Introduction

As youth obesity rates remain at unacceptably high levels, particularly across underserved populations, the promotion of physical activity has become a focus of youth obesity prevention across the United States. Thus, the purpose of this study was to develop and test the reliability and validity of a self-reported questionnaire on home, school, and neighborhood physical activity environments for youth located in low-income urban minority neighborhoods and rural areas. Third-, fourth-, and fifth-grade students and their parents were recruited from six purposively selected elementary schools (three urban and three rural). A total of 205 parent/child dyads completed two waves of a 160-item take-home survey. Test-retest reliability was calculated for the student survey and validity was determined through a combination of parental and school administrator responses, and environmental audits. The majority (90%) of measures had good reliability and validity (74%; defined as ≥70% agreement). These measures collected information on the presence of electronic and play equipment in youth participants’ bedrooms and homes, and outdoor play equipment at schools, as well as who youth are active with, and what people close to them think about being active. Measures that consistently had poor reliability and validity (≤70% agreement) were weekly activities youth participated in and household rules. Principal components analysis was also used to identify 11 sub-scales. This survey can be used to help identify opportunities and develop strategies to encourage underserved youth to be more physically active.

Keywords

reliability and validity, research methods, social sciences, physical activity, youth, built environment, public health
Creating or enhancing access to places for physical activity is also a recommended strategy in The Guide for Community Preventive Strategies (Heath et al., 2006) to improve physical activity in communities. Recent evidence shows differences in access to parks and green space by urbanicity. Low-income minority urban neighborhoods had greater access to parks, but less access to green space, whereas rural areas had less access to parks, but greater access to green space (Wen, Zhang, Harris, Holt, & Croft, 2013). Rainham et al. (2012) also found urban youth obtained most of their moderate- to vigorous-intensity activity from active commuting, that is, walking around their neighborhoods, whereas rural youth obtained theirs while at school. However, rural youth perceive higher levels of neighborhood trust (i.e., I can ask my neighbor for help) and safety (it is safe for kids to play alone outside) than urban youth (Eriksson, Hochwälder, & Sellström, 2011). Understanding these and other differences in community-, school-, and home-based physical activity supports and barriers across urbanization is imperative to the development of an approach to promote physical activity and prevent obesity in these underserved populations (Trasande et al., 2008).

Despite the growing acknowledgment of the environment’s importance in obesity prevention and the attainment of a physically active lifestyle (Sallis, Floyd, Rodriguez, & Saelens, 2012), few validated measures are in place to assess a wide range of physical-activity-related determinants and their applicability to diverse populations (Brownson, Hoehner, Day, Forsyth, & Sallis, 2009; Floyd, Taylor, & Whitt-Glover, 2009). Measurement tools are needed to understand not only if youth are active, but how and where they are active. Although parent reports are often used to assess the physical activity of a child, Cremeens, Eiser, and Blades’ (2006) review of self-report health-related measures found that parents are often unable to accurately reflect on their children’s daily lives. Of all measurement methods utilized, self-report questionnaire measures designed for children are the most cost-effective, practical, straightforward approach to collecting a wide range of data from children (Kohl, Fulton, & Caspersen, 2000; Rachele, McPhail, Washington, & Cuddihy, 2012). Although there is a great number of youth self-report physical activity assessment measures developed, many of the measures are extremely long, require time-intensive data collection efforts, and may be limited in their design (Biddle, Gorely, Pearson, & Bull, 2011). These measures need to be suitably designed and cognitively appropriate to meet the specificities of the target population they are evaluating. However, because of the increased risk for obesity in low-income urban minority and rural youth (Janssen, Boyce, Simpson, & Pickett, 2006; Joens-Matre et al., 2008; Ogden, Carroll, Curtin, Lamb, & Flegal, 2010), any useful survey used to assess a child’s physical activity support profile must be easily understood by individuals in both these populations. It must be considered that physical activity behavior, trends, and cognitive ability may differ across age, rural–urban, and socio-economic groups. Furthermore, the validity and reliability of self-report measures needs to be thoroughly tested on the underserved population they are targeting (Sallis, 1991) whether it is younger children, low-income, rural, or minority youth.

Further testing and developing of self-report measures of their home, school, and neighborhood environments for rural and low-income, minority urban youth, is necessary to determine if these measures are able to help us to better understand the physical activity behaviors and environmental physical activity supports that are important to these underserved populations. Therefore, the purpose of this study was to develop and test the reliability and validity of administering a self-report questionnaire on home, school, and neighborhood physical activity environments for youth located in (a) rural areas and (b) low-income urban minority neighborhoods.

