Development and Testing of a Community Stakeholder Park Audit Tool

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Background: Parks are valuable community resources, and auditing park environments is important for understanding their influence on physical activity and health. However, few tools exist that engage citizens in this process.

Purpose: The purpose of this study was to develop a user-friendly tool that would enable diverse stakeholders to quickly and reliably audit community parks for their potential to promote physical activity. A secondary aim was to examine community stakeholders' reactions to the process of developing and using the new tool.

Methods: The study employed a sequential, multiphase process including three workshops and field testing to ensure the new instrument was the product of input and feedback from a variety of potential stakeholders and was psychometrically sound. All study stages, including data collection and analysis, occurred in 2010.

Results: Stakeholder recommendations were combined with reviews of existing instruments to create the new Community Park Audit Tool (CPAT). The CPAT contains four sections titled Park Information, Access and Surrounding Neighborhood, Park Activity Areas, and Park Quality and Safety. Inter-rater analyses demonstrated strong reliability for the vast majority of the items in the tool. Further, stakeholders reported a range of positive reactions resulting from their engagement in the project.

Conclusions: The CPAT provides a reliable and user-friendly means of auditing parks for their potential to promote physical activity. Future use of the CPAT can facilitate greater engagement of diverse groups in evaluating and advocating for improved parks and overall healthy community design.

(Am J Prev Med 2012;42(3):242–249)

Physical activity is an important societal issue, and population-level approaches are necessary to affect public health outcomes.[1–3] Social ecological models and behavior settings theory emphasize that in addition to individual and interpersonal factors, the availability and characteristics of elements of the built environment exert a strong influence on health behaviors.[4–7] Parks are acknowledged as important environmental resources for physical activity,[8–10] but they can vary dramatically with respect to size, shape, available facilities and amenities, quality, safety, and neighborhood context. Indeed, several studies suggest that the features of a park are highly important in determining its use for physical activity.[11–13] For example, trails have been associated with adult physical activity[11,14] and playgrounds with youth physical activity,[15,16] whereas other attributes such as restrooms, drinking fountains, lighting, and shade have also been found to be important.[17–19]

Methods for evaluating active living environments have advanced rapidly, and observational audits are the best option when assessing the presence and quality of certain neighborhood attributes.[20] Several tools for auditing parks have been developed,[13,21–25] although the reported use of each has been limited to date.[11,26–28] Table 1 provides a summary, based on a review by the authors, of the attributes of prominent park-related audit tools (for further information on each tool, readers are referred to the original sources).

Despite each possessing numerous redeeming qualities, existing tools all contain shortcomings in that they

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0749-3797/$36.00
doi: 10.1016/j.amepre.2011.10.018

Table 1. Summary of existing park audit tools

Audit tool	Use setting	Length (pages [items])	Completion time (minutes)	Park quality	Youth-oriented	Developed with stakeholders	Tested with stakeholders
BRAT-DO	Parks	16 (181)	Not available	Yes	Somewhat	Some	No
EAPRS	Parks	47 (646)	M: 67 Range: 10–258	Yes	Somewhat	Some	No
PARA	Various resources	1 (49)	M: 10 Range: up to 30	Limited	No	No	No
POST	Parks, ovals	2.5 (88)	Not available	Limited	No	Some	No
RFET	Various facilities	5 (61)	M: 20	Limited	No	No	No
SAGE	Various green spaces	2.5 (96)	Not available	Limited	No	No	No
SHAPE	Parks	1 (20)	Not available	Yes	No	Some	No

BRAT-DO, Bedimo–Rung Assessment Tools–Direct Observation[21]; EAPRS, Environmental Assessment of Public Recreation Spaces[23]; PARA, Physical Activity Resource Assessment[22]; POST, Public Open Space Audit Tool[13]; RFET, Recreation Facility Evaluation Tool[25]; SAGE, Systematic Audit of Green Space Environments[24]; SHAPE, Safe, Healthy, and Attractive Public Environments (unpublished Kansas City MO Parks and Recreation Department park maintenance audit tool)

were not designed with an explicit eye toward youth physical activity, were not developed or tested with varied stakeholders, and/or are too lengthy for practical use by community members and nonresearchers. Brownson et al.[20] suggested that "simplified observational measures of parks . . . can be created from existing measures. Creating practical measures for community groups should be a goal for researchers" (p. 120).

See Commentary by Floyd in this issue.

