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Do features of public open spaces vary between urban and rural areas?

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Abstract

Objective: Parks are an important setting for physical activity and specific park features have been shown to be associated with park visitation and physical activity. Most park-based research has been conducted in urban settings with few studies examining rural parks. This study examined differences in features of parks in urban compared with rural areas.

Methods: In 2009/10 a tool was developed to audit 433 urban and 195 rural parks located in disadvantaged areas of Victoria, Australia. Features assessed included: access; lighting/safety; aesthetics; amenities; paths; outdoor courts/ovals; informal play spaces; and playgrounds (number, diversity, age appropriateness and safety of play equipment).

Results: Rural parks scored higher for aesthetics compared with urban parks (5.08 vs 4.44). Urban parks scored higher for access (4.64 vs 3.89), lighting/safety (2.01 vs 1.76), and diversity of play equipment (7.37 vs 6.24), and were more likely to have paths suitable for walking/cycling (58.8% vs 40.9%) and play equipment for older children (68.2% vs 17.1%).

Conclusion: Although the findings cannot be generalized to all urban and rural parks, the results may be used to inform advocacy for park development in rural areas to create parks that are more supportive of physical activity for children and adults.

Introduction

Recent evidence suggests that geographic location may be an important correlate of participation in physical activity. In the US, studies among adults have shown a disparity in overall physical activity between rural and urban areas, with rural residents less likely to meet US physical activity (Parks et al., 2003) and leisure-time recommendations (Reis et al., 2004). Fewer studies have examined differences in overall activity levels among children residing in rural and urban areas, and existing evidence is mixed. Joens-Martre et al. (2008) and Simen-Kapeu et al. (2010) found from self-report that rural children aged 10-11 years were more active than urban children, while other studies have found no significant differences (Bruner et al., 2008; Davis et al., 2008). There is more consistent evidence of urban/rural differences in overweight and obesity, with consistently higher rates found amongst rural children and adults (Bruner et al., 2008; Cleland et al., 2010; Joens-Matre et al., 2008).

Urban/rural differences in physical activity behaviour and in overweight and obesity may be at least partly attributable to differences in environmental supports for physical activity in urban and rural areas, such as availability and quality of parks. There is a growing body of literature identifying links between neighborhood parks in urban areas and enhanced physical activity levels and related health outcomes (Bedimo-Rung et al., 2005; Kaczynski and Henderson, 2007; Maas et al., 2006). Availability and access to parks near home is associated with higher levels of physical activity in youth (Cohen et al., 2006) and adults (Sugiyama et al., 2010) and specific park features (amenities and facilities within the park) have also been shown to be associated with park visitation and physical activity both generally and within the park among children and adults (Kaczynski et al., 2008; Rung et al., 2011; Timperio et al., 2008). Children living near a larger sized park with a water feature and/or whose parents reported greater satisfaction with park quality have also been shown to spend less time playing computer/e-games and watching television (Veitch et al., 2011).

Few studies have compared environmental supports for physical activity between urban and rural areas. Cross-sectional studies in the US have shown that rural adults report fewer neighborhood environmental supports for physical activity (Parks et al., 2003; Wilcox et al., 2000). In a Canadian study, parents of grade five students residing in rural towns were less likely than their urban counterparts to perceive their neighborhood as having good parks (Simen-Kapeu et al., 2010). In addition, Shores and West (2010) found that visitors to parks

were less active in rural parks compared to urban parks. This may be due to differences in park features and quality. To date, however, the majority of existing park research has been conducted in urban settings with few studies having examined rural parks. The aim of this study was to examine whether features and amenities of parks vary between urban and rural areas. Since residents of disadvantaged neighborhoods are at an increased risk of inactivity and associated poor health (Ball and Crawford, 2006; Pearce and Maddison, 2011), parks in disadvantaged neighborhoods were the focus of this study.

Methods

This study was nested within the Resilience for Eating and Physical Activity Despite Inequality (READI) study, a longitudinal study examining resilience to obesity among socially and economically disadvantaged women and children. The methods have been described in more detail elsewhere (Ball et al., 2012). Briefly, women and their children living in low socioeconomic status (SES) neighborhoods in 40 urban and 40 rural areas of Victoria, Australia were recruited. Disadvantaged areas were randomly selected from neighborhoods in the bottom tertile of the Victorian Socio-Economic Index for Areas (SEIFA) distribution (Australian Bureau of Statistics, 2001b) within urban and rural strata. Within each neighborhood, 150 women aged 18-45 years (total n=11,940) were randomly selected from the Victorian electoral roll (registration compulsory for Australian citizens) and were sent an invitation to participate. Completed surveys were received from 4,934 eligible women (41% response rate). Of these, 1457 had a child aged 5-12 years and 771 consented to their child being included in the study (53% response rate).

