Youth Physical Activity Opportunities in Lower and Higher Income Neighborhoods

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ABSTRACT *The presence of youth physical activity opportunities is one of the strongest environmental correlates of youth physical activity. More detailed information about such opportunities is needed to maximize their contributions to physical activity promotion especially in under resourced, lower income areas. The objectives of this study were to construct a comprehensive profile of youth physical activity opportunities and contrast profile characteristics between lower and higher income neighborhoods. Youth physical activity opportunities in eight lower (median household income <\$36,000) and eight higher (>\$36,000) income neighborhoods were identified and described using interviews, neighborhood tours, site visits, and systematic searches of various sources (e.g., Internet). Lower income neighborhoods had a greater number of locations offering youth physical activity opportunities but similar quantities of amenities. Lower income neighborhoods had more faith-based locations and court, trail/path, event, and water-type amenities. Higher income neighborhoods had significantly more for-profit businesses offering youth physical activity opportunities. Funding for youth physical activity opportunities in lower income neighborhoods was more likely to come from donations and government revenue (e.g., taxes), whereas the majority of youth physical activity opportunities in the higher income neighborhoods were supported by for-profit business revenue. Differences between lower and higher income neighborhoods in the type and amenities of youth physical activity opportunities may be driven by funding sources. Attention to these differences could help create more effective and efficient strategies for promoting physical activity among youth.*

KEYWORDS *Physical activity, Child, Youth, Environment, Social class*

INTRODUCTION

Youth gain health benefits from routine participation in physical activity.^{1,2} Unfortunately, they are not very active on a regular basis, particularly ethnic-minority youth living in low-income, under resourced neighborhoods.³⁻⁵ Although intra- and interpersonal factors affect physical activity behavior, characteristics of the environment undoubtedly play a role.⁶⁻⁸ One of the strongest environmental correlates of youth physical activity is the availability/adequacy of youth physical activity opportunities.⁹⁻¹³ Youth are more likely to walk, cycle, and play if there is easy access to parks or other recreational facilities, and the lack of affordable and/

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or accessible recreation facilities has been cited by youth as a major barrier to physical activity.^{10,14–19} Children provided with a safe schoolyard in their neighborhood become more physically active than children not granted such an amenity.²⁰

Inequality in the built environment is a highly plausible explanation for variations in youth physical activity observed between population subgroups defined by income level.^{21,22} Lower income neighborhoods are consistently found to have significantly fewer opportunities for physical activity than more affluent neighborhoods.^{9,21,23–26} Similar contrasts between different income areas have not been made for youth physical activity opportunities; however, data on youth perceptions suggest that environmental factors likely vary between lower and higher income neighborhoods. For example, perceptions of lower income youth concerning neighborhood aesthetics and street connectivity rank below those of youth from higher income areas.²⁷ Moreover, concerns around the factors that link youth with youth physical activity opportunities, such as transportation and expenses, are expressed significantly more often by parents of lower than higher income youth.²⁸ According to the Ecologic Model of Physical Activity, contextual factors along with the linkages and processes among and between environmental factors and behavior are critical to understanding the relationships between environment and behavior; yet, these have not been well defined.⁶

Although the association between youth physical activity opportunities and youth physical activity has been documented, there is a dearth of literature on empirically and objectively measured youth physical activity opportunities and how details about youth physical activity opportunities relate to neighborhood income. More refined knowledge regarding youth physical activity opportunities may help policy decisions about the cost–benefit ratio of physical activity promotion in the context of neighborhood culture as affected by income. The objective of this study was to construct a theoretically guided, comprehensive profile of youth physical activity opportunities and contrast profile characteristics between lower and higher income neighborhoods.

METHOD

Design. Cross-sectional data on youth physical activity opportunities were collected in 16 urban neighborhoods located in a large, Midwestern metropolitan area. Neighborhood dyads consisting of one lower and one higher income neighborhood were randomly assigned to a data collection period equivalent to one of the calendar months between March 1 and October 31. During the data collection periods, two trained investigators used multiple techniques to identify and describe youth physical activity opportunities currently being offered and those offered during the past 12 months. The University's Protection of Human Subjects Board approved the study's procedures.

