



## Disparities in park availability, features, and characteristics by social determinants of health within a U.S.–Mexico border urban area<sup>☆</sup>



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### ABSTRACT

**Objective.** To examine disparities in park availability, features, and characteristics by income and the percentage of foreign-born population within a predominately-Hispanic border community.

**Methods.** This study occurred in 2010–2011 in El Paso, Texas. All census tracts ( $n = 112$ ) were categorized as low, medium, or high income and percent foreign-born. The number of parks intersecting each tract was determined using ArcGIS and park features (facilities, amenities) and characteristics (aesthetic features, park and neighborhood quality/safety concerns) were assessed via park audits ( $n = 144$ ). Analysis of variance and Kruskal–Wallis tests examined differences across income and percent foreign-born tertiles for all park measures.

**Results.** The medium income tertile had more parks than the high tertile, and more park facilities than the low or high tertiles, but no differences in park amenities were observed across income groups. As well, none of park availability, facilities, or amenities differed across percent foreign-born tertiles. Finally, parks in the high income tertile had significant fewer park and neighborhood quality/safety concerns and parks in the high percent foreign-born tertile had significantly greater park and neighborhood quality/safety concerns.

**Conclusion.** Identifying disparities in park availability, features, and characteristics can aid policymakers and citizens in improving the contribution of parks to community health for all.

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### Introduction

Parks are key environmental features for promoting physical activity and health (Bedimo-Rung et al., 2005; Kaczynski and Henderson, 2007), especially in low-income areas where financial access to other resources may be less feasible and where poorer health behaviors and outcomes are more prevalent (August and Sorkin, 2011; Zhang and Wang, 2004). However, several studies highlight that park availability, features, and quality may not be equally-distributed across socioeconomically-deprived and racially and ethnically diverse neighborhoods in the U.S. (Estabrooks et al., 2003; Gordon-Larsen et al., 2006; Vaughan et al., 2013). In turn, this may contribute to reduced physical activity and greater obesity observed in low income and minority populations (Gordon-Larsen et al., 2006; Ogden et al., 2012). Conversely, other studies have reported that such resource disparities are not present in diverse communities around the world (Abercrombie et al., 2008; Lofti and Koohsari, 2009; Timperio et al., 2007). Additionally, to date, little, if any, such research has been conducted in minority-heavy areas along

the U.S.–Mexico border where health concerns are a growing issue (United States–Mexico Border Health Commission, 2010). Persons from Hispanic backgrounds are one of the fastest growing minority groups in the U.S. and represent over 80% of the population in cities such as El Paso, Texas where this study occurred (United States Census Bureau, 2013). In addition to potentially having lesser access to *personal* resources that might facilitate health (e.g., income, knowledge, language fluency), lower income and minority neighborhoods often disproportionately lack *environmental* resources, a phenomenon referred to as deprivation amplification (Macintyre et al., 2008). This dynamic population structure and shift resulting from growing Hispanic populations combined with traditionally poorer health among lower-income and minority groups presents an important challenge for parks and recreation, planning, and public health professionals aiming to create salutogenic neighborhood environments (Day, 2006).

Given these considerations, the purpose of this study was to examine differences in park availability, features, and characteristics according to median household income and the percentage of foreign-born population in a predominately Hispanic border community. Much research has documented income as a key determinant of health (Wilkinson and Pickett, 2006). Likewise, the percentage of foreign-born residents can be an indicator of health status, although conflicting research exists as to whether greater immigrant population in an area is beneficial or harmful

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for positive health behaviors and outcomes (Lee and Ferraro, 2007). Therefore, better understanding variations in park access and attributes in high-risk communities according to income and nativity can lead to environmental and policy interventions that might facilitate increased physical activity and reduced health disparities.

## Methods

This study occurred in El Paso, Texas in 2010–2011 where 80.7% of residents are Hispanic or Latino, and 25.5% were born outside of the U.S. (United States Census Bureau, 2013). For all census tracts (CTs) within the city ( $n = 112$ ), data on median household income and the percentage of foreign-born residents were extracted from the U.S. Census Bureau's 2005–2009 American Community Survey. All CTs were then categorized into even tertiles (low, medium, high) for both variables (Estabrooks et al., 2003; Vaughan et al., 2013).

A GIS shape file of all parks in the study area was obtained from the City of El Paso and on-site audits were conducted to determine if parks were useable for physical activity/recreation (i.e., not under renovation or construction) and publically accessible. To measure park availability, using ArcGIS 9.3, an edited park layer ( $n = 144$ ) was cross-referenced with the CT layer to determine the number of parks that intersected each CT (Abercrombie et al., 2008; Vaughan et al., 2013). Data on park features and characteristics were obtained by a trained auditor visiting each park ( $n = 144$ ) using the Community Park Audit Tool (CPAT), which has demonstrated excellent reliability (Kaczynski et al., 2012). The total number of each park variable: i) park facilities (e.g., playgrounds, basketball courts, trails), ii) park amenities (e.g., benches, drinking fountains, picnic tables), iii) aesthetic features (e.g., landscaping, artistic features, historical/educational monuments), iv) park quality/safety concerns (e.g., evidence of threatening behavior, dangerous spots, vandalism) and v) quality/safety concerns in the neighborhood visible around the park (e.g., inadequate lighting, graffiti) were summed for each CT.