For this study, residential addresses for a subset of 200 children living within 120 kilometres from Melbourne were identified. Urban areas included 28 neighborhoods within metropolitan Melbourne. Rural areas were located outside the Melbourne metropolitan area and included five neighborhoods located on the outskirts of a regional area and 15 neighborhoods located outside a 25 km radius of six regional Victorian cities. The population and area of each neighborhood was obtained from the 2001 census (Australian Bureau of Statistics, 2001a). The urban neighborhoods averaged 6.9 square kilometres in area with a population density of 2200 persons per square kilometre. The rural neighborhoods averaged 50.6 square kilometres with 507 persons per square kilometre. Ethics approval was granted by the Deakin University Human Ethics Committee.

Procedure

Each child's home address was geocoded using a geocoding script in a Geographic Information System (ArcMap 9.3) and for each address all public parks and playgrounds (excluding educational institutions, wetlands, flora and fauna reserves and golf courses) accessible within 800m from home along the pedestrian road network were identified. An 800m buffer zone was chosen as this has been established as a 'walkable' distance for children (Timperio et al., 2004). Spatial data on location of parks were drawn from the Open Space 2002 dataset (Australian Research Centre for Urban Ecology) for metropolitan Melbourne and from custom-digitised data layer based on various sources for areas outside the Open Space 2002 boundaries (Maptrax State Coverage 2008 – Digital Map Images, MapInfo Features 12.5, Google Maps 2009, Melways Digital Map Images 2007 and 2009, RACV Vic Roads 2006, TUMAUS 2002, Department of Sustainability and Environment PK_RKRES/PARKRES layer, tourist maps and council websites). In Australia, local parks are generally managed by the local council department and the parks included in this study would be covered by multiple departments.

Measures

In 2009/2010, one of two trained auditors visited each of these parks and assessed the features of the park using the READI Park Audit Tool. The Park Audit Tool is an 84-item paper and pencil audit checklist designed by the authors to be used by field observers to identify and evaluate characteristics and amenities within parks that may be associated with physical activity for adults and youth. This instrument includes detailed items relating to playground equipment so it is suitable for assessing park features likely to be important for children. Based on previous park research and park audit tools (Bedimo-Rung et al., 2006; Kaczynski et al., 2012; Rung et al., 2011; Saelens et al., 2006; Timperio et al., 2008) park features assessed by the tool included: access; lighting and safety; aesthetics; amenities; paths; outdoor courts/sports ovals; informal play spaces; and playgrounds (number of playgrounds and diversity, age appropriateness and safety/condition of play equipment). Data from the audit tool were coded and collapsed into six continuous and five categorical variables (see Table 1). Spearman correlations were examined to ensure the variables were not highly correlated.

Intra-rater reliability of the Park Audit Tool was assessed by the same auditor assessing 14 parks on two occasions. Inter-rater reliability was tested on 13 randomly selected parks by

two auditors assessing the park on the same day. The mean percent agreement for both intra-rater and inter-rater reliability is reported in Table 1.

Insert Table 1 Here

Analyses

All analyses were conducted in SPSS Statistics 20. As continuous scores were normally distributed, independent sample t-tests were used to compare features of parks between urban and rural areas. Pearson chi-square tests of difference were used for categorical variables.

Results

Park audits were completed at 433 urban and 195 rural parks. The spearman correlations showed the variables were not highly correlated (range: 0.014-0.54; only two correlations were >0.4). The parks located in urban areas scored significantly higher compared with parks in rural areas on access (mean 4.64 vs 3.89), lighting and safety (2.01 vs 1.76), and diversity of play equipment (7.37 vs 6.24). Rural parks scored higher on aesthetics compared with urban parks (5.08 vs 4.44). A significantly higher percentage of urban parks compared with rural parks had a path suitable for walking or cycling, and play equipment suitable for a range of ages (Table 2). A higher percentage of rural parks compared with urban parks had informal play spaces however this only approached significance ($p=0.064$). No significant differences were observed between urban and rural parks in regards to amenities, safety/condition of the play equipment and the percentage of parks with outdoor courts/sports ovals, and playgrounds.

Insert Table 2 Here

Discussion

To our knowledge this is the first study to compare features of parks in disadvantaged urban and rural areas. Overall, rural parks had a higher score for aesthetics compared to urban parks, but urban parks scored higher for access, lighting and safety, suitability of paths for walking and cycling and the diversity and age appropriateness of play equipment. These

results suggest that although rural parks are an aesthetically attractive destination, their features may not be as supportive of physical activity as urban parks, which may in part explain previous findings that park users in rural areas are less active than those visiting parks in urban areas (Shores and West, 2010).