Study Neighborhoods. A multistep process was employed to define neighborhoods in the city's central, urban core (2000 US census metropolitan area with $\geq 50,000$ residents). First, geographical information system applications, reviews of published land-use data, and US Census data were used to construct neighborhood maps based on socioeconomic indicators, ethnic minority compositions, and geographical parameters. Next, systematic street-level observations and survey ratings of all properties in the neighborhoods were completed. Observable physical obstructions

(major thoroughfares, railroad tracks) most likely to be consistent with resident perceptions were used as neighborhood boundaries. Homogeneity in economic status (evidenced by housing type and housing maintenance) and homogeneity of ethnicity were primary considerations. This is an accepted process for defining neighborhoods used in urban health research.²⁹

The definition process resulted in 240 neighborhoods, of which 55 met the inclusion criteria, requiring a population greater than 500 residents with 20% or more of them being 18 years of age or younger. These criteria were imposed to ensure a need (i.e., residents, youth) for youth physical activity opportunities. Socioeconomic status was based on median household income which was obtained from the 2000 US Census.³⁰ Eight neighborhoods below (lower income) and eight above (higher income) the median household income (\$36,093) were randomly selected for the study. For the statistical analyses, eight neighborhoods per income group were determined to be sufficient to detect a difference of at least two youth physical activity opportunity locations with a power of 0.83 and confidence level of 0.05. Sample size calculations for group comparisons were based on data obtained in a previous study.³¹

Identification and Description of Youth Physical Activity Opportunities. Youth physical activity opportunities were defined as any program, event, or physical structure intended primarily for physical activity that were accessible to youth (≤ 18 years of age) residents of the neighborhoods. A combination of several established techniques were used to identify youth physical activity opportunities including phone book, Internet, and neighborhood media searches (e.g., newspapers, school publications), key informant interviews, and neighborhood walking/biking tours.^{9,24,31,32}

When youth physical activity opportunities were identified, contact information was obtained for individuals who could provide more details regarding the opportunities. Structured, in-person or phone interviews were then conducted with these individuals to obtain information about the locations (e.g., school, for-profit business), amenities (e.g., equipment, structures, personnel), programs (class times, sessions per week), and sources of support (funding mechanism, fund contributors) associated with the youth physical activity opportunities. Additionally, trained investigators examined extant and/or archival resources (e.g., brochures) if available and made site visits to all identified youth physical activity opportunities to confirm interview data and complete the description of the opportunity.

MEASUREMENT PROCEDURES

Phone Book and Internet Searches. Searches were done using a comprehensive list of key terms identified previously.^{3,24,25} Key terms included health, health club, athletics, athletic club, dance, dance studio, fitness, fitness centers, martial arts, parks, running, and youth sports. For an example of an Internet search site, see <http://www.switchboard.com/swbd.main/dir/index.htm>.

Media. Newspapers, local sports and exercise publications, school publications/handouts, and program material (e.g., brochures, flyers) were collected and searched for youth physical activity opportunities and descriptive information about youth physical activity opportunities such as amenities.

Key Informant Interviews. Contact information was obtained from several sources (Internet, neighborhood associations, word-of-mouth, and postings at youth physical activity opportunities) for individuals thought to be knowledgeable about youth physical activity opportunities in the study neighborhoods. Eight to ten semistructured interviews (in-person or phone) were completed in each neighborhood to locate youth physical activity opportunities and/or describe their amenities and support mechanisms. The interviews were based on developed protocols and began with introductions and an explanation of the key informant interview process.^{31,33,34} Occasional research team meetings were held to discuss the process of the interviews, identify issues, and troubleshoot any problems that may have arisen.³⁵

Neighborhood Tours. Trained pairs of investigators canvassed the neighborhoods on foot or bicycle to validate the information from phone book, Internet, media, and key informant interviews, search for other youth physical activity opportunities, and collect information about the opportunities (address, telephone numbers, and sponsorship plaques). If possible, site audits were conducted at this time to further describe the opportunities. The investigators carried detailed maps to help them navigate the neighborhoods, keep track of the routes taken, and mark where youth physical activity opportunities were observed.

