

Original article

# Low-income neighborhood barriers and resources for adolescents' physical activity

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## Abstract

**Purpose:** To investigate factors of low-income neighborhoods and households on physical activity with a sample of adolescents from low-income neighborhoods.

**Methods:** Middle-school-aged youth ( $n = 74$ ) from a low-income neighborhood completed self-report surveys. Measures include vigorous exercise frequency, neighborhood hazards, after-school time demands, availability of facilities, quality of facilities, and perceived safety. Hierarchical multiple linear regression and Pearson product moment correlations were conducted to test hypotheses that more frequent physical activity would be associated with more available locations, better quality facilities, fewer time demands, more after-school programs, more perceived safety, and more hazards.

**Results:** Results indicate that more physical activity was associated with more hours spent in after-school programs ( $r = .50, p < .001$ ) and perception of higher quality of local facilities ( $r = .28, p < .05$ ). Perception of safe adults at local facilities accounted for more variance than perception of neighborhood hazards in the association with physical activity even after accounting for gender, age, and socioeconomic status.

**Conclusions:** Future health promotion programs should consider factors of after-school programs such as quality, cost, and presence of safe adults when attempting to increase and maintain youth physical activity in lower income areas. © 2005 Society for Adolescent Medicine. All rights reserved.

**Keywords:** Socioeconomic status; Adolescent; Physical activity; Hazards; Neighborhood

Approximately 50% of U.S. youth do not currently meet the public health recommendations for frequency and vigorosity of physical activity [1–4]. There are few studies on the relationship between socioeconomic status and adolescents' physical activity, despite the fact that lower socioeconomic status is linked with higher rates of physical activity and obesity [5–11]. Traditional socioeconomic status measures, such as income and education, do not create a complete picture. Researchers argue that household and neighborhood factors are important markers of social class to consider [12]. There is little research addressing perceptions of low-income neighborhood and household barriers/resources in relationship to adolescents' physical activity.

## *Low-income context for neighborhood resources*

In large, predominantly middle-class samples of adolescents, researchers have found that access to play spaces and equipment have been associated with higher rates of physical activity [3,4]. Further, minority youth, who are more likely to live in low-income neighborhoods, have reported that fewer convenient facilities are available to them [10]. Low-income neighborhoods may be less likely to have available facilities/locations that facilitate physical activity, such as parks, schoolyards, local gyms, or community centers. Issues of accessibility, quality, and safety have been hypothesized to inhibit youth's physical activity in low-income neighborhoods but have not been empirically explored in previous research [13]. Both lack of transportation and cost of facility fees may prohibit youth from accessing local facilities. Facilities in lower income neighborhoods

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may also be perceived as having lower quality space or equipment. However, previous studies have not empirically investigated the impact of the perception of convenience or facility quality on youth physical activity rates.

Minority youth have reported that neighborhood safety is also an important factor for youth's physical activity [10]. Other studies have identified lack of safety as an issue for physical activity [7,12–15]. The majority of these studies have measured safety only through neighborhood crime rates, which are often based on local police reports. These studies have assumed that individuals that live in lower income neighborhoods do not feel safe as a result of the crime rates without actually assessing individual perception of safety or crime. One study that assessed lower income children's perception of safety in relationship to physical activity has provided preliminary evidence contradictory to the assumption that more neighborhood problems will inhibit their physical activity. Romero et al report that the perception of more neighborhood hazards (crime, gangs, drugs, traffic, and noise) was associated with more physical activity, not less activity [9]. However, this finding was only significant for children who did not report the lowest levels of socioeconomic status in the study. The previous study did not directly inquire about the individual perception of safety, only the perception of neighborhood hazards as problems.