The comprehensive EAPRS instrument, for example, was developed via an extensive Delphi process asking park directors and users about park See Commentary by Floyd in this issue. elements that are important for physical activity, but its length may be perceived as daunting and stakeholders from other fields were not involved.[23] Further, to our knowledge, none of the existing tools have been tested for reliability with diverse community stakeholders. Additionally, only the two lengthier tools were at least somewhat youth-oriented in that they sufficiently captured park elements important to youth physical activity (e.g., details of playgrounds, family-friendly features).

In addition to accurate measurement, developing activity-friendly neighborhoods requires support from multiple constituencies.[29] This can be advanced by involving diverse groups in evaluating, advocating for, and promoting improved accessibility and design of community parks. Indeed, "the incorporation of reliable observational measures into health advocacy efforts should be encouraged to provide an evidence base for advocacy" (p. 120).[20] This broader citizen engagement in active living research will facilitate not only the fair treatment component of environmental justice (i.e., equal access to quality park environments) but also individuals and groups having an opportunity to be meaningfully involved in actions related to their health.[30,31] Thus, the purpose of this paper is to describe the development and testing of a user-friendly tool that can enable diverse stakeholders to quickly and reliably audit community parks for their potential to promote physical activity. A secondary aim was to examine community stakeholders' reactions to the process of developing and using the new tool.

Methods

Design

The present study was conducted in collaboration with the Kansas City, Missouri Parks and Recreation Department (KCMOPARD) and approved by the IRBs at Kansas State University and the University of Missouri. The seven project stages included: (1) review of existing park audit tools to evaluate their user-friendliness and suitability to youth physical activity and the domains and specific items each covers; (2) planning workshop engaging community stakeholders in the process of developing a park audit tool that emphasizes youth physical activity and use by nonresearchers; (3) development of a new park audit tool using information gathered in Stages 1 and 2; (4) training workshop with stakeholders to present the new tool and to train participants in its use for field testing; (5) testing of the tool, including interrater reliability analyses for all items; (6) evaluation workshop with stakeholders to gain feedback on the tool's usability and suggestions for disseminating it; and (7) dissemination of the tool locally and nationally to academic, professional, and lay audiences. The first six stages, including data collection and analysis, occurred in 2010.

Participants

With the assistance of KCMOPARD, representatives from prominent agencies and demographic groups with an interest in health and/or youth from across the KC metro area were recruited to participate in the study. Individuals were contacted with an initial project introduction letter from KCMOPARD and a follow-up e-mail from the study team. From an original list of 42 people, 34 stakeholders (14 male, 20 female; 32 adults, two teenagers) agreed to participate. These included representatives from public health, parks and recreation, planning, nonprofit agencies, youth agencies, education, business associations, municipal legislators, academia, and adult and youth park users and nonusers.

Tool Development

Creation of the new park audit tool was informed by a review of existing instruments (Stage 1), focus group discussions during the initial workshop with stakeholders (Stage 2), and three key informant interviews with researchers familiar with audit tools. The detailed content analysis covered six major existing audit tools, as well as KCMO's own SHAPE park maintenance rating tool (Table 1). The analysis identified all domains and subelements covered within existing instruments and the rating scales used to evaluate each item, as well as any available information on the reliability of specific items.

The initial workshop focus group discussions ($n = 24$) were each approximately 30 minutes and were focused on four primary topics: (1) park elements conducive to facilitating physical activity; (2) special considerations for promoting youth physical activity; (3) characteristics of a user-friendly audit tool; and (4) strengths and weaknesses of existing park audit tools. For each topic, the participants were divided into six groups of five to six individuals. The key informant interviews were 30–60 minutes and focused on the same topics. Following established guidelines,[32] all data were transcribed, coded by two reviewers, and subsequently used to develop a comprehensive yet parsimonious new audit tool. The draft tool was then reviewed and tested in a single park by stakeholders (Stage 4) and revised for content and clarity.