Site Audits. Trained investigators visited locations offering youth physical activity opportunities to confirm interview data and record the number and types of amenities present. Their primary tasks were to locate, describe, and count all amenities at the youth physical activity opportunity locations. Amenities included spatially independent structures and areas, events, classes, and leagues. For example, a location with one soccer field, two tennis courts, a Jungle gym, and two swing sets had six amenities. Individual pieces of indoor equipment (treadmills, weight machines, toys) were not counted as separate amenities, but rather grouped according to function (aerobic training, resistance training, play). If playground structures (slides, swings, Jungle Gyms) were physically independent of each other, each was counted as one amenity.

Data Integration. Data on youth physical activity opportunities were continually reviewed to prevent duplication. Once the descriptive process (interviews, site visits) for a given opportunity was completed, the data were synthesized by investigators and expressed accordingly (what was an amenity, amenity type).

STATISTICAL ANALYSIS

Descriptive statistics are presented as means $\pm$ standard errors of the means (SEM) or percentages where applicable. The primary outcome variables are the number of locations per neighborhood offering youth physical activity opportunities and the number of amenities per neighborhood. Secondary outcomes included location types (e.g., school) per neighborhood, amenity types (e.g., ball field) per neighborhood, and funding types (e.g., government) per neighborhood. Both primary and secondary outcomes were compared between lower and higher income neighborhoods using the Student's *t* test procedure for independent samples. Variables of interest for the lower and higher income groups followed a normal distribution and

had equal variances. The significance level was set at $p < 0.05$, and all analyses were conducted using the SPSS statistical software package (SPSS for Windows, Rel. 17.0. 2008. Chicago, SPSS Inc.).

RESULTS

A comprehensive description of the youth physical activity opportunities is given in Table 1 for lower and higher income neighborhoods combined ($n=16$). Youth physical activity opportunities were found at most conceivable neighborhood locations and were characterized by a heterogeneous mixture of amenities. For example, amenities consisted of outdoor structures (e.g., Jungle gyms), outdoor areas designated/converted for sport use (e.g., baseball fields), indoor equipment for aerobic or resistance training, classes of various natures (e.g., Tai Chi, dance), and sports leagues. Water amenities (e.g., pool) and one-time events were not common; however, the presence of water amenities was exaggerated in one neighborhood due to the existence of a water park offered by a for-profit business. Three of the amenities (wrestling, basketball, and baseball leagues) were designated for exclusive use by males and two (volleyball and basketball leagues) for use only by females (data not shown). All others were open to both genders but did carry age restrictions. For example, some classes were restricted to 3–8-year-old participants, and others reserved for 10–13 year olds (data not shown). Funding mechanisms included local governments, grants, donations (monetary and time), revenue/income from business, and user fees. User fees were dollars paid most likely by parents/guardians so that their children could participate in a particular activity. Specific names of fund contributors were very difficult to obtain. Therefore, for each funding source, the main contributors were designated as follows: monetary donations from faith-based congregation members; time donations from parents/guardians; user fees from parents/guardians; government revenue from tax payers; business revenue from customers; and grants from sources that were indistinguishable.

Neighborhood characteristics are shown in Table 2. Several variables differed significantly between the lower and higher income neighborhoods. Lower income neighborhoods were significantly smaller in size than higher income neighborhoods, but had similar percentages of land zoned for residential and commercial/retail use. Median household income was 45% less and the proportion of the residents who were ethnic/minority nearly twofold greater in lower compared with higher income neighborhoods ($p < 0.05$). Although there was a greater number of youth in higher vs. lower income neighborhoods, they represented similar percentages of the total populations. Finally, lower income neighborhoods had on average 2.5 more youth physical activity opportunity locations per neighborhood than higher income neighborhoods, a difference of 56% ($p < 0.05$). More locations, however, did not translate to significantly more amenities.