#### *Low-income household factors*

Household factors may create barriers for adolescents to engage in higher rates of physical activity. Sallis and colleagues reported in 1996 that Anglo youth were twice as likely as minority youth to take after-school physical activity classes [10]. This finding may suggest that lower income households, wherein minorities are more likely to be over-represented, may encounter barriers to participating in after-school programs. These barriers may include availability of after-school programs, cost of programs, or convenient location (within walking distance or having reliable transportation). Other potential factors that may limit adolescent activity may include lack of free time, because lower income youth may be more likely to have a job or household responsibilities (babysitting, chores, etc.). Previous studies have not explored the impact of competing after-school time demands that may limit free time for lower income adolescents to engage in physical activity.

#### *Hypotheses*

The present study will examine the relationship between low-income neighborhood and household barriers and resources on adolescents' physical activity. Lower socioeconomic status has been associated with less adolescent physical activity; however, there is still much to learn about how low-income environments specifically affect physical activity frequency. Previous studies have not explored the impact

of quality and cost of facilities, perception of safety of facilities, and after-school time demands on adolescent physical activity. These factors of low-income neighborhoods and households will be investigated in the current study with a sample of adolescents from low-income neighborhoods. The hypotheses to be tested in this study are as follows: (a) more frequent vigorous physical activity will be associated with more total available facilities (gyms, community centers, parks, etc.) and perceived higher quality of facilities; (b) perception of safety (safe adults, safe location, and safe walking distance) will account for more variance in frequency of vigorous physical activity than neighborhood hazards; more physical activity will be associated with perception of higher safety; (c) more frequent vigorous physical activity will be associated with fewer hours spent on after-school time demands (job, housework and babysitting), more free time, and more hours in after-school physical activity programs.

## **Methods**

### *Study design*

The study is a cross-sectional survey design. Adolescents ( $n = 74$ ) between the ages of 10 and 16 years were recruited from a local middle school (80% of sample) and from local community centers (20% of sample) in a mid-sized city in the southwestern United States. The median family income in the neighborhood area where youth were recruited is under \$14,000, with approximately 39% single female-headed households and 80% economically disadvantaged households based on Department of Housing and Urban Development income limits and federal free-lunch eligibility. Furthermore, this neighborhood area had eight times more suicides, six times more robberies, four times more arrests for drug possessions and sales, four times more physical and sexual assaults, and 10 times more prostitution than the nearby metropolitan city [16].

A survey was administered to youth during a science/health class for middle school students and after school at local community centers. Active consent from the participant's parent or guardian was required, as well as youth assent. Youth completed a survey administered by bilingual/bicultural research staff. The surveys were read aloud in English or in Spanish (language was based on preference of youth). The survey took approximately 1 hour to complete. This study was approved by the overseeing institution's Human Subjects Review Board.

### *Measures*

The questionnaire was first developed in English and then translated into Spanish by a professional translator. The translations were back-translated from Spanish to English by local native Spanish speakers [17,18]. The following is a summary of all the measures used in the present study:

**Exercise frequency.** The current study includes a measure of physical activity that specifically assesses the frequency of vigorous activity that lasts at least 20 minutes [19]. The amount of reported physical activity was measured with an item from the Youth Risk Behavior Survey of the Centers for Disease Control with the question, “on how many of the past 7 days did you exercise or participate in some form of physical activity for at least 20 minutes that made you sweat and breathe hard?” [20]. Response items ranged from 0–7 days, with a higher score indicating more days of activity.

**Neighborhood hazards.** Children’s perceived neighborhood hazards were assessed with eight self-report items based on a 3-point Likert type scale: 1 = “Not a problem,” 2 = “A little problem,” 3 = “A big problem.” This scale was adapted from the Hazards scale developed by Aneshensel and Sucoff [21]. All of the items used the beginning phrase “how much of a problem is . . .” The eight neighborhood hazard items included: traffic, trash and litter, crime, too much noise, gangs, access to parks, prejudice, and drugs. The eight items were averaged, with a higher score indicating more problems in the neighborhood. The internal consistency of this scale was found to be  $\alpha = .78$  in the current study.