**Method**

This pilot study was targeted to both rural and low-income minority urban populations of third, fourth, and fifth graders (age range = 8-12 years) to provide information on the home, school, and neighborhood physical activity environments, as well as family-level physical activity behavior. The survey was developed for use in planned evaluations of local policy changes, including street, park, and school playground renovations. The age range was selected because playgrounds are developed for youth 12 years old and younger. To validate youth’s responses, parental/legal guardian surveys were administered, using previously tested reliable and validated measures (Hume, Ball, & Salmon, 2006; Iannotti, Kogan, Janssen, & Boyce, 2009; Kerr, Norman, Sallis, & Patrick, 2008), and school and neighborhood audits were conducted.

Third-, fourth-, and fifth-grade students and their parents/guardians were recruited from six purposively selected elementary schools (three urban and three rural) in the greater Chicagoland Metropolitan Statistical Area and its surrounding area. “Urban” and “rural” were defined using the Census Bureau’s urban and rural definitions. Recruitment efforts began in August 2010 with project staff attending open houses at the beginning of the school year to introduce the study to parents and students and inform them that recruitment efforts would begin in early fall. We identified a primary contact person to work with in each of the six schools. In half of the schools this contact person was the principal. In the other three schools we worked with (a) a staff member of a local community organization that was housed within the school, (b) the assistant principal who was also one of the school’s physical education instructors, and (c) two parent volunteers.

We employed multiple recruitment methods with the schools. These included (a) sending project representatives to report card pick-up day; (b) sending flyers/consent forms
related to the study home with students; (c) attending school-based events held after school hours, such as talent shows and book fairs; and (d) attending parent/PTA meetings to present the study and recruit participants. The most successful recruitment method in the urban schools was having project representatives available to recruit parents at report card pick-up day. Rural school participants were primarily recruited by sending flyers/consent forms home with students.

**Survey Development**

Using an overarching socio-ecological framework as the foundation for the study, a 172-item take-home survey was developed by drawing upon the empirical literature to identify built environmental correlates, and physical activity-related perceptions, attitudes, and practices that have been associated with physical activity behavior, and by drawing upon existing survey instruments (Hume et al., 2006; Iannotti et al., 2009; Kerr et al., 2008). Study staff conducted a review of existing surveys and targeted measures that assessed barriers and supports to youth’s physical activity within the home, school, and neighborhood environments. All existing measures were entered into a database and sorted by construct. Members of the research team then chose survey items that were related to the key constructs of the study. Ten surveys with relevant measures, that captured information on children between the ages of 6 and 12, or adolescents aged 13 to 18, were identified. However, after reviewing the surveys it was determined that most questions were similar across the instruments, thus we selected three surveys (Active Where, Health Behavior in School-Aged Children, and one unnamed study; Hume et al., 2006; Iannotti et al., 2009; Kerr et al., 2008) that had reliability and/or validity testing, and included some of the measures selected for our instrument. One survey was administered to 11-year-old children (Hume et al., 2006), one had two versions (Kerr et al., 2008; one for adolescents and another for parents of children below 13 years old), and the third survey was administered to adolescents (Iannotti et al., 2009). When combined, questions from these three surveys comprise all measures included in our instrument. Revisions were made to ensure the final questions were at an appropriate reading level for the targeted youth study participants.

The youth survey was tested and received a Flesch-Kincaid reading grade level score of 2.8. This statistic, calculated through Microsoft Word, reflects the amount of education needed to read and understand a passage and is calculated using the average number of words per sentence and the average number of syllables per word (Willis, 2004). In addition, an education professional compared the survey questions with the Illinois State Board of Education (ISBE) reading standards for third, fourth, and fifth grades and verified that the vocabulary and sentence structure were appropriate for children aged 9 to 11 (ISBE, 2010). Visual aids and pictures were added to most questions to make the survey more engaging and accessible to youth. Due to its length, the survey was divided into sections, so that youth had the option to complete the survey over multiple sittings or days rather than all at once. Because research on cultural appropriateness of health surveys for minority urban residents has shown that yes/no response options result in fewer disparities in comprehension levels across racial/ethnic groups (Johnson et al., 2006), and due to the developmental nature of this study and the length of the survey, response options were kept as simple as possible. The resulting questionnaire was divided into eight sections: (a) demographic characteristics; (b) school environment; (c) home environment; (d) physical activity behavior; (e) sedentary behavior; (f) attitudes, beliefs, and perceived support of physical activity; (g) neighborhood environment; and (h) parental rules related to physical activity.