Study Area and Data Collection

The KCMO park system contains 219 parks that vary in size (0.09–1805 acres), geography (urban/suburban), neighborhood composition (e.g., income), quality (e.g., landscaping), safety (e.g., lighting), and availability of active (e.g., playground) and passive (e.g., picnic shelter) facilities and supporting amenities (e.g., restroom).[33] A sample of 66 parks was selected in which to test the new tool (Stage 5). Parks were chosen to maximize diversity with respect to location, size, key features, quality, and neighborhood income and racial composition. All project stakeholders were randomly assigned to each other and to three to 12 parks each. Provided with park addresses and maps, the stakeholders undertook the park audits independently and received $20 per hour for completing and returning their park audit forms. For seven parks, completed audits were received from only one stakeholder, often because of an inability to find or get to a park or personal time constraints. This resulted in a final sample of 59 pairs of ratings for use in the present analyses. Selected characteristics of the 59 parks are shown in Table 2.

A final workshop (Stage 6) was held to gain feedback on the stakeholder experience developing and using the tool and how it

Table 2. Characteristics and number of study parks

Characteristics	*n* (%)
Total	59 (100)
Size (acres)	
0.1–4.99	15 (25.4)
5–9.99	13 (22.0)
10–14.99	11 (18.7)
≥20	20 (33.9)
Selected park facilities	
Green space	56 (94.9)
Playground	38 (64.4)
Trail	32 (54.2)
Baseball field	26 (44.1)
Basketball court	17 (28.8)
Sport field	14 (23.7)
Tennis court	10 (16.9)
Lake	7 (11.9)
Splash pad	4 (6.8)
Swimming pool	3 (5.1)
Selected park amenities	
Car parking	57 (96.6)
Trash can	45 (76.3)
Benches	44 (74.6)
Picnic table	37 (62.7)
Lights	25 (42.4)
Shade	24 (40.7)
Picnic shelter	17 (28.8)
Restroom	13 (22.0)
Bike rack	4 (6.8)
Drinking fountain	4 (6.8)
Park quality[a]	
Low (0.00–0.74)	20 (33.9)
Medium (0.75–0.99)	18 (30.5)
High (1.00)	21 (35.6)
Location by district	
North	24 (40.7)
Central	18 (30.5)
South	17 (28.8)

(continued on next page)

Table 2. *(continued)*

Characteristics	*n* (%)
Neighborhood income (quartile)[b,c]	
Lowest	12 (20.7)
Second	16 (27.6)
Third	16 (27.6)
Fourth	14 (24.1)
Neighborhood minority population (%)[c]	
0–24	28 (47.5)
25–49	10 (16.9)
50–74	5 (8.5)
75–100	16 (27.1)

[a]Calculated based on average SHAPE maintenance rating from 2009 and 2010 (range=0–1.00)
[b]Income quartiles ($): 8,442–31,960; 31,961–41,737; 41,738–57,828; and 57,829–229,333
[c]Neighborhood income and minority proportion are based on data from the 2000 census for the tract containing each park's centroid.
SHAPE, Safe, Healthy, and Attractive Public Environments (unpublished Kansas City MO Parks and Recreation Department park maintenance audit tool)

could be disseminated and used in future. As part of this, a one-page survey was administered at the conclusion of the workshop. Two scale questions on the survey asked whether their perceptions of the importance of the built environment and parks for physical activity had improved over the course of the workshops (1 = not improved, 4 = improved a lot). Three open-ended questions asked about their experience participating in the tool development and testing process, the value of such a process for other community groups, and the utility of the tool as a resource for community members.

Analysis

Kappa and percent agreement statistics were used to examine the inter-rater reliability of all items in the new tool. Kappa accounts for chance agreement between raters and was interpreted using established guidelines.[34] Percent agreement is more appropriate when little variability exists among ratings (e.g., all playgrounds in good condition), and was considered acceptable if greater than 70%.[35] Items that performed poorly were either removed or modified based on feedback from the auditors gained in the final workshop. Finally, descriptive statistics were used to summarize the quantitative data collected via the survey during the final workshop. The qualitative data from the workshop discussions and open-ended survey questions about developing and using the new tool were analyzed by two of the authors for emergent themes using constant-comparison coding methods.[36]

Results

During the instrument development phase, stakeholders identified numerous points related to the themes of interest. First, for park elements conducive to facilitating physical activity, it was noted that the tool should capture the presence of a wide range of facilities (e.g., trail, ball diamond) and supporting amenities (e.g., restroom), as well as the condition of these and the ability of visitors to access and use them. Likewise, attributes related to comfort (e.g., drinking fountains); safety (e.g., lighting); quality (e.g., litter); and access (e.g., public transportation) were also important. Second, specific considerations related to youth included such things as fencing, vandalism, graffiti, traffic, shade, and separation between activity areas. Finally, desired qualities in a user-friendly audit tool included a length of two to eight pages or 15–60 minutes (to balance depth and parsimony), simple question response formats, space for subjective comments, and directions within the tool that were easy to follow and required minimal training.