**After-school time demands.** Assessment of time demands for youth items included the following questions: (a) “Do you have a job?,” (b) “Do you help your parents with housework?,” (c) “Do you babysit for a family member on a regular basis?,” (d) “Are you involved in after-school activities?” Participants were asked to answer with a “yes” or “no” to the above items. The items on job, housework, and babysitting were summed for a total number of after-school time demands and also for a total number of hours. For each of these items a follow-up question was asked to determine the amount of hours typically spent doing such activities in 1 week. One additional question asked “how much free time do you have during the week?” The responses ranged from 1 = 1–2 hours, 2 = 3–4 hours, 3 = 5–6 hours, 4 = 7–8 hours, 5 = 9–10 hours, 6 = 10–20 hours, 7 = 20–30 hours. The items on after-school activities and free time hours were used separately in analyses.

**Availability of facilities.** Availability of facilities for physical activity was assessed with several questions. Six specific facilities were asked about: community center, outdoor park/facility, YMCA/YWCA, school playground, backyard/front yard, and home gym. Participants were asked the following questions for each location: (a) “Is it available to you?,” (b) “Is it free?,” (c) “If it is not free, is your parent/guardian willing to pay for you?,” (d) “Do you have to walk there?,” (e) “Do you have someone that will give you a ride to this place?” All responses to these six questions were “yes” or “no.” A sum score was calculated for the six items that asked “is it available to you” with a possible range of zero to six, the higher score indicated more facilities/locations available.

**Perceived quality of facilities.** The quality of the most fre-

Table 1  
Sample characteristics

	n	%
Gender		
Male	34	45.9
Female	40	54.1
Age (years)		
10–11	21	28.4
12	14	18.9
13	14	18.9
14	12	16.2
15–16	13	17.6
Ethnicity		
Mexican American	56	75.7
Mexican National	7	9.5
Native American	2	2.7
White	5	6.8
Biracial	4	5.4
Generation		
1st (immigrant)	10	13.7
2nd (youth born in U.S.)	26	35.1
3rd (parent born in U.S.)	18	24.7
4th (grandparent born in U.S.)	19	25.7

quently used facility for physical activity was measured with five items: quality of equipment, overall facility quality, open when needed, availability of equipment, and having fun. Responses were on a 4-point Likert-type scale ranging from 1 = “strongly disagree” to 4 = “strongly agree.” The items were averaged together; a higher score indicates perception of higher quality of facilities. For the five perceived quality items the internal consistency score was acceptable;  $\alpha = .80$ .

**Perceived safety.** The safety of facilities was measured with three items: “I do not feel safe when certain adults are around,” “The facilities are located in areas where I feel safe,” and “If I had to walk to this place, I feel safe doing so.” Responses were on 4-point Likert-type scale ranging from 1 = “strongly disagree” to 4 = “strongly agree.” The first item was recoded, so that a higher score indicates perception of more safety for all three items. A higher score indicates perception of more safety. The items were used separately in analyses.

## Results

### Descriptives

Demographic sample characteristics are included in Table 1. The average number of days of self-reported vigorous physical activity was  $M = 3.53$  days ( $SD = 2.70$ ) with a 0–7 range; 58.9% of respondents were engaging in 3 days or more of vigorous physical activity. The average perceived socioeconomic status was  $M = 2.48$  ( $SD = .71$ ) with a range from 0–4 (0 = my family’s income is somewhat less than others, 4 = my family’s income is somewhat more than others).