A corresponding parent/guardian survey was developed using the same protocol and included previously tested valid and reliable measures (Hume et al., 2006; Iannotti et al., 2009; Kerr et al., 2008). The purpose of the parent/guardian survey was to test criterion-related or concurrent validity between youth and parent self-report responses to the same survey items, as well as to obtain information on measures, for example, social capital and the length of time youth engaged in activities that youth could not reliably answer. Surveys related to school-based physical activity practices and policies were completed by the school principals. Observational playground and field, and street assessments were conducted by study staff at all six schools and the streets surrounding youth participants’ homes.

The principal, street segment, and school observation surveys and accompanying data collection protocols were developed and tested through the Bridging the Gap Research project, funded by the Robert Wood Johnson Foundation (www.bridgingthegapresearch.org). Briefly, the principals were asked to complete a self-report survey on school physical activity-related policies and practices. For the environmental assessments, study staff underwent a 1-week training to audit microscale (e.g., sidewalks, lighting, bike lanes) features of neighborhood streets and the presence and condition of the playgrounds and fields located at the participating schools. Principal and environmental measures were matched to youth responses (e.g., presence of basketball hoops on school grounds was matched the corresponding youth question and response).

**Survey Pretesting**

Probe-based cognitive interviews were conducted with both rural and low-income minority urban youth between the ages of 8 and 11 to pretest all youth questions. Research has shown that when surveying youth it is important to (a) limit the complexity of sentence structure and vocabulary so that survey questions can be fully understood
Participant Recruitment

A total of 329 (33%) out of 1,006 third-, fourth-, and fifth-grade parent/youth dyads were recruited from the six schools for the study. Data collection occurred from November 2010 through May 2011. Youth and parent/guardian surveys were sent home and, given the length of the survey and the nature of the questions being asked (the majority of survey responses are about environments, general perceptions, and parental/guardian rules, and are not time sensitive), participants were given up to 1 week to complete and return the survey (test survey). The majority of parents reported that their children completed the full survey in one sitting. The retest survey was sent to participants 2 to 3 weeks after the test survey was returned. Non-respondents were sent up to three copies of both the test and retest surveys to help improve overall participation rates. All participants (both youth and parents/guardians) received a US$15.00 monetary incentive for their participation in the study. Participants only received the incentive if they completed both the test and retest survey.

We found the most successful method involved personally handing youth participants’ copies of the surveys to be completed and reminding them the US$15 incentive would only be received if they could return both the surveys in 1 week. This method resulted in a 50% completion of all distributed surveys. A total of 253 (77%) youth/parent dyads completed the test and 205 (62%) completed retest surveys. The school principal (n = 5) and/or school contact (assistant principal and physical education teacher, n = 1) also completed a survey about the schools’ physical activity policies, programs, and practices, and research staff completed built environmental observations of the school properties and neighborhood streets and parks.

Statistical Analyses

Study data were collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tools hosted at the University of Illinois at Chicago (Harris et al., 2009). REDCap is a secure, web-based application designed to support data capture for research studies, providing (a) an intuitive interface for validated data entry, (b) audit trails for tracking data manipulation and export procedures, (c) automated export procedures for seamless data downloads to common statistical packages, and (d) procedures for importing data from external sources (Harris et al., 2009).

Using SAS version 9.2, inter-rater reliability was assessed by calculating the intra-class correlation coefficient (ICC) for continuous or ordinal variables and the Cohen’s kappa statistic for dichotomous variables. The ratings system developed by Landis and Koch (1977) was used to interpret reliability results, where .81 to 1.00 represents almost perfect agreement, .61 to .80 represents substantial agreement, .41 to .60 represents moderate agreement, .21 to .40 represents fair agreement, .00 to .20 represents slight agreement, and <.00 represents poor agreement. The overall % agreement (the proportion of cases grouped within the same response category for test and retest) was also calculated to help interpret those dichotomous measures that were skewed toward yes/no or true or false. Measures that showed agreement at or above 70% were considered to be reliable (Fleiss, Levin, & Paik, 2013). Criterion-related or concurrent validity was assessed by calculating the % agreement between (a) self-report youth and parent/guardian responses to the same survey items (Tables 2 and 3), (b) youth self-report measures and street segment observation audits (Table 3), and (c) school-based youth self-report measures and principal reports or school observation assessments. Again, the measures showing agreement at or above 70% were considered valid (Fleiss et al., 2013).

Principal component analysis (PCA) with varimax rotation was also conducted for scale development of the youth survey questions as it is a useful tool to summarize data, detect linear relationships, and to reduce the number of variables in regression analyses. A factor loading of .40 or higher was used to determine which components would be retained for scale development. Internal consistency of scales was assessed by calculating Cronbach’s alpha and test-retest reliability was assessed by calculating one-way random single measure ICCs.

