise Class Time Schedule and PA Participation

The Chi-square test results presented in Table 2c summarizes the estimates of the association between the time of the day that exercise classes were scheduled and PA participation. A greater percentage of participants reported evening as their most preferred time to exercise. For those who agreed that they were more physically active because of their participation in the program, 25% preferred to exercise in the evening and for those who strongly agreed, 75.5% expressed preference for same time compared to all other times. The Chi-square test (χ 2 = 18.492, df = 8, P = .018) showed that the time of the day that participants preferred to exercise was associated with PA participation.

Table 2. Chi-square Analysis for Association: Characteristics Associated with PA Uptake

Characteristic	PA Participation					
	Neither	Agree	Strongly Agree	Total Count (%)	df P	χ 2
2.a Location convenience (N=312)					2 .001	13.748
Response						
Yes	3(1)	75(25)	222(74)	300 (100)		
No	3(25)	4(33.3)	5(41.7)	12 (100)		
Missing cases: 15						
Multiple Response Analysis						
2b. Type of exercise equipment (N = 327)					12 .209	15.618
Flexi-bands						
Count (%)	4(2.3)	50(28.4)	122(69.3)	176(100)		
Exercise Balls						
Count (%)	3(3.8)	21(26.2)	56 (70)	80 (100)		
Exercise Mats						
Count (%)	2(1.8)	22(19.8)	87(78.4)	111(100)		
Dumb Bells						
Count (%)	3(3)	23(22.8)	75(74.2)	101(100)		
Treadmills						
Count (%)	2(1.9)	21(20.2)	81(77.9)	104(100)		
Stationary Bike						
Count (%)	2(2)	18(18.6)	77 (79.4)	97(100)		
Multiple Response Analysis						
2c. Time of the day (N = 315)					8 .018	18.49
Morning						
Count (%)	2(1.8)	31(27.2)	81(71)	114 (100)		
Midday						
Count (%)	3(6.2)	14(29.2)	31 (64.6)	48 (100)		
Afternoon						
Count (%)	2(3)	17(27)	44 (71)	63 (100)		
Evening						
Count (%)	1(.5)	49 (24)	155(75.5)	205(100)		
Missing cases: 12						

Note: The Chi-square statistic is significant at the .05 level. Tables 2b and 2c: Multiple response analysis.

4. Discussion

Overall, we found that characteristics such as location, and timing of exercise classes were significantly associated with PA uptake in church-going African Americans in NYC.

The convenience of the church location in this study is defined as the church being a familiar place which is considered safe to travel to and is fairly close to where participants live. The finding in the present study appears largely to be consistent with many other studies. Bopps et al (2006) reported that a safe and comfortable setting is an important factor that creates adherence to PA among African Americans and the church setting appear to meet this need [24]. Thompson et al (2013) also found the use of the church as a place of intervention to be feasible in promoting PA [25]. Similarly, Tak et al (2012) found the convenience of the exercise location as an important factor in initiating and adhering to PA [26]. In their study, Belza et al (2008) found that locating PA in churches among other places increased PA participation because of proximity to home [27]. Sbrocco et al, (2005), Kennedy et al (2005), Samuel-Hodge et al (2009), McCoy et al (2017), Tang, Nwanko and Whiten (2014) and Tucker et al all found increase in PA participation in church-based PA intervention programs [28,29,30,31,32,33]. While the current finding suggests that the African American church appear to show a promise for increasing PA, it was inconsistent with the finding by Faridi et al (2009) (p=.066) [34]. Perhaps, the reason for this inconsistency was due to the differences in the design, content and delivery of the two studies.

In their study, Bopps et al (2006) found the lack of exercise equipment as a practical barrier to initiating and adhering to PA [24]. One would assume therefore that adding exercise equipment in a church-placed PA program would be positively related to PA participation. Surprisingly, this study did not observe any significant association between the use of exercise equipment and PA participation among participants. A test of independence of association showed that there was no significant relationship between PA participation and the use of exercise equipment (p=.209). This appears to contradict findings from previous studies. Parks et al (2003) found that lower income residents of suburban areas who had access to treadmills or other exercise equipment were four times more likely to be physically active [15]. Similarly, Bevans, K.B., et al (2010) found that, access to adequate exercise equipment was positively related to student PA levels [35]. Sami (2018) also reported in his study that park fitness zones with exercise equipment appear to be an effective intervention for increasing PA among park users [36].