There were six different types of locations where youth physical activity opportunities were offered (Table 3). A total of 56 locations were in the lower income neighborhoods compared with 36 in the higher income neighborhoods. The most common locations were faith-based (30.3% of locations) in lower income neighborhoods and for-profit businesses (50.0% of locations) in higher income neighborhoods. Lower income neighborhoods had significantly more faith-based locations per neighborhood with youth physical activity opportunities than higher income neighborhoods ($p < 0.01$), while higher income neighborhoods had more for-profit businesses per neighborhood offering youth physical activity opportunities

TABLE 1 Composite description of youth physical activity opportunities in eight lower and eight higher income neighborhoods

YPAO locations	YPAO amenities	Funding mechanisms
Public parks	Baseball field	Government revenue—Tax payers User fees—Parents/guardians
	Basketball court	
	Football field	
	Green Space	
	Jungle gym	
Community centers	Soccer field	Government revenue—Tax payers User fees—Parents/guardians
	Aerobic equipment	
	Basketball camp	
	Basketball league	
	Dance class	
Faith-based entities	Aerobic equipment	Grant—Individuals and organizations Monetary donations—Congregation members Time donations—Volunteers (congregation members) User fees—Parents/guardians
	Baseball field	
	Baseball league	
	Basketball court	
	Basketball league	
	Bowling league	
	Climbing wall	
	Dance class	
	Exercise training class	
	Green space	
	Jungle gym	
	Baseball field	
	Basketball league	
	Jungle gym	
	Tetherball pole	
Private/Public schools	Pool	Government revenue—Tax payers Grants—Indistinguishable Monetary Donations—Individuals Time Donations—Volunteers (mainly parents/guardians) User fees—Parents/guardians
	Swings	
	Tennis court	
	Tetherball pole	
	Trail	
	Exercise training class	
	Resistance equipment	
	Track	
	Volleyball camp	
	Resistance equipment	
	Running club	
	Soccer field	
	Soccer league	
	Swimming league	
	Swing	
Private/Public schools	Tai Chi class	Government revenue—Tax payers Grants—Indistinguishable Monetary Donations—Individuals Time Donations—Volunteers (mainly parents/guardians) User fees—Parents/guardians
	Trail	
	Walk/run event	
	Wrestling league	
	Resistance equipment	
	Soccer league	
	Swings	
	Track/field day	
	Volleyball league	

For-profit business	Aerobic equipment Baseball field Basketball courts Basketball league Bowling league Dance class Exercise training class Jungle gym Exercise training class Jungle gym Play equipment	Pool Resistance equipment Sprinkler park Swings Trail Volleyball league Water rides	Business revenue—Customers
Residence			Grant—Indistinguishable Monetary Donations—Individuals and organizations Time Donations—Volunteers (parents/guardians)

YPAO youth physical activity opportunity

TABLE 2 Neighborhood characteristics in lower and higher income neighborhoods

	Lower income (<i>n</i> =8)	Higher income (<i>n</i> =8)
Characteristics	M (SEM)	M (SEM)
Population	1,970 (567)	2,519 (571)
Median annual household income (\$)	32,342 (1,143)*	58,334 (8,734)
Area (square miles)	0.4 (0.1)*	0.9 (0.2)
% Commercial and retail area	21.2 (3.6)	17.3 (2.6)
% Residential area	78.4 (3.6)	74.3 (1.9)
% Female adults	52.5 (0.8)	51.6 (0.8)
Youth (≤18 years)	699 (232)	813 (187)
%Youth	34.0 (1.1)	32.1 (0.8)
% Ethnic/minority	77.8 (11.9)*	41.7 (12.8)
YPAO locations	7.0 (0.71)*	4.5 (0.57)
YPAO amenities	26.5 (4.42)	24.8 (8.05)
Amenities/location	3.8 (0.52)	4.8 (1.16)

M (SEM) mean ± (standard error of the mean), YPAO youth physical activity opportunity

**p*<0.05

(*p*<0.05). Community centers and residential sites with youth physical activity opportunities were found in lower but not higher income neighborhoods.