Results

Table 1 shows the student demographics. An equal number of male and female youth completed the surveys. More fourth than third or fifth graders completed both surveys and almost 69% of the sample was Caucasian. Parent demographics showed that 33% rented their home, 55% worked 40+ hr a week, 30% worked less than 40 hr, and 15% did not
Table 1. Student Demographic Characteristics.

|          | Total N | Rural (n = 143) | Urban (n = 62) |
|----------|---------|----------------|---------------|
| Gender   |         |                |               |
| Female   | 103     | 50.24          | 51.79         |
| Male     | 102     | 49.76          | 48.21         |
| Age      |         |                |               |
| 8 years old | 40     | 19.61          | 27.14         |
| 9 years old | 77     | 37.75          | 35.71         |
| 10 years old | 58    | 28.43          | 28.57         |
| 11 to 12 years old | 29 | 14.22          | 8.57          |
| Grade    |         |                |               |
| Third grade | 65     | 31.71          | 33.57         |
| Fourth grade | 77    | 37.56          | 36.43         |
| Fifth grade | 63    | 30.73          | 30.00         |
| Racea    |         |                |               |
| Caucasian | 134    | 68.72          | 86.62         |
| African American | 40 | 20.51        | 3.52          |
| Asian/Other | 21    | 10.77          | 9.86          |
| Ethnicitya |      |                |               |
| Latino   | 43      | 22.05          | 16.20         |
| Socioeconomic status | |            |               |
| % Students free/reduced lunch | 132 | 64.42          | 35.00         |
|         |         |                | 93.50         |

*a n = 10 missing race/ethnicity data.

work; and 26% of the sample had high school/GED degree or less, 36% had some college or an associate’s degree, and 38% had a college degree or higher.

The full set of results is presented in Tables 2, 3, and 4. The results are separated into three tables based on the sources for validating the youth responses, or in the case of Table 4, the lack of any comparable data source for validation. Reliability and validity results were also conducted separately for each grade, as well as for urban and rural youth. We tested the equality of kappa coefficients across groups (urban vs. rural and by grade separately) using the AGREE function in SAS PROC FREQ. We found a few measures where the kappa coefficients were statistically different. Urban youth had higher % agreement on the presence of sidewalks and bike lanes, and rural youth had higher percent agreement on the presence of garbage in their neighborhoods. Urban youth also had lower % agreement on three of the parental rules between test and retest. All other results were similar across grades and urbanization (results not shown), thus we only present results for the full sample.

Youth Reliability Results

Results for 130 items included in the youth survey are presented in Tables 2, 3, and 4. Overall, nine items had almost perfect and 22 had substantial agreement. Most of the measures had moderate (60) or fair (33) agreement. Only four items had slight agreement and, for two items, kappas could not be calculated due to lack of variation in responses (presence of basketball hoops and swings on the school playground). The four items with slight agreement were music player in the home, completing homework after school, youth is supposed to stay away from strangers, and presence of grassy fields on the school grounds. Results of examining % agreement between test and retest surveys shows that only 10 of the 130 items had lower than 70% agreement. These items were (a) listened to music on the weekend, (b) did arts and crafts on the weekend, (c) hung out with family and friends after school, (d) did arts and crafts after school, (e) number of hours physically active after school during the week, (f) number of hours physically active on the weekend, (g) participated in physical activity during after-school program, (h) number of days active during an after-school program, (i) there are not many people to be active with, and (j) my grandparents play with me a lot.

Parent Validity Results

Parent validity results are presented in Tables 2 and 3. A total of 84 youth survey items had a corresponding parent measure. Of these 58 of the questions were identical in both the youth and parent surveys. Results are presented for both identically and similarly asked questions. Twenty-two (26%) of the 84 items had overall agreement below 70%. Only one bedroom/home feature received low validity (computer/laptop in youth’s bedroom). Two physical activity-related measures, four measures related to why youth do not walk/bike to school, six measures regarding weekend/after-school activities, five measures related to household rules, three measures related to neighborhood perceptions, and one measure related to physical activity support received low validity. The three measures that were validated using street segment observation audits (presence of sidewalks, street lighting, and garbage on the street) all had good validity.

School/Environment Observation Validity Results

School principal and environment observation validity results are presented in Table 4. All measures had 70% of higher agreement between principal reports, school observation audits, and youth responses, which suggest high validity for these items.