ANOVA F-tests (for normally-distributed park variables) and Kruskal–Wallis H tests (for non-normal variables) with adjusted Bonferroni post-hoc analyses were used to determine significant ( $p < 0.05$ ) differences in the total number of parks, park features (facilities and amenities), and park characteristics (aesthetic features, park quality/safety concerns, and neighborhood quality/safety concerns) across CT income and percent foreign-born tertiles (low, medium, high).

## Results

The medians for average household income and percentage of foreign-born residents across all CTs were \$46,191 and 28.0%, respectively. The median number of parks per CT was 1.0, with a range of 0–9 parks per tract. As shown in Table 1, park availability differed significantly by

income ( $\chi^2 = 6.71$ ,  $p = 0.04$ ), with the medium income tertile having more parks than the high income tertile ( $p = 0.01$ ). There was no significant difference for park availability across percent foreign-born tertiles ( $\chi^2 = 1.51$ ,  $p = 0.47$ ).

The number of park facilities ( $F = 10.21$ ,  $p < 0.01$ ) per tract differed significantly across income tertiles (Table 1). Specifically, the medium income tertile had significantly more facilities than the low ( $p < 0.01$ ) or high ( $p = 0.02$ ) income tertiles. The overall ANOVA test examining the number of amenities across income tertiles was significant ( $F = 3.77$ ,  $p = 0.03$ ), but further post-hoc pairwise comparisons showed no significant differences between the three groups. Neither the number of park facilities ( $F = 2.10$ ,  $p = 0.13$ ) nor amenities ( $F = 1.64$ ,  $p = 0.20$ ) differed significantly across percent foreign-born tertiles.

The number of park aesthetic features did not differ significantly across either income ( $F = 0.29$ ,  $p = 0.75$ ) or percent foreign-born ( $F = 0.09$ ,  $p = 0.91$ ) tertiles (Table 1). However, there were several differences in park quality/safety concerns and neighborhood quality/safety concerns across income and percent foreign-born tertiles ( $\chi^2 = 26.21$ , 30.40, 39.95, and 42.69,  $p < 0.01$  for all tests). The low and medium income tertiles had significantly more park quality/safety concerns than the high income tertile (both  $p < 0.01$ ), while the low income tertile also had more neighborhood quality/safety concerns than the medium or high income tertiles (both  $p < 0.01$ ). Both the high and medium foreign-born tertiles had significantly more park quality/safety concerns than the low foreign-born tertile (both  $p < 0.01$ ). Finally, the high foreign-born tertile had significantly more neighborhood quality/safety concerns than the low or medium foreign-born tertiles (both  $p < 0.01$ ).

## Discussion

This study adds to the current literature on park disparities by examining such issues within a U.S.–Mexico border community. These border regions are some of the poorest areas in the U.S. with respect to both income and health (United States–Mexico Border Health Commission, 2010). Our findings further demonstrate how publically-available recreational facilities, and their features and characteristics, are often not equally-distributed across neighborhoods by income or foreign-born composition (Estabrooks et al., 2003; Gordon-Larsen et al., 2006; Vaughan et al., 2013). The present study was unique in that it highlighted these issues within a predominately Hispanic community. Lower income Hispanic or Latino neighborhoods

**Table 1**  
Park availability, features, and characteristics by income and percentage of foreign-born residents, El Paso, Texas, 2010–2011.

	Census tracts N	Availability Median (Q1, Q3)	Facilities Mean (SD)	Amenities Mean (SD)	Aesthetic features Mean (SD)	Park quality/safety concerns Median (Q1, Q3)	Neighborhood quality/safety concerns Median (Q1, Q3)
Median income							
Low (<\$25,724)	38	0.00 (0.00, 1.00) <sup>ab</sup>	3.34 (2.64) <sup>a</sup>	6.70 (2.08)	1.21 (1.16)	2.00 (1.00, 3.00) <sup>a</sup>	4.00 (2.00, 6.00) <sup>a</sup>
Medium (\$25,725–43,603)	38	0.00 (0.00, 1.00) <sup>a</sup>	6.29 (3.93) <sup>b</sup>	7.91 (2.44)	1.18 (0.93)	2.00 (1.00, 2.50) <sup>a</sup>	2.00 (0.50, 3.00) <sup>b</sup>
High (>\$43,603)	36	0.00 (0.00, 0.00) <sup>b</sup>	4.42 (2.97) <sup>a</sup>	6.79 (2.71)	1.33 (0.95)	0.50 (0.00, 1.80) <sup>b</sup>	1.00 (0.00, 2.00) <sup>b</sup>
p		0.04	<0.01	0.03	0.75	<0.01	<0.01
Percent foreign-born							
Low (<22.2%)	39	0.00 (0.00, 1.00)	5.00 (3.51)	7.10 (2.68)	1.29 (0.92)	1.00 (0.00, 1.75) <sup>a</sup>	1.00 (0.00, 2.00) <sup>a</sup>
Medium (22.2–31.7%)	37	0.00 (0.00, 1.00)	5.20 (3.50)	7.61 (2.81)	1.20 (0.98)	2.00 (1.00, 2.00) <sup>b</sup>	2.00 (0.00, 3.00) <sup>a</sup>
High (>31.7%)	36	0.00 (0.00, 1.00)	3.87 (3.19)	6.70 (1.76)	1.23 (1.15)	2.00 (1.00, 4.00) <sup>b</sup>	4.00 (2.00, 6.00) <sup>b</