Table 2  
After-school time demands

	Yes (n)%	Less than 4 hours (n) %	5–8 hours (n) %	More than 10 hours (n) %
Job	(11) 14.5	(5) 45.5	(5) 45.5	(1) 9.0
Housework	(58) 86.6	(38) 66.7	(10) 17.5	(9) 15.8
Babysit	(37) 56.1	(23) 65.7	(8) 22.9	(4) 11.4
Free time	(68) 100	(21) 30.9	(17) 25.0	(30) 44.1
Afterschool programs	(41) 63.1	(28) 70.0	(7) 17.5	(5) 12.5

### Demographic differences

Student's *t*-test analyses indicate that gender differences were significant for vigorous physical activity ( $t(71) = -4.68, p < .001$ ). Males ( $M = 4.97, SD = 2.52$ ) reported significantly more vigorous physical activity than females ( $M = 2.35, SD = 2.26$ ). Males ( $M = 2.19, SD = 2.15$ ) reported significantly more hours in after-school activities than females ( $M = .97, SD = 1.34$ ) ( $t(62) = -2.79, p < .01$ ). There were no significant gender differences for the following variables: hazards, time demands total, time demands hours, total number of locations, safe adults, safe locations, safe walking distance, or perceived quality.

One-way ANOVA analysis indicates that age differences were significant only for hours spent on after-school time demands (including jobs, babysitting, and housework) ( $F [62,4] = 4.54, p < .01$ ). Youth aged 15–16 years ( $M = 6.92, SD = 3.87$ ) reported significantly more hours than all other ages, except 14-year-olds ( $M = 4.67, SD = 4.14$ ). There were no significant age differences for vigorous physical activity, hazards, perceived quality, total number of locations, safe adults, safe locations, safe walking distance or time demands total. There were no significant language preference differences or generation differences for any of the variables, including physical activity, hazards, perceived quality, total number of locations, safe adults, safe locations, safe walking distance, time demands total, or time demands hours.

### Time demands descriptors

Few youth (14.5%) reported having a job, and the majority of those (91%) reported working less than 10 hours a

week (Table 2). Although many youth reported that they helped parents with housework (86.6%) and babysitting (56.1%), the majority of those reported doing less than 4 hours a week (66.7% and 65.7%, respectively). 63.1% of youth reported being active in after-school programs. Up to 44.1% of youth reported having more than 10 hours of free time every week. However, up to 30.9% of youth reported less than 4 hours of free time during the week.

### Availability descriptors

Youth indicated how many locations were available for physical activity (Table 3). They also indicated whether these locations were free, parents willing to pay if not free, proximity to home, ability to walk or get a ride to the location (Table 3). Out of a total of six facilities listed, youth reported that on average they had access to  $M = 4.03$  ( $SD = 1.40$ ) facilities.

### Correlations

Pearson product moment correlations for variables of interest are provided in Table 4. More frequency of vigorous physical activity was associated with higher socioeconomic status, more safe adults at facilities, more safe areas for facilities, more hours spent in after-school programs, and higher quality of locations. Perception of better quality of facilities was associated with perception of safe location, more time demands, and more after-school program hours.

### Hypothesis 1: availability and quality

It was hypothesized that more physical activity would be associated with more available and better quality facilities. This hypothesis was supported for quality, but not for availability. Perception of better quality of facilities was associated with more vigorous physical activity ( $r = .28, p < .05$ ) (Table 4).

### Hypothesis 2: hazards

Perception of safety was hypothesized to account for more variance in physical activity than neighborhood hazards. Additionally, it was hypothesized that more physical activity would be associated with perception of more safety. The results indicate that this hypothesis was supported (Table 5). Gender, age, and perceived socioeconomic status

Table 3  
Availability and accessibility of local facilities

	Community Center (n) %	Park (n) %	YWCA/YMCA (n) %	School Playground (n) %	Yard (n) %	Home Gym (n) %
Is it available?	(52) 80.0	(46) 69.7	(27) 45.8	(60) 92.3	(60) 93.8	(27) 45.8
Is it free?	(37) 59.7	(43) 67.2	(13) 23.2	n/a	n/a	n/a
Parent willing to pay fees?	(28) 45.2	(23) 39.7	(23) 38.3	n/a	n/a	n/a
Transportation available?	(47) 72.3	(39) 63.9	(33) 56.9	(49) 80.3	n/a	n/a
Within walking distance?	(23) 35.9	(25) 41.0	(8) 14.3	(30) 50.8	n/a	n/a

Note: n/a indicates nonapplicable question for facility.