These considerations were combined with a review of existing instruments to create the new Community Park Audit Tool (CPAT). The full CPAT (Appendix A, available online at www.ajpmonline.org) contains four sections titled Park Information, Access and Surrounding Neighborhood, Park Activity Areas, and Park Quality and Safety. An accompanying guidebook containing more detailed information and definitions was also developed to provide minimal training. In total, the tool spans six pages (including a half-page of instructions and tips and directions throughout) and is largely designed with dichotomous (yes/no) or ordinal (all/some/none) response formats. The completion time when used in diverse parks (1.1–193.2 acres) by stakeholders ranged from 10 to 65 minutes (depending on the size of a park and its observable features), with an average of 32 minutes per audit.

Inter-rater analyses demonstrated a high degree of reliability for the vast majority of the 140 items (Table 3). For ten items (all related to sub-elements of uncommon park activity areas [e.g., condition of a skate park or dog park]), reliability could not be assessed because less than three pairs of ratings were available.[23] In the rest of the tool, for all but four items, percent agreement between the two auditors exceeded 70%, with most items well above 80%–90%. For 56 items, kappa could not be calculated or was inappropriate because of low variability. However, only eight of the remaining 64 items had a kappa less than 0.40 (suggesting poor to fair agreement). Lower-reliability items were often related to subjective or temporally variable elements in the Park Quality and Safety section, such as noise and lighting coverage. During the final workshop, these issues were discussed, and stakeholders provided feedback about tool items or guidebook definitions that could be revised or clarified (e.g., better defining an "external trail"; distinguishing different types of bike

Table 3. Reliability of community park audit tool items, kappa statistic

Tool section	Total items	Reliability not assessed	Poor (0.00–0.19)	Fair (0.20–0.39)	Moderate (0.40–0.59)	Substantial (0.60–0.79)	Almost perfect (0.80–1.00)	Not applicable	>70%	<70%
Access and surrounding neighborhood	38	0	1	1	4	15	2	15	38	0
Park activity areas	52	10	0	0	5	8	5	24	40	2
Park quality and safety	50	0	0	6	4	13	10	17	48	2
Total	140	10	1	7	13	36	17	56	126	4

Note: Final two columns show percent agreement.

lanes). After such modifications, given their theoretic importance for park-based physical activity, many of these items were retained for further testing.

Finally, during the concluding survey, 83% of stakeholders reported that their perceptions of the importance of both the built environment and parks for promoting physical activity had improved "moderately" or "a lot" over the course of the project. When asked about the process and utility of the tool, participants spoke of networking and community-building impacts of the tool development process: "The process encourages and fosters a sense of togetherness, team building, and community." Additionally, they indicated the tool helps increase understanding of the importance of parks for physical activity: "It broadens awareness." Finally, they thought the tool will be useful for advocacy efforts: "It provides a nice vehicle for engaging grassroots citizens and constituents in a reasonably manageable process by which to assess parks and what they offer."

Discussion

Parks are important resources, but their full potential for promoting physical activity may yet be unrealized.[37] Creation of a briefer, user-friendly tool that has been developed, tested, and disseminated with a wide range of community stakeholders can facilitate greater participation by individuals and groups interested in investigating and advocating for parks and improved active-living environments.[20] Given its content validity and tested reliability and feasibility, the CPAT helps to fulfill this mandate.

At six pages in length and 32 minutes to complete on average, the CPAT fits within the page-length and use-duration guidelines recommended by stakeholders. It also balances concerns related to length voiced about lengthy researcher-oriented tools with anxieties about key park elements that shorter tools may be missing. Likewise, it includes numerous instructions and examples within the tool itself and questions with simplified response formats, two other suggestions emphasized during the first workshop.

Further, as a result of the comprehensive development process involving reviews of existing tools, key informant interviews, and multiple workshops with stakeholders, the CPAT is content valid and captures several types of elements (e.g., park quality, youth-oriented features) frequently not rated in other brief instruments. It also compares favorably with conceptual models about elements of parks that are important for physical activity.[8,10] Most importantly, though, unlike past tools largely designed for researchers, the CPAT was developed and tested with

community stakeholders from a variety of disciplines and fields.