One possible explanation for our findings is that parks in urban areas cater to a greater population and are therefore designed and better resourced to meet this need. Indeed, rural areas included in the READI study were considerably less populated (and much larger) than the urban areas (Ball et al., 2012) and it is possible that urban parks are also more likely to cater to populations in neighboring suburbs given that the travel distances are likely to be much shorter than distances between neighboring rural areas. It is also possible that parks in rural areas cater to different types of users. It has been suggested, for example, that users of parks in rural areas may be attracted to the park for reasons other than physical activity, such as community gatherings or other forms of leisure (Shores and West, 2010). Conversely, the features of these parks may dictate the types of activities that can be undertaken, rather than the park being designed with the needs of users in mind.

Previous research has suggested that a lack of play equipment suitable for children aged over eight years discourages park visits from older children (Veitch et al., 2006; Veitch et al., 2007). The findings from the present study show that compared to urban parks, parks in rural areas had a poorer diversity of play equipment and were also less likely to have play equipment suitable for children aged 8-15 years. This suggests that in order to encourage park use by older children living in rural areas it may be important to further examine the suitability of features within rural parks for youth and adolescents.

The focus on disadvantaged areas, where parks may be particularly important, is a notable aspect of the study. Parks are a free resource and there is evidence of inequalities in the built environment, with previous research demonstrating that parks in low SES areas have fewer amenities and features likely to promote physical activity among children than parks in higher SES areas (Crawford et al., 2008). Improving parks may also be particularly advantageous for increasing physical activity levels among disadvantaged populations where residents are at an increased risk of inactivity and associated poor health (Ball and Crawford, 2006; Pearce and Maddison, 2011).

Strengths of this study include the large number of parks audited, the comprehensiveness of the audit tool and its specificity to park features relevant to children's physical activity. The tool used in this study was based on an instrument that had previously been developed to assess specific features of parks likely to influence children's physical activity, but that focused mainly on the presence or absence of features rather than quality (Timperio et al., 2008). The current tool is more comprehensive, with additional items assessing nearby streets, aesthetics and the condition and quality of playground equipment and park amenities.

Although a large number of parks were audited, only a selected number of neighborhoods were included in the study as determined by randomly-selected participants' residential addresses. Hence the audited parks only represent a small proportion of the total number of parks in Victoria. It is recognized that the selected parks may not be representative of all urban and rural parks; however, the findings may be generalizable to parks located in low SES areas in Victoria. Future studies might include parks from more diverse neighborhoods and remote rural locations. It is also acknowledged that there are many approaches that could be used to score items within the audit tool and that different scoring systems (e.g. assigning alternative scores or weighting for variables) may produce results inconsistent with those reported here. To further strengthen the validity of this tool, it may be beneficial to obtain input from an expert panel. Predictive validity could also be tested in future studies by examining associations between the scores and park use and/or physical activity. Although we found differences between features of the parks in urban and rural areas we lacked information on how the neighborhoods varied in other ways such as neighborhood crime or the proportion of children. Finally, the intra- and inter-rater reliability estimates were calculated on a sample of 14/13 parks respectively, which may limit power.

Conclusion

Given the importance of physical activity for healthy lifestyles, there is a need to ensure park features are supportive of park-based physical activity. This study found that among parks located in low SES areas of Victoria, parks in urban areas had higher scores for access, lighting and safety and the diversity of play equipment, and greater proportions of parks had paths suitable for walking and/or cycling and play equipment suitable for a wider age range of children, compared to parks in rural areas. These findings can be used to inform advocacy for park development in rural areas with a view to creating parks that are more supportive of physical activity. Future studies should examine associations between park features and

children's and adult's physical activity in urban and rural areas, as well as associations with park use, park-based physical activity, other health behaviors and health outcomes.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

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Table 1: Description of variables created from park audit tool