Table 4  
Pearson product moment correlations

	1	2	3	4	5	6	7	8	9	10	11	12
1. Vigorous Activity	1.0											
2. Perceived SES	.37**	1.0										
3. Hazards	.22	-.04	1.0									
4. Safe adults	.26*	.08	-.08	1.0								
5. Safe location	.24*	.02	-.07	.11	1.0							
6. Safe to walk	.14	.10	-.08	-.10	.27*	1.0						
7. Time demands	.02	.15	.08	-.18	.12	.03	1.0					
8. Time demands hours	.14	.01	.10	-.02	.08	-.15	.56**	1.0				
9. After-school program hours	.50***	.19	.07	.17	.21	.18	-.05	.05	1.0			
10. Free time hours	-.06	.08	.06	.12	-.09	.08	-.16	-.16	-.02	1.0		
11. Available facilities	.18	.18	.06	-.01	.03	.21	.08	-.01	.10	-.02	1.0	
12. Facility quality	.28*	.02	.12	.12	.66***	.15	.40**	.21	.27*	-.03	.18	1.0

\*  $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

were added in step 1,  $R^2 = .29$ , ( $F [3,57] = 7.85$ ,  $p < .001$ ). Step 2 added neighborhood hazards,  $R^2 = .34$ ,  $\Delta R^2 = .04$ , ( $F [4,56] = 7.064$ ,  $p < .001$ ). Step 3 added safe adults, safe facility area, and safe walk to area  $R^2 = .47$ ,  $\Delta R^2 = .13$ , ( $F [7,53] = 6.62$ ,  $p < .001$ ). The final overall model was significant in Step 3. Perception of safety accounted for 13% more variance once added to the model, compared with only 4% accounted for by hazards. Specifically, more vigorous physical activity was associated with being male, higher socioeconomic status, perception of more hazards, and more safe adults at facilities.

### Hypothesis 3: time demands

It was hypothesized that more physical activity would be associated with fewer hours spent in after-school time demands (job, babysitting, and housework), more free time, and more hours in after-school programs. This hypothesis was supported for more hours in after-school programs based on Pearson Product Moment Correlations (vigorous activity:  $r = .50$ ,  $p < .001$ ). This hypothesis was not supported for after-school time demands or free time (Table 4).

Table 5  
Hierarchical multiple linear regression models for hypothesis 3

Regression Step	$R^2$	$\Delta R^2$	Std. $\beta$	$t(p <)$
Dependent variable: Vigorous physical activity				
1. Gender	.29	.29	.32	2.83**
Perceived SES <sup>a</sup>	.29	.29	.25	2.32*
Age	.29	.29	.17	1.63
2. Neighborhood hazard	.34	.04	.26	2.45*
3. Safe adults	.47	.13	.30	2.86**
Safe facility	.47	.13	.17	1.64
Safe to walk	.47	.13	.08	.72

\*  $p < .05$ ; \*\* $p < .01$ .

<sup>a</sup> SES indicates socioeconomic status.

## Discussion

The purpose of this study was to investigate youths' perception of lower income neighborhood and household barriers and resources for physical activity. Generally, lower socioeconomic status youth were more likely to report less physical activity, consistent with previous research [6,9,10]. The results indicate that the hypotheses were partially supported. As hypothesized, more vigorous physical activity was associated with more hours in after-school programs and perception of better quality of local facilities for physical activity. However, after-school time demands (job, housework, babysitting), free time, and number of available facilities for physical activity were not associated with physical activity, contrary to hypotheses. More physical activity also was associated with being male, perception of more safe adults, and more neighborhood hazards.