Youth Scale Development Results

PCA analyses resulted in the development of 14 scales (see Tables 2 and 3 for items, factor loadings, αs, and ICCs). Three of these scales were previously developed and tested (Forman et al., 2008). All scales had moderate or higher test-retest reliability and three scales had good (α > .70) and five had moderate (α > .60) internal consistency.
| Measures | Youth reliability | Parent validity | Youth response scale development |
|----------|-------------------|-----------------|---------------------------------|
|          | Kappa  | % agreement | % agreement | % yes/true | Factor loading | % var. | ICC  | α   |
| Bedroom features: Electronic media in bedroom (In the room you/your child sleeps in there is a . . . ) Response categories: Yes/No | | | | | | | | |
| Television | .90   | 95   | 97   | 56 | .79  | .44  | .79  | .73 |
| VCR/DVD player | .67   | 86   | 88   | 34 | .70  | —    | —    | —   |
| DVR (digital recording device) | .46   | 88   | 89   | 14 | .50  | —    | —    | —   |
| Music player | .59   | 80   | 73   | 52 | —    | —    | —    | —   |
| Computer/laptop | .69   | 92   | 86   | 16 | .61  | —    | —    | —   |
| Internet connection | .69   | 91   | 92   | 14 | .55  | —    | —    | —   |
| Video game player | .68   | 86   | 87   | 33 | .76  | —    | —    | —   |
| Telephone | .64   | 93   | 93   | 11 | —    | —    | —    | —   |
| Home features: (In my home there is a . . . ) Response categories: True/False | | | | | | | | |
| iPod/MP3 player | .55   | 83   | 73   | 72 | .62  | .37  | .73  | .57 |
| Portable video game player | .72   | 90   | 85   | 76 | .54  | —    | —    | —   |
| Cell phone | .32   | 89   | 95   | 96 | —    | —    | —    | —   |
| Music player | .08   | 88   | 92   | 93 | —    | —    | —    | —   |
| Computer/laptop | .61   | 97   | 32   | 94 | .59  | —    | —    | —   |
| Internet connection | .61   | 93   | 97   | 89 | .66  | —    | —    | —   |
| Video game player | .57   | 92   | 93   | 85 | .63  | —    | —    | —   |
| Telephone | .82   | 93   | 93   | 69 | —    | —    | —    | —   |
| Play equipment: (Do you/does your child have a . . . ) Response categories: Yes/No/I do not have . . . | | | | | | | | |
| Play accessories (scooter, roller blades, etc.) | .69   | 88   | 81   | 74 | .57  | .31  | .86  | .71 |
| Bicycle | .80   | 97   | 90   | 89 | .58  | —    | —    | —   |
| Sports equipment | .53   | 92   | 85   | 88 | .61  | —    | —    | —   |
| Jump rope | .67   | 86   | 66   | — | .46  | —    | —    | —   |
| Active space (play room) | .51   | 77   | 63   | — | .54  | —    | —    | —   |
| Backyard | .88   | 98   | 93   | 90 | .50  | —    | —    | —   |
| Fence | .75   | 88   | 88   | 26 | —    | —    | —    | —   |
| Swimming pool | .72   | 90   | 93   | 14 | .46  | —    | —    | —   |
| Trampoline | .85   | 94   | 93   | 17 | —    | —    | —    | —   |
| Basketball hoop | .86   | 92   | 87   | 40 | .60  | —    | —    | —   |
| Swing set, sandbox, etc. | .79   | 88   | 88   | 45 | .63  | —    | —    | —   |
| Alley | .50   | 85   | 16   | — | —    | —    | —    | —   |
| Physical activity | | | | | | | | |
| Participate on sports team in past year | .67   | 85   | 68   | — | —    | —    | —    | —   |
| Attend after-school program | .53   | 77   | 74   | — | —    | —    | —    | —   |
| Do anything active during program | .44   | 67   | 68   | — | —    | —    | —    | —   |
| # days active in after-school program | .42   | 65   | —    | — | —    | —    | —    | —   |
| Do you usually walk or bike to school | .77   | 91   | 90   | — | —    | —    | —    | —   |
| Reasons why don’t walk/bike to school: Response categories: Check all the reasons you don’t walk or bike to school | | | | | | | | |
| Environment | | | | | | | | |
| No sidewalks/bike lanes | .75   | 89   | 83   | 23 | .79  | .48  | .75  | .68 |
| Too much traffic | .48   | 78   | 58   | 26 | .77  | —    | —    | —   |
| Too far | .70   | 85   | 81   | 48 | .71  | —    | —    | —   |
| Route to school is boring | .47   | 94   | 87   | 4 | .09  | —    | —    | —   |
| No safe place to cross street | .59   | 84   | 51   | 25 | .82  | —    | —    | —   |
| Planning/psychosocial | | | | | | | | |
| Other kids don’t walk/bike to school | .53   | 84   | 70   | 20 | .65  | .42  | .65  | .65 |
| Not cool to walk/bike to school | .58   | 96   | 87   | 5 | .63  | —    | —    | —   |
| Too much stuff to carry | .52   | 85   | 71   | 17 | .72  | —    | —    | —   |
| I get hot/sweaty | .37   | 91   | 86   | 7 | .72  | —    | —    | —   |
| Easier for someone to drive me | .45   | 76   | 67   | 31 | .49  | —    | —    | —   |
| Safety | | | | | | | | |
| Unsafe because of crimes/gangs | .44   | 79   | 68   | 21 | .68  | .40  | .54  | .50 |
| Bullied/people make fun of me | .32   | 96   | 91   | 3 | .63  | —    | —    | —   |
| No bike rack at school | .77   | 94   | 69   | 14 | .52  | —    | —    | —   |
| Loose dogs | .32   | 89   | 83   | 8 | .67  | —    | —    | —   |
| Inactive on weekend: (Think about what you/your child did last weekend. Last weekend did you/your child . . . ) Response categories: Yes/No | | | | | | | | |
| Use computer/Internet for fun | .38   | 70   | 57   | 57 | —    | .47  | .41  | .43 |
| Played video games | .35   | 75   | 80   | 73 | —    | —    | —    | —   |
| Read for fun | .46   | 78   | 68   | 70 | —    | —    | —    | —   |
| Talked/texted on the phone | .51   | 80   | 75   | 30 | .71  | —    | —    | —   |
| Hung out with friends/family | 1.00  | 100  | 78   | 82 | .67  | —    | —    | —   |
| Listened to music | .39   | 69   | 63   | 50 | .67  | —    | —    | —   |