	Items	Range	Reliability (mean percent agreement)
Access	<ul style="list-style-type: none"> • >2 entry points (1) • designated cycle path/trail link (1) • car parking within the park (1) • access to public transport within one block of the park (1) <p>For the roads immediately surrounding the park (mean score):</p> <ul style="list-style-type: none"> • zebra crossing (crossing with marked lines on ground but no signals) (1) • pedestrian crossing (crossing with signals such as traffic lights) (1) • having between 1-3 road lanes (1) • footpath on one side of road only (1) or • footpaths on both sides of the road (2) 	0-9	Intra-rater=98% Inter-rater=97%
Lighting/safety	<ul style="list-style-type: none"> • light source for car parking area (1) • lighting along paths (1) • houses facing at least one side of the park (1) • ability to see facing houses/streets from centre of park (1) 	0-4	Intra-rater=97% Inter-rater=91%
Aesthetics	<ul style="list-style-type: none"> • trees (1) • gardens/landscaping (1) • each water feature (maximum of 5) (1) • no or very little litter (1) • no or very little graffiti (1) • no overflowing rubbish bins (1) • very little 'risky' litter (e.g. alcohol containers, broken glass) (1) or • no 'risky' litter (2) 	0-12	Intra-rater=87% Inter-rater=90%
Amenities	<ul style="list-style-type: none"> • toilets in at least average to excellent condition (1) • benches in below average to excellent condition (1) • picnic tables in below average to excellent condition (1) • drinking fountains (only if $\geq 50\%$ were functional) (1) • kiosk (1) • BBQ (1) • bicycle racks (1) • shelter (1) • shade (e.g. trees, shade sails) (1) 	0-9	Intra-rater=96% Inter-rater=96%

Playgrounds	<ul style="list-style-type: none"> • no playground (0) • at least one playground (1) 	Categorical (0,1)	Intra-rater=100% Inter-rater=100%
Diversity of playground equipment (e.g. different types of equipment)	Summed presence of 20 different playground items within park (e.g. slide, monkey bars, swings)	0-20	Intra-rater=93% Inter-rater=93%
Safety/condition of playground equipment	<ul style="list-style-type: none"> • average to excellent condition of play equipment across park (1) • non-concrete surfaces under equipment (1) • average to excellent condition of surface under play equipment (1) • trees shading playground (1) • shelter shading playground (1) • roads clearly visible from playground (1) • homes clearly visible from playground (1) 	0-7	Intra-rater=79% Inter-rater=82%
Age appropriateness of playground equipment (e.g. equipment appropriate for a variety of ages)	<ul style="list-style-type: none"> • no equipment for 8-10 year-olds or 11-15 year olds (0) • equipment for 8-10 year-olds or 11-15 year olds (1) • equipment for both age groups (2) 	Categorical (0,1,2)	Intra-rater=70% Inter-rater=96%
Paths	<ul style="list-style-type: none"> • no path or path unsuitable for walking/cycling (0) • path suitable for walking only or cycling only (1) • path suitable for walking and cycling (2) 	Categorical (0,1,2)	Intra-rater=100% Inter-rater=100%
Outdoor courts/sports ovals	<ul style="list-style-type: none"> • no courts/ovals (0) • 1-2 courts/ovals (1) • ≥ 3 courts/ovals (2) 	Categorical (0,1,2)	Intra-rater=100% Inter-rater=96%
Informal play spaces (e.g. grassy areas, climbing trees, bushy areas)	<ul style="list-style-type: none"> • no informal play space (0) • at least one informal play space (1) 	Categorical (0,1)	Intra-rater=81% Inter-rater=89%

Table 2: Comparison of features of urban and rural parks

Park feature	Urban parks (n=433)	Rural parks (n=195)	p ^{ab}
Access score (range 1-7), mean (SD)	4.64 (0.94)	3.89 (1.28)	<0.005
Lighting/safety (range 0- 4), mean (SD)	2.01 (0.76)	1.76 (0.71)	<0.005
Aesthetics score (range 0-8), mean (SD)	4.44 (1.39)	5.08 (1.46)	<0.005
Amenities score (range 0-8), mean (SD)	2.19 (1.62)	2.05 (1.69)	0.302
Diversity of playground equipment (range 1-16), mean (SD)	7.37 (2.84)	6.24 (2.78)	0.002
Safety/condition of playground equipment (range 2-7), mean (SD)	4.84 (0.88)	4.87 (0.87)	0.801
Paths (%)			<0.005
No paths	41.2	59.1	
Paths for walking <u>or</u> cycling	35.3	23.3	
Paths for walking <u>and</u> cycling	23.5	17.6	
Outdoor courts/sports ovals (%)			0.372
No courts	83.5	86.6	
1-2 courts/ovals	8.0	4.8	
3+ courts/ovals	8.5	8.6	
Informal play spaces (%)			0.064
No informal play spaces	74.8	67.7	
At least one informal play space	25.2	32.2	
Number of playgrounds (%)			0.955
No playground	54.4	54.6	
At least one playground	45.6	45.4	
Age appropriateness of playground equipment (%)			<0.001
No equipment for 8-15 y/o	31.8	83.0	
Equipment for 8-10 <u>or</u> 11-15 y/o	48.7	11.4	
Equipment for 8-10 <u>and</u> 11-15 y/o	19.5	5.7	

Parks situated in Victoria, Australia; audits conducted in 2009/2010.

^a T-tests used to compare urban and rural parks on continuous measures.

^b Chi-square tests of independence used to compare urban and rural parks on categorical measures.