### Neighborhood factors

It was hypothesized that lower income neighborhoods may have local facilities with less access and lower quality that may limit adolescent physical activity. In this study, the total number of available facilities was not associated with physical activity; adolescents reported access to an average of four out of six available facilities for physical activity. The majority of youth reported that facilities either were within walking distance or that they had transportation to the facility; thus location of facilities did not appear to be a major barrier. However, more than half of the youth perceived that their parents would not be willing to pay for facility fees, which may be an important barrier to consider. Additionally, 30% to 40% of youth perceived that local community centers and parks were not free, although the majority of these local facilities are free in actuality. Results do indicate that perception of lesser quality of facilities was associated with less vigorous physical activity. Future studies may consider further pursuing the impact of inability to

pay facility fees and perception of quality of facilities with regard to lower rates of physical activity among lower income youth.

Perception of safety accounted for more variance in frequency of vigorous physical activity than perception of neighborhood hazards, as hypothesized. Results indicate that the perception of safe adults at local facilities were associated with more frequent physical activity. In an existing qualitative study on perception of inner city neighborhoods, Polivka et al found that inner-city youth reported local facilities (parks, community recreation facilities) were fun, but also dangerous and dirty [22]. Thus, low-income youth may report neighborhood problems, but these problems may not necessarily affect their perception of neighborhood safety. However, future studies should consider the implications of the perception of safe adults as a key element of safety, not only safe neighborhood environments.

#### *Household factors*

The hypothesis that more time spent in after-school programs was associated with more physical activity was supported, as in previous research with adolescents [6]. A majority of youth (63.1%) reported being active in after-school programs, which may be a positive resource for youth from lower income neighborhoods, and a potential mechanism through which to increase physical activity rates. However, the results of the current study may be slightly biased in that 20% of the sample was recruited from community centers, which may increase the likelihood of involvement in after-school programs. Boys reported spending more hours in after-school programs than girls, and boys also reported more frequency of vigorous physical activity. It is not clear in the current study whether boys' after-school programs provided more opportunities for physical activity than girls' programs. Future researchers may consider inquiring more specifically about the type and availability of after-school programs in low-income neighborhoods for both boys and girls.

It was hypothesized that youth from lower income households would have additional after-school time demands (job, babysitting, housework) that would decrease their free time to engage in physical activity. This hypothesis was not supported. In fact, few youth reported having an after-school job (14.5%). However, the majority of the sample was under 16 years of age, and results indicate that older teens were more likely to report more hours spent in after-school time demands. Although the majority of youth reported assisting with babysitting and housework, most reported doing these activities for less than 4 hours a week. Future studies with older teens may still consider the impact of jobs and after-school time demands on physical activity.

#### *Limitations*

The correlational nature of the current study design limits the generalizability of this association; for example, youth that are regular participants at local community centers may perceive more familiar adults as safer. Results also indicate that more physical activity is associated with perception of more neighborhood hazards, as found in previous studies [9]. The interpretation of this finding is still unclear; however, the current study has found that hazards were not significantly associated with perception of safety, as expected. This may suggest that the hazards measure may not be assessing perception of fear or danger within neighborhoods as anticipated. Generalization of results of the current study are also limited by the small sample size; however the current study does begin to shed light on some specific barriers and resources to physical activity within lower income neighborhoods. Future studies may also consider objective measures of physical activity/physical fitness along with self-report measures as relied on in the current study. A comparison group of a different income level may be considered for future research to provide comparison for relative economic differences.

#### **Conclusions**

The current study indicates that low-income neighborhood factors, such as perception of lower quality of facilities and inability to pay facility fees, were barriers to youth engaging in more frequent physical activity. Additionally, the perception of more safe adults at local facilities was associated with higher frequency of physical activity among youth. Youth who participated in after-school programs were more likely to report more frequent vigorous physical activity. The results extend the current research by providing empirical evidence on the impact of perception of quality, cost, and safety on youth physical activity in low-income neighborhoods. Overall, the findings may guide the development of future health promotion programs to increase physical activity and decrease obesity in adolescents, one of the nation's major health concerns.