(continued)
Youth reliability and concurrent validity were assessed with a self-administered home, school, and neighborhood physical activity supports questionnaire targeted to low-income minority urban youth and rural youth aged 8 to 11 years. Although the youth survey questions were primarily drawn from existing instruments, these measures had not previously been tested with our targeted vulnerable populations. Thus, this study fills gaps in the existing literature related to the lack of reliable and valid instruments targeted to both rural areas (Brownson et al., 2009) and those that address the needs and conditions of low-income minority urban communities (Floyd et al., 2009), both of which are at increased risk of achieving low levels of moderate-to-vigorous-intensity physical activity (Moore et al., 2013; Trost et al., 2013) and higher rates of overweight and obesity (Janssen et al., 2006; Joens-Matre et al., 2008; Ogden et al., 2010).

**Test-Retest Reliability**

Although kappa results suggest that nearly one third of the survey items had fair to poor agreement, % agreement results...
show that only 10 items had less than 70% agreement between the test and retest. The majority of these items referred to activities respondents may have participated in, such as listening to music or doing arts and crafts after school or on the weekend. These types of activities are more likely to vary from week to week, and thus would naturally be subject to lower reliability. Youth’s % agreement was 80% or higher for nearly all bedroom and home features, and the school-related measures. These results are consistent with previous research examining similar items, where they found good reliability of home physical environments and poor reliability of how social environments (Iannotti et al., 2009; Kerr et al., 2008). For measures related to daily physical activity, results were mixed. We found good reliability for walking or biking to school, weekly physical education and recess, attending an after-school program, and whether they