Also shown in Table 3 are the amenities associated with the locations. A total of 212 amenities were provided in lower and 198 amenities in higher income neighborhoods. Lower and higher income neighborhoods differed in terms of the number of amenities offered at certain locations. In lower income neighborhoods, faith-based locations had the most amenities (23.6% of total amenities) averaging 6.3 faith-based amenities per neighborhood, versus 3.3 faith-based amenities for each of the higher income neighborhoods (*p*<0.01). In higher income neighborhoods, most amenities were at for-profit businesses (57.6% of total amenities). The average number of amenities/neighborhood provided by for-profit businesses was 14.3 in higher income neighborhoods but only 4.5 in lower income neighborhoods (*p*<0.05). Although there were only two community centers (both in lower income neighborhoods), they provided 22.6% of all amenities. The number of amenities at schools and parks were similar between neighborhoods. Amenities associated with youth physical activity opportunities at residences provided only 3.8% of all amenities in the lower income neighborhoods. Residential youth physical activity opportunities were not found in higher income neighborhoods.

More details regarding the amenities are provided in Table 4. The most common types of amenities were classes, accounting for 20.8% and 48.3% of all amenities in the lower and higher income neighborhoods, respectively. The next most common types of amenities were playground equipment in both lower (17.0%) and higher (18.0%) income neighborhoods, followed by courts (14.2%) in lower and ball fields (16.9%) in higher income neighborhoods. Statistical comparisons of means revealed that lower income neighborhoods had significantly more courts, trails/paths, events, and water amenities than higher income neighborhoods.

Information on youth physical activity opportunity funding is given in Table 5. A total of 70 funding sources were identified in the lower income neighborhoods and 46 in the higher income neighborhoods. Monetary donations (37.1% of total sources) and government (28.6% of total sources) were the most common funding

TABLE 3 Youth physical activity opportunity location types and amenities provided by location type in lower and higher income neighborhoods

Location type	Lower income (n = 8)				Higher income (n = 8)			
	No. locations/neighborhood		No. amenities/neighborhood		No. locations/neighborhood		No. amenities/neighborhood	
	M (SEM)	Sum	M (SEM)	Sum	M (SEM)	Sum	M (SEM)	Sum
Public parks	1.8 (0.67)	14	4.8 (1.92)	38	0.5 (0.19)	4	3.5 (2.08)	28
Community centers	0.3 (0.16)	2	6.0 (3.93)	48	0	0	0	0
Faith-based organizations	2.5 (0.42)**	20	6.3 (1.26)*	50	1.0 (0.01)	8	3.3 (0.62)	26
Private/Public schools	0.8 (0.31)	6	4.0 (1.85)	32	1.0 (0.01)	6	3.8 (1.08)	30
For-profit businesses	1.3 (0.31)	10	4.5 (2.11)*	36	2.3 (0.47)	18	14.3 (4.25)	114
Residence	0.5 (0.19)	4	1.0 (0.38)	8	0	0	0	0

M (SEM) mean ± (standard error of the mean)
*p<0.05; **p<0.01

TABLE 4 Amenity types in lower and higher income neighborhoods

Amenity type	Lower income (n=8)		Higher income (n=8)	
	M (SEM)	Sum	M (SEM)	Sum
Playground equipment	4.5 (1.32)	36	4.0 (0.60)	32
Ball field	2.0 (0.71)	16	3.8 (1.82)	30
Court	3.8 (0.31)**	30	1.5 (0.57)	12
Indoor equipment	1.8 (0.56)	14	1.3 (0.62)	10
Trail/path	0.8 (0.16)*	6	0.3 (0.16)	2
Class	5.5 (3.17)	44	10.8 (5.21)	86
League	3.5 (1.48)	28	1.5 (0.42)	12
Event	0.8 (0.31)*	6	0.1 (0.00)	1
Green space	0.8 (0.31)	6	1.3 (0.31)	10
Pool	3.0 (1.16)*	24	0.5 (0.19)	4

M (SEM) mean ± (standard error of the mean)

* $p<0.05$; ** $p<0.01$

sources in lower income neighborhoods, whereas for-profit business revenue (39.1% of total sources) was the most common in higher income neighborhoods. Relatively greater numbers of monetary and government funding sources were found in the lower income neighborhoods ($p<0.05$). Higher income neighborhoods had significantly more for-profit business funding sources than lower income neighborhoods. Grants were used as a source of youth physical activity opportunity support only in lower income neighborhoods.