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#### **References**

- [1] Sallis JF, McKenzie TL. Physical education's role in public health. *Res Q Exerc Sport* 1991;62:442.
- [2] Sallis JF, Patrick K. Physical activity guidelines for adolescents: Consensus statement. *Pediatr Exerc Sci* 1994;6:302–14.

- [3] Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. *Med Sci Sports Exerc* 2000;32:963–75.
- [4] United States Department of Health and Human Services. *Healthy People, 2000: National Health Promotion and Disease Prevention Objectives*. Washington, DC: U.S. Government Printing Office, 2000.
- [5] Andersen RE, Crespo CJ, Bartlett SJ, et al. Relationship of physical activity and television watching with body weight and level of fatness among children: Results from the third national health and nutrition examination survey. *JAMA* 1998;279:938–42.
- [6] Gordon-Larsen P, McMurray RG, Popkin BM. Determinants of adolescent physical activity and inactivity patterns. *Pediatrics* 2000;105:1–8.
- [7] Lacar ES, Soto X, Riley WJ. Adolescent obesity in a low-income Mexican American district in South Texas. *Arch Pediatr Adolesc Med* 2000;154:837–40.
- [8] McKenzie TL, Sallis JF, Nader PR, et al. Anglo- and Mexican American preschoolers at home and at recess: Activity patterns and environmental influences. *J Dev Behav Pediatr* 1992;13:173–80.
- [9] Romero AJ, Robinson TN, Kraemer HC, et al. Are perceived neighborhood hazards a barrier to physical activity in children? *Arch Pediatr Adolesc Med* 2001;155:1143–8.
- [10] Sallis JF, Zakarian JM, Hovell MF, Hofstetter R. Ethnic, socioeconomic, and sex differences in physical activity among adolescents. *J Clin Epidemiol* 1996;49:125–34.
- [11] Winkleby MA, Robinson TN, Sundquist J, Kraemer HC. Ethnic variation in cardiovascular disease risk factors among children and young adults: Findings from the Third National Health and Nutrition Examination Survey. *JAMA* 1999;281:1006–13.
- [12] Krieger N, Fee E. Social class: The missing link in U.S. health data. *Int J Health Serv* 1994;24:25–44.
- [13] Sallis JF, Johnson MF, Calfas KJ, et al. Assessing perceived environmental variables that may influence physical activity. *Res Q Exerc Sport* 1997;68:345–51.
- [14] Brooks-Gunn J, Greg J, Duncan P, et al. Do neighborhoods influence child and adolescent development? *Am J Sociol* 1993;99:353–95.
- [15] LeClere FB, Rogers RG, Peters K. Neighborhood social context and racial differences in women's heart disease mortality. *J Health Soc Behav* 1998;39:91–107.
- [16] South Tucson Community Council Crime Survey. City of South Tucson. 2000.
- [17] Brislin RW. *Translation: Applications and Research*. New York, NY: Gardner Press, 1976.
- [18] Brislin RW, Lonner WJ, Thorndike RM. *Cross-cultural Research Methods: Comparative Studies in Behavioral Science*. New York, NY: Wiley, 1973.
- [19] American College of Sports Medicine *Guidelines for Exercise Testing and Prescription*, 4th edition. Philadelphia, PA: Lea & Febiger, 1991.
- [20] Heath GW, Pate RR, Pratt M. Measuring physical activity among adolescents. *Public Health Rep* 1993;108(Suppl 1):42–6.
- [21] Anshensel C, Sucoff CA. The neighborhood context of adolescent mental health. *J Health Soc Behav* 1996;37:293–310.
- [22] Holaday B, Swan JH, Turner-Henson A. Images of the neighborhood and activity patterns of chronically ill school age children. *Environ Behav* 1997;29:348–73.