### Table 3. Youth Physical Activity Reliability and Validity.

| Measures                                                                 | Youth reliability | Validity % | Youth response scale development |
|--------------------------------------------------------------------------|-------------------|------------|---------------------------------|
|                                                                          | Kappa             | % agreement| % agreement | % yes/true | Factor loading | % Var. | ICC | α |
| Active near your home: Neighborhood walkability: (Near my home . . .)     |                   |            |            |            |                |        |     |   |
| Response categories: True/False                                          |                   |            |            |            |                |        |     |   |
| I feel safe walking without an adult³                                   | .44               | .75        | 62         | .83        | .35            | .60    | .64 |
| It is easy to walk or bike³                                             | .37               | .79        | 81         | .63        |                |        |     |   |
| I feel safe crossing the road without adult³                            | .61               | .81        | 80         | .55        | .82            |        |     |   |
| Neighborhood social capital: (Near my home . . .) Response categories: True/False |                   |            |            |            |                |        |     |   |
| There are good places to hang out¹                                      | .38               | .70        | 59         | .49        | .57            | .60    | .61 |
| Other kids my age live near me                                          | .60               | .85        | 68         | .73        | .84            |        |     |   |
| I am friends with kids who live near me¹                                | .71               | .90        | 76         | .76        |                |        |     |   |
| Neighborhood street safety: (Near my home . . .) Response categories: True/False |                   |            |            |            |                |        |     |   |
| There are a lot of cars going up and down the street¹                   | .51               | .77        | 59         | .46        | .76            | .50    | .60 |
| I am worried about loose dog¹                                            | .48               | .81        | 25         | —          |                |        |     |   |
| It’s hard for me to walk or bike because there are no safe place to cross street | .46               | .78        | 31         | .70        |                |        |     |   |
| There are sidewalks or bike lanes²                                      | .47               | .79        | 77²        | 28         |                |        |     |   |
| Streets have good (enough) lighting at night                            | .49               | .75        | 75²        | 53         |                |        |     |   |
| There are a lot of places to be active (e.g., playgrounds, parks, or gyms)³ | .64               | .84        | 55         | 66         |                |        |     |   |
| There is a lot of garbage on the street²                               | .61               | .86        | 76        | 25         | .53            |        |     |   |
| People who live near are nice²                                          | .39               | .91        | 92         | —          |                |        |     |   |
| Being active alone, with friends, or family: Physical Activity barriers: Response categories: True/False |                   |            |            |            |                |        |     |   |
| I like to watch TV/play video games more than I like to be active²     | .45               | .75        | 33         | .64        | .42            | .45    | .30 |
| I think I should be more active²                                       | .49               | .82        | 79         | —          |                |        |     |   |
| I am too busy to be more active²                                       | .29               | .78        | 22         | .72        |                |        |     |   |
| I am not in shape enough to be active²                                  | .39               | .92        | 8          | .57        |                |        |     |   |
| PA support                                                              |                   |            |            |            |                |        |     |   |
| There are many people to be active with²                                | .25               | .63        | 57         | .43        | .25            | .61    | .66 |
| My parent/caregiver wants me to be active²                             | .23               | .81        | 87         | .90        | .50            |        |     |   |
| Parent/caregiver does active things with me²                            | .49               | .74        | 61         | .56        | .65            |        |     |   |
| My friends think being active is fun²                                   | .32               | .84        | 91         | .46        |                |        |     |   |
| My friends think being active is important²                             | .31               | .74        | 73         | .57        |                |        |     |   |
| I can find something fun/active to do²                                   | .29               | .87        | 91         | .43        |                |        |     |   |
| My friends think after-school programs are fun²                         | .36               | .70        | 68         | —          |                |        |     |   |
| My whole family plays together a lot²                                   | .53               | .77        | 45         | .58        |                |        |     |   |
| My dad/stepdad plays with me a lot²                                     | .51               | .74        | 59         | .43        |                |        |     |   |
| My mom/stepmom plays with me a lot²                                     | .60               | .80        | 55         | .46        |                |        |     |   |
| My brothers/sisters play with me a lot²                                 | .58               | .81        | 71         | —          |                |        |     |   |
| My friends play with me a lot²                                          | .40               | .87        | 87         | .41        |                |        |     |   |
| My cousins play with me a lot²                                          | .40               | .87        | 87         | .41        |                |        |     |   |
| My grandparents/step grandparents play with me a lot²                   | .48               | .65        | 26         | —          |                |        |     |   |

Note. ICC = intra-class correlation coefficient.
²ICCs were calculated for these measures.
³Parents and youth were asked different questions regarding the same measure.
⁴Parents were not asked these questions because they are designed to capture the youth’s perceptions/opinions.
⁵Kappa not calculated because there was no variation in the responses.
⁶Validity calculated with Street Segment Observation data.
Table 4. Youth Reliability and School Administrator/Observation Assessment Validity Results.

| Measures                        | Youth reliability | School-related validity % |
|---------------------------------|-------------------|---------------------------|
| # Days/week have Physical Education | .83 .92          | 81%                       |
| # Days/week have Recess         | .88 .90          | 90%                       |
| # Times/day have Recess         | .27 .76          | 71%                       |
| School facility features: (Does your school have any of these? My school has . . . ) Response categories: Yes/No/Don’t know |
| Basketball hoops                | .53 .86          | 74%                       |
| Blacktop games                  | .60 .78          | 70%                       |
| Grassy field                    | −.01 .99         | 98%                       |
| Soccer goals                    | .52 .85          | 73%                       |
| Running or walking track        | .51 .84          | 79%                       |
| Climbers                        | .44 .86          | 81%                       |
| Swings                          | .53 .86          | 74%                       |
| Play accessories                | .60 based on adolescent self-report, and we found consistent on weekends received low validity scores. It is quite possible parents are not aware of all the activities their children undertake during their free time, even if that free time occurs at home. There were also a number of measures related to the reasons why youth do not walk or bike to school that had low validity scores. It is possible that parents/guardians and youth have different perceptions regarding why youth do not walk or bike to school. Parents/guardians and youth also differed in their responses to some of the household rules. It is possible that either youth and parents have different perceptions of what the household rules are, or some parental/guardian surveys were subject to bias, suggesting their responses reflect the perceived desired rather than the actual rules practiced in their home.