Field testing among stakeholders showed strong inter-reliability for all tool components. The current findings are similar to those described in another study involving community members who conducted audits of street segments.[38] The fact that the CPAT was developed with considerable input from non-academic parties undoubtedly contributed to its reported ease of use and demonstrated reliability among stakeholders. Nevertheless, disparate interpretations of terms (e.g., bike lane) or varying frames of reference (e.g., poor maintenance) led to some minor confusion for a small minority of items that were subsequently clarified. Such issues reinforce the decision to, wherever possible, provide definitions and instructions on the tool itself, simplified rating scales, and an accessible guidebook as a backup reference.

On-site audits provide a means to measure detailed attributes of physical activity environments not catalogued in electronic databases. The use of such tools to engage community members in research and evaluation has also been shown to be a feasible and reliable approach.[38,39] Nevertheless, other practical methods for capturing environmental characteristics, including those within parks, also merit consideration. For example, Taylor et al.[40] described the use of Google Earth Pro to examine the quality of public open spaces. The authors reported that audits took considerably less time to complete when done online rather than on-site and that the two methods provided comparable information. However, numerous important items in the on-site audit tool (e.g., restrooms, drinking fountains, public transit access, neighborhood visibility) could not be assessed accurately or at all via remote imagery because of poor resolution and other limitations of the online system. As well, satellite images are not available for all areas (or may be obscured by tree cover, especially in parks) and how current such images are is usually unknown. Future research should explore how evolving technology and direct observation can be combined to both make active living research more interesting and accessible to average citizens and to gather the best information possible about the characteristics of park environments.

A growing body of literature suggests that capturing the characteristics of nearby parks is central to understanding their impact on park-based[11,19,41] and total[15,17] physical activity. However, it may be that perceptions of park attributes (e.g., safety, quality) are just as or more important than audited features. Moreover, objectively and subjectively measured proximity to parks often do not agree[42–45] and some research suggests that residents are uninformed about the features of parks within their community.[46] Therefore, involving residents in a process of evaluating neighborhood parks may facilitate not only outcomes related to engagement and advocacy but also awareness of local resources and how they may be used for physical activity.

Limitations

The goal for the current study of developing a user-friendly tool meant that certain concessions with respect to the length and complexity of the tool were necessary. Therefore, the CPAT is not as detailed as some existing tools designed for researchers (although it is more comprehensive than others) and the primarily dichotomous response options may reduce the variability in ratings. The CPAT was also tested across only 59 parks in a single city. As well, certain facilities and amenities were less prevalent in parks in the current study and therefore fewer pairs of ratings were available on which to test the inter-rater reliability of those items. Further, the stakeholders heralded from diverse fields, but almost all were adults and well educated (based on their employment positions). Finally, the stakeholders who tested the tool were involved in its development, which may have positively influenced the reliability of the ratings obtained. Future testing of the CPAT in diverse settings and with diverse groups should help to overcome these limitations.

Conclusion

The CPAT provides a reliable and user-friendly means of auditing parks for their potential to promote physical activity. Future research should test the CPAT with varied populations (including youth) and explore how using such tools can facilitate citizens' cognitive and behavioral responses related to knowledge, attitudes, and advocacy. For example, a recent study in two low-income urban neighborhoods found that the PARA was a useful needs assessment and program planning tool that facilitated familiarity with the local built and social environment; however, residents also noted several key objective (e.g., sidewalks) and subjective (e.g., bullying) attributes not captured by the tool.[39] In general, it is hoped that the CPAT and tools like it will facilitate greater engagement of diverse groups in considering, evaluating, and advocating for improved parks and overall healthy community design.

The present study was funded by a grant from Active Living Research, a national program of the Robert Wood Johnson Foundation. We thank Drs. Christine Hoehner, Andrew Mowen, and Brian Saelens for their advice and support throughout the project. Katherine Vaughan also contributed immensely to

the success of the study. In addition, the Kansas City Parks and Recreation Department continues to be an invaluable partner in our research on parks and physical activity. Finally, we express our deep gratitude to the many Kansas City–area stakeholders for their contributions to developing and testing the CPAT.

No financial disclosures were reported by the authors of this paper.