DISCUSSION

Developing effective and sustainable strategies for promoting physical activity among youth living in more economically disadvantaged neighborhoods is a public health challenge. Fostering creative changes in environmental aspects of neighborhoods that favor physical activity and increasing links between youth physical activity opportunities and youth is a promising approach for achieving this goal. The purpose of the present study was to further elucidate environmental differences that may underlie physical activity disparities between lower and higher income neighborhoods. Our findings build on existing knowledge and provide information

TABLE 5 Sources of funding for youth physical activity opportunities in lower and higher income neighborhoods

Source	Lower income (n=8)		Higher income (n=8)	
	M (SEM)	Sum	M (SEM)	Sum
Monetary donation	3.3 (0.73)*	26	1.3 (0.16)	10
Time donation	0.5 (0.19)	4	0.3 (0.16)	2
User fees	1.3 (0.49)	10	1.0 (0.27)	8
Government	2.5 (0.42)*	20	1.0 (0.27)	8
Business income	0.8 (0.16)*	6	2.3 (0.56)	18
Grant	0.5 (0.33)	4	0	0

M (SEM) mean ± (standard error of the mean)

* $p<0.05$

for those driving efforts to alter policies, norms, and behaviors favoring youth physical activity.

The results of this and previous studies agree in terms of the types of locations offering opportunities to be physically active even though marked differences exist in their methodology (e.g., subjective vs. objective assessments of locations, operational definitions employed).^{9,21,24,25,36–38} Locations offering physical activity opportunities consistently represent parks, recreation centers, schools, faith-based organizations, and for-profit businesses. Contrary to our findings, other researchers have found relatively fewer resources (e.g., facilities) that youth could use for physical activity in lower income areas.^{21,24,25,36} This discrepancy may be due to our focus on youth physical activity opportunities as opposed to others who did not make the distinction between adult and youth opportunities during the identification/description process. It is possible that within the broad context of physical activity resources, subtypes like those specifically for use by youth could relate differently to neighborhood dynamics associated with resident income. This has been observed with other types of community services (e.g., unattended pregnancy, drug use).³⁹ Second, our youth physical activity opportunity identification and description process was more involved which may have uncovered opportunities not found by previous researchers. Key informant interviews are particularly effective at eliciting information that would otherwise remain unknown, and our experience was that certain opportunities would most likely have been missed unless eluded to by a key informant (e.g., residential opportunities not detectable by tours and material searches).⁴⁰ If our finding that lower income areas have on average similar or greater numbers of youth physical activity opportunities than higher income areas is confirmed, it would be important to examine how this relates to youth physical activity. As it stands now, youth in lower income areas are less physically active than youth from more economically privileged areas.⁴ If youth physical activity opportunities are available, then it is possible that they are not adequately addressing or meeting the needs of youth physical activity. For instance, common characteristics of lower income areas such as high crime, poor aesthetics, and unattractive attributes could easily negate a positive effect produced by the addition of more youth physical activity opportunities.⁴¹

In addition to identifying youth physical activity opportunity locations, the present study presents new information regarding their distribution at the neighborhood-level scale. There were significantly more faith-based locations with youth physical activity opportunities in the lower income neighborhoods and more for-profit businesses with youth physical activity opportunities in the higher income neighborhoods. Faith-based organizations accounted for 36% of the locations in lower income areas (22% in higher income areas), while for-profit businesses represented 50% of the locations in higher income areas (18% in lower income areas). Lee et al.²⁵ found the most common types of physical activity resources were parks and public school yards (60%) and churches (38%) in lower and higher income areas, respectively. In the present study, 35% of locations in lower income neighborhoods were parks and public school yards. The variable results may reflect differences in neighborhood definitions (800 meters around a low income housing development vs. our current definition), the levels of income used to define groups (\$22,000 vs. ~\$32,000 for lower income), and/or the characteristics of the physical activity resources considered (for youth only, i.e., youth physical activity opportunities). Difficulty comparing studies because of such methodological variations has been and will continue to be a problem unless clear operational definitions of terms