The remaining measures with lower validity related to physical activities and perceptions of neighborhood environments. Youth and adults may have different perceptions of what defines “a lot of cars” or what living near a park means. Children may think a park is far if it is not across the street or at the end of the block. Adults may define near as being located within a quarter mile to home. These results suggest important distinctions in youth’s perceptions of their larger neighborhood environment. Divergence in youth and parent perceptions regarding neighborhoods and household rules should be explored in future research. Finally, parent and youth responses had a lower validity score on participation on a sports team. Percent agreement for youth was high suggesting participants understood the measure. However, it is important to mention, the wording of parents’ and youth’s questions varied. Youth were asked about participation in the past year and parents were asked about current participation. It is possible that some children had played on a sports team previously in the year, but were not currently playing a sport at the time of the survey, which could account for the lower validity score. Thus, overall results suggest that youth as young as 8 years old can reliably and validly report on their home, school, and neighborhood physical activity-related features and some physical activity-related measures.

Youth Scale Development

The results were mixed for internal consistency testing of the youth self-report scales. Scales related to youth’s bedroom features, play equipment, and rules in the home were good. Scales related to neighborhood walkability (including walking/biking to school), social capital, and PA support were also acceptable. Scales related to availability of electronic features in the home, sedentary behavior, perceived neighborhood street safety, and PA barriers showed poor internal consistency. Only Forman et al. (2008) also developed and tested sub-scales of their survey items. Environment, psychosocial, and safety sub-scales were developed using questions related to why youth do not walk or bike to school. Results of this comparison study showed ICCs of .75, .64, .60 based on adolescent self-report, and we found consistent
results with .75, .65, .54 ICCs respectively. For the sedentary behavior scales, some of this may be attributable to inverse relationships between the activities, where the participants maybe engaged in one activity or the other at a given time. In general, the sedentary behavior measures appear to primarily be capturing information on independent or conceptually different behaviors. For example, reading had very low factor loadings in all sedentary behavior scales. For the final three scales, the prevalence of youth who worried about street safety or PA barriers was low, which may have impacted the results of the scale development. The relevance of the measures included in the safety scales may differ across rural and urban settings, which may also impact the results of the scales. Additional research and testing with larger samples may be needed for these measures.

Strengths and Limitations

The study targeted two vulnerable populations at risk for high levels of inactivity and prevalence of obesity. The study proved reliable and valid for both urban and rural environments, as well as single and multi-family (e.g., apartment buildings) dwellings. We drew upon existing surveys shown to have good reliability and validity and then appropriately tailored those measures to the targeted populations. Finally, the survey instrument captured information on multiple environments (home, school, and neighborhood) and included a large number of questions.

It is also important to note some limitations of the study. The study sample was relatively small with a total of 205 parent/child dyads clustered around six schools or six neighborhood environments. We also did not conduct follow-up interviews with non-responders for the retest survey to determine their reasons, for example, the survey was too long, for failing to complete the full study. Finally, the study was conducted in a total of four municipalities all located in one state. However, the questions were drawn from surveys developed in other regions of the country, as well as other countries, thus the risk of questions not being generalizable to other areas should be minimized. Finally, although we selected three rural areas, they do not represent all possible levels or rurality, and again results may not be generalizable to all rural areas.

Conclusion

To our knowledge, this is the first study to assess the test-retest reliability and validity of a self-report survey on home, school, and neighborhood environments in a sample of both rural and racially and socioeconomically diverse urban children between the ages of 8 and 12 years. Results of the study showed acceptable test-retest reliability and concurrent validity on most measures. Our results are also consistent with other studies that administered similar surveys only to urban youth and adolescent populations (Iannotti et al., 2009; Kerr et al., 2008). Results of the study suggest that youth who participated in this study can reliably provide information on their home, school, and neighborhood built environments and this self-report survey provides a promising and potentially lower cost method of obtaining important environment determinants of physical activity among vulnerable populations of children. This survey, or sub-sections, can also be used to help identify opportunities for schools and communities to develop strategies to encourage youth to be more physically active. The survey can also be used to develop home-based interventions to increase youth physical activity.

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