The time of the day exercise classes are held has been identified as a factor in initiating and adhering to PA [24]. Bopps et al (2006) found that, time commitment and inconvenience were barriers that prevents African Americans from adhering to PA [24]. Tak et al (2012) also noted that participants found time of the day that exercise were held to be a practical barrier to starting and adhering to PA [26]. Similarly, Forkan et al (2006) found that time and scheduling problems accounted for why people who were prescribed exercise program did not adhere to the prescriptions [37]. Considering that timing of exercise classes is an important factor, this study explored the question of what time of the day was most preferred by participants to exercise. A majority of those who agreed or strongly agreed that they were more physically active because of their participation in the program, preferred to exercise in the evening. A test of independence of association found the association to be statistically significant (P = .018.)

This finding is inconsistent with the finding of a prior study that examined a similar question. In their study, Belza et al (2008) found morning to be most preferred time by program participants, because it provided participants with a reason to get out of bed [27]. Perhaps, the contradiction in these two studies can be explained by the fact that Belza et al (2008) focused their study on participants within the age range of 62-96 years; a majority of whom may have been non-working people while the participants in the present study included the age range of 18 years to 80 years and above and may have included working people. Clearly for working people, the time of the day to exercise present challenges.

This study has several limitations that must be noted. Firstly, it did not involve a pre-test post-test assessment or other PA measurement scales. Instead, PA was measured based on subjects' perception of their participation. Consequently, it lacked an objective measure of PA participation. It is likely for participants to have exaggerated the level of influence of this program on their PA participation given that the program was offered free of charge to their churches. Their desire to speak positively about its impact in order to keep it supported by the NYCDOHM is possible. Secondly, since the sizes of the different congregations of participating churches were unknown, the sample may not be representative of the churches' community-serving populations. It is possible that those who participated self-selected because they were more health conscious. Hence, generalizing the results of the study may be limited. Thirdly, this study used bivariate analyses. Consequently, it was unable to control for any of the covariates that may have influenced the outcome. It is entirely possible therefore, that the associations found were the result of confounders. Future studies may utilize a more robust design such as the RCT that can control for the effect of other factors within the socio-ecological model. Lastly, it ought to be emphasized that even though the PA questionnaire used in study may have had face validity, it had not been validated.

4.1. Implications for Policy and Practice

Stakeholders that are considering community-based settings for large scale public health interventions including PA should consider the key findings of this study in selecting the setting that best maximizes participation. This research suggest that the church space can be utilized to support PA uptake.

- This research found the church space to be convenient for members to participate in PA. The practice implications of this finding can extend beyond PA participation to other major public health issues. The church space for instance can be deployed to address current public health issues such as community Covid-19 testing and vaccinations.

- The study also observed an association between evening as the most preferred time to exercise and PA uptake. This highlights the importance of timing in program design. Therefore, future large-scale church-placed PA interventions should consider evening for PA opportunities as a part of the design.
- Lastly, the study did not find any relationship between the utility of the donated exercise equipment and PA uptake. This has useful cost-benefit implications for sponsors of community-based PA programs. Stakeholders wishing to invest in PA interventions should consider culturally appropriate activities that are not exercise equipment dependent.

5. Conclusion

The present study was an attempt to assess the impact of the church environment as an enabler of PA among church-going African Americans in NYC. For the African American community, the lack of PA opportunities undermines peoples' desire to become more physically active [24]. The study results suggest that promoting PA within the church in the African community is feasible. It shows that when PA is implemented within the church, participation among church-going African Americans is impacted positively. Moreover, making PA programs accessible in the evening appear to play a role in PA participation. While these findings underscore the potential impact of local public health department and church partnership on PA in the African American community, they clearly provide a blueprint for future policy decision making regarding promoting PA in the African American community.

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Conflict of Interest

The authors declare no conflict of interest related to this study.

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