can be established.⁴² Nevertheless, the results of both studies do suggest that there is a heterogeneous mixture of locations offering opportunities to be physically active and that the locations appear to reflect the neighborhood's culture as influenced by resident income levels. Obviously, this information could be of use when planning initiatives that promote physical activity. For example, strategies that improve the efficiency with which scarce resources are distributed should consider the involvement of faith-based organizations with youth physical activity opportunities to reduce the linkage between these opportunities and the youth who would use them.⁴³ More research is needed to assess the importance and potential use of involving other neighborhood locations such as for-profit businesses.⁴⁴

Opportunities for physical activity at residences (i.e., homes) were not common even though residences were very prominent in the study communities (59% of land-use). A possible explanation is that some youth physical activity opportunities may be present but are difficult to identify since they are in more private locations. Other methods such as surveys of residents may be needed to identify youth physical activity opportunities at residences. Another explanation is that residential-type youth physical activity opportunities are not present, suggesting their development by neighborhood residents be examined as a potential intervention component. Semiformalization (e.g., scheduled meeting times, advertisement) could expand residential youth physical activity opportunities and create a valuable asset (e.g., space) for increasing the quantity of youth physical activity opportunities and reducing the burden on other neighborhood resources. It has been shown that when a community-based participatory research method is used to promote physical activity, youth physical activity opportunities do arise at residential locations.³¹

The number of amenities was found to be similar between lower and higher income neighborhoods; however, lower income neighborhoods had more courts, trails/paths, events and water amenities. This finding is not consistent with previous research. Parks and playgrounds in low income areas have been characterized by more incivilities, fewer exercise facilities, and more hazards, while public open spaces were found to have significantly fewer walking/cycling paths, lighting, and water features.⁴⁵⁻⁴⁷ As with findings on youth physical activity opportunity locations, methodological variations (e.g., how an amenity is defined) could account for these differences in study outcomes. Alternatively, the interplay between factors associated with a neighborhoods income level and the number and types of amenities present may be complex and, at times, counterintuitive. For instance, Abercrombie et al.⁴⁸ found more parks in mixed-race, middle-income neighborhoods, while fewer parks were seen in high-income, mostly minority areas. Research indicates that physical activity is positively associated with the presence of amenities.^{49,50} Therefore, explorations are highly warranted to clarify ambiguity regarding the factors associated with the quantity, quality, and type of physical activity amenities.

Interestingly, the predominant types of amenities in both lower and higher income areas were playground equipment (mostly Jungle gyms) and classes (dance, martial arts, education plus exercise). A Jungle gym apparatus requires a high initial outlay of money but little maintenance, and it provides continuous opportunities for physical activity (within hours designated for use). Unfortunately, no information exists regarding how playground equipment affects physical activity, although youth have been shown to become more physically active when provided with safe schoolyards (with playground equipment) in their neighborhoods.²⁰ Classes, on the other hand, may require less of an outlay to start but substantial funds for space and

instructor costs incurred over time. In higher income areas, most classes are offered through for-profit businesses who charge fees to cover the costs. In lower income neighborhoods, most of the classes were made available through the two community centers which are generally supported by public spending (i.e., tax dollars). Although this method of funding provides free or low-cost programs, it is subject to policy decisions concerning budgets and fund distributions. It has been documented that public spending on parks in lower income areas lags behind spending in more affluent areas.⁵¹ Studies that evaluate cost data for amenities are highly warranted.⁵² Cost effectiveness models could be constructed to describe amenity costs relative to utilization rates or even energy expenditure.