References

1. Kumanyika SK, Obarzanek E, Stettler N, et al. Population-based prevention of obesity: the need for comprehensive promotion of healthful eating, physical activity, and energy balance: a scientific statement from American Heart Association council on epidemiology and prevention, interdisciplinary committee for prevention (formerly the expert panel on population and prevention science). Circulation 2008;118(4): 428–64.
2. Sacks G, Swinburn B, Lawrence M. Obesity policy action framework and analysis grids for a comprehensive policy approach to reducing obesity. Obes Rev 2009;10(1):76–86.
3. Huang TT, Glass TA. Transforming research strategies for understanding and preventing obesity. JAMA 2008;300(15):1811–3.
4. Sallis JF, Owen N, Fisher EB. Ecological models of health behavior. In: Glanz K, Rimer BK, Viswanath K, eds. Health behavior and health education: theory, research, and practice. 4th ed. San Francisco CA: Jossey-Bass, 2008:465–85.
5. Saelens BE, Handy SL. Built environment correlates of walking: a review. Med Sci Sports Exerc 2008;40(7S):S550–S566.
6. Sallis JF, Bauman A, Pratt M. Environmental and policy interventions to promote physical activity. Am J Prev Med 1998;15(4):379–97.
7. Wicker AW. Behavior settings reconsidered: Temporal stages, resources, internal dynamics, context. In: Stokols D, Altman I, eds. Handbook of environmental psychology. New York: Wiley, 1987: 613–53.
8. Bedimo-Rung AL, Mowen AJ, Cohen DA. The significance of parks to physical activity and public health: a conceptual model. Am J Prev Med 2005;28(2S2):159–68.
9. Kaczynski AT, Henderson K. Environmental correlates of physical activity: a review of evidence about parks and recreation. Leis Sci 2007;29(4):315–54.
10. Loukaitou-Sideris A, Sideris A. What brings children to the park? Analysis and measurement of the variables affecting children's use of parks. J Am Plann Assoc 2010;76(1):89–107.
11. Kaczynski AT, Potwarka LR, Saelens BE. Association of park size, distance, and features with physical activity in neighborhood parks. Am J Public Health 2008;98(8):1451–6.
12. Sugiyama T, Francis J, Middleton NJ, Owen N, Giles-Corti B. Associations between recreational walking and attractiveness, size, and proximity of neighborhood open spaces. Am J Public Health 2010; 100(9):1752–7.
13. Giles-Corti B, Broomhall MH, Knuiman M, et al. Increasing walking: how important is distance to, attractiveness, and size of public open space? Am J Prev Med 2005;28(2S2):169–76.
14. Reed JA, Arant CA, Wells P, Stevens K, Hagen S, Harring H. A descriptive examination of the most frequently used activity settings in 25 community parks using direct observation. J Phys Act Health 2008;5(S1):183–95.
15. Timperio A, Giles-Corti B, Crawford D. Features of public open spaces and physical activity among children: findings from the CLAN study. Prev Med 2008;47(5):514–8.
16. Potwarka LR, Kaczynski AT, Flack AL. Places to play: association of park space and facilities with healthy weight status among children. J Community Health 2008;33(5):344–50.
17. Cohen DA, Ashwood JS, Scott MM, et al. Public parks and physical activity among adolescent girls. Pediatrics 2006;118(5):e1381–9.
18. McCormack GR, Rock M, Toohey AM, Hignell D. Characteristics of urban parks associated with park use and physical activity: a review of qualitative research. Health Place 2010;16(4):712–26.
19. Kaczynski AT, Havitz ME. Examining the relationship between proximal park features and residents' physical activity in neighborhood parks. J Park Recreat Admin 2009;27(3):42–58.
20. Brownson RC, Hoehner CM, Day K, Forsyth A, Sallis JF. Measuring the built environment for physical activity: state of the science. Am J Prev Med 2009;36(4S):S99–S123.
21. Bedimo-Rung AL, Gustat J, Tompkins BJ, Rice J, Thompson J. Development of a direct observation instrument to measure environmental characteristics of parks for physical activity. J Phys Act Health 2006;3(S1):S176–S189.
22. Lee RE, Booth KM, Reese-Smith JY, Regan G, Howard HH. The physical activity resource assessment (PARA) instrument: Evaluating features, amenities and incivilities of physical activity resources in urban neighborhoods. Int J Behav Nutr Phys Act 2005;2:13.
23. Saelens BE, Frank LD, Auffrey C, Whitaker RC, Burdette HL, Colabianchi N. Measuring physical environments of parks and playgrounds: EAPRS instrument development and inter-rater reliability. J Phys Act Health 2006;3(S1):S190–S207.
24. Byrne J, Wolch J, Swift J, Ryan C. SAGE (Systematic Audit of Greenspace Environments): audit form and instructions. University of Southern California Center for Sustainable Cities, Los Angeles CA, 2005.
25. Cavnar MM, Kirtland KA, Evans MH, et al. Evaluating the quality of recreation facilities: developing an assessment tool. J Park Recreat Admin 2004;22(1):96–114.
26. Colabianchi N, Maslow AL, Swayampakala K. Features and amenities of school playgrounds: a direct observation study of utilization and physical activity levels outside of school time. Int J Behav Nutr Phys Act 2011;8:32.
27. Rung AL, Broyles S, Mowen AJ, Gustat J, Sothern MS. Escaping to and being active in neighborhood parks: park use in a post-disaster setting. Disasters 2011;35(2):383–403.
28. Sister C, Wolch J, Wilson J. Got green? Addressing environmental justice in park provision. GeoJournal 2010;75(3):229–48.
29. Sallis JF, Cervero RB, Ascher W, Henderson KA, Kraft MK, Kerr J. An ecological approach to creating active living communities. Annu Rev Public Health 2006;27:297–322.
30. Taylor WC, Floyd MF, Whitt-Glover MC, Brooks J. Environmental justice: a framework for collaboration between the public health and parks and recreation fields to study disparities in physical activity. J Phys Act Health 2007;4(S1):S50–S63.
31. Floyd MF, Taylor WC, Whitt-Glover M. Measurement of park and recreation environments that support physical activity in low-income communities of color: highlights of challenges and recommendations. Am J Prev Med 2009;36(4S):S156–S160.
32. Patton MQ. Qualitative research and evaluation methods. Thousand Oaks CA: Sage, 2002.
33. Board of Parks and Recreation Commissioners. Kansas City, Missouri Parks and Recreation Reference Book. www.kcmo.org/idc/groups/parksandrec/documents/parksrecreation/09refbook.pdf.
34. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics 1977;33(1):159–74.
35. Boarnet MG, Day K, Alfonzo M, Forsyth A, Oakes M. The Irvine-Minnesota inventory to measure built environments: reliability tests. Am J Prev Med 2006;30(2):153–9.
36. Glaser B, Strauss A. The discovery of grounded theory. Hawthorne NY: Aldine Publishing Company, 1967.