To our knowledge, this is the first account concerning the funding sources used for youth physical activity opportunities. The sources of funding for youth physical activity opportunities may drive factors that link them to youth by reducing costs, transportation needs, or supervision. In lower income neighborhoods, youth physical activity opportunities were funded mainly by monetary donations from individuals and groups and local governments through the use of tax payer dollars. Monetary donations were mostly received from congregation members at faith-based organizations and used to support their youth physical activity opportunities. Revenue from individuals patronizing for-profit businesses was the primary source of funds for youth physical activity opportunities in higher income areas. This most likely reflects the economic characteristics of the neighborhoods and would be considered an appropriate design for promoting physical activity especially in lower income areas (free or reduced cost youth physical activity opportunities). However, a potential problem is the quality of youth physical activity opportunities associated with support types. For-profit businesses offering youth physical activity opportunities would not be in business if they provided substandard quality opportunities. In contrast, evidence suggests that the relative quality of youth physical activity opportunities in lower income areas is poorer, possibly reflecting the funding sources used.^{10,47} Although not examined in this study, this could reflect the amount of dollars spent on youth physical activity opportunities (less in lower income areas) and/or the efficient use of those dollars. It is possible that the knowledge needed to provide the highest quality youth physical activity opportunities for the amount of money available is lacking in areas relying on certain funding sources such as those used in lower income neighborhoods.

Volunteerism or the act of donating one's time for youth physical activity opportunities was low in both income areas. Part of the low rates may be attributed to the reality that a certain amount of volunteerism is not documented or known precisely and therefore difficult to accurately describe. Alternatively, volunteerism for youth physical activity opportunities may be low or at least lower than other initiatives using volunteers (e.g., food distribution). This indicates a potential component for promoting physical activity. Grants were used to fund youth physical activity opportunities in lower but not higher income areas. The use of grant funds for youth physical activity opportunities in lower income areas is an attractive mechanism. Whether our finding of four grants is low or high for a given economic time period cannot be determined. Nevertheless, only two of the eight lower income areas were utilizing this funding mechanism suggesting room for improvement. Besides a deficit in grants for youth physical activity opportunities, underuse also could reflect a lack of ability to write award-winning proposals, inadequate knowledge about grants available, and/or overly difficult processes for obtaining grants. These unexplored factors are fertile areas for future research and

interventions that use grant writing workshops, promotional activities, and simplification of the application process.

This study has limitations that should be considered when interpreting the results. First, the study sample was small and drawn from one metropolitan area, possibly restricting generalizability. The sample did represent over 20% of the population from which it was drawn, and the metropolitan area is considered “typical” in terms of demographics. Second, youth physical activity opportunity location attributes were considered individual amenities if youth could use them for physical activity. The definition could be criticized for being overly robust; however, this was done purposefully because an agreed upon operational definition of amenity is not available, and we did not want to impose a subjective “stamp” on this key variable. Nevertheless, other researchers have and will use slightly different definitions producing variable results. This is not necessarily a negative if findings are considered in the context of the definition used. For example, an amenity definition that allows for finer detail on a more microscale could reveal aspects of amenities themselves that are important determinants of physical activity. Counting each individual piece of aerobics equipment at a gym could show more equipment positively affects choice, interest level, and accessibility (number that can use it at the same time), leading to higher levels of physical activity. Last, a richer meaning could have been ascribed to our findings if a more complete “picture” of the youth physical activity opportunities was drawn, particularly by including other characteristics of the opportunity such as quality and youth utilization rates. The present study was a focused approach to understand one aspect or construct of a complex theory of behavior which is consistent with the accepted line of inquiry (i.e., usual practice) in this research area.⁷ As the results of other studies become available, more fluent and robust interpretations of the data will be possible.

In conclusion, differences in youth physical activity opportunity locations, amenities, and funding mechanisms were found between lower and higher income neighborhoods. The results suggest that youth physical activity opportunities and their funding sources reflect the culture of the areas, most likely the economic culture. Examining youth physical activity opportunities over a longer period of time to capture temporal dynamics, gathering more details about their funding, and evaluating their relationship with physical activity from an economic perspective are topics for future research. This study adds to the literature and provides results that can be used to inform the development of strategies for promoting youth physical activity in both lower and higher income neighborhoods.

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