37. Mowen A, Kaczynski AT, Cohen DA. The potential of parks and recreation in addressing physical activity and fitness. President's Council on Physical Fitness and Sports Research Digest 2008;9(1):1–8.
38. Hoehner CM, Ivy A, Ramirez LK, Handy S, Brownson RC. Active neighborhood checklist: a user-friendly and reliable tool for assessing activity friendliness. Am J Health Promot 2007;21(6):534–7.
39. DeBate RD, Koby EJ, Looney TE, et al. Utility of the physical activity resource assessment for child-centric physical activity intervention planning in two urban neighborhoods. J Community Health 2011; 36(1):132–40.
40. Taylor BT, Fernando P, Bauman AE, Williamson A, Craig JC, Redman S. Measuring the quality of public open space using Google earth. Am J Prev Med 2011;40(2):105–12.
41. Perry CK, Saelens BE, Thompson B. Rural Latino youth park use: characteristics, park amenities, and physical activity. J Community Health 2011;36(3):389–97.
42. Boehmer T, Hoehner C, Wyrwich K, Ramirez LKB, Brownson R. Correspondence between perceived and observed measures of neighborhood environmental supports for physical activity. J Phys Act Health 2006;3(1):22–36.
43. Kirtland KA, Porter DE, Addy CL, et al. Environmental measures of physical activity supports: perception versus reality. Am J Prev Med 2003;24(4):323–31.
44. Macintyre S, Macdonald L, Ellaway A. Lack of agreement between measured and self-reported distance from public green parks in Glasgow, Scotland. Int J Behav Nutr Phys Act 2008;5:26.
45. Lackey KJ, Kaczynski AT. Correspondence of perceived vs. objective proximity to parks and their relationship to park-based physical activity. Int J Behav Nutr Phys Act 2009;6:53.
46. Spotts D, Stynes D. Public awareness and knowledge of urban parks: a case study. J Park Recreat Admin 1984;2(4):1–12.

Appendix

Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.amepre.2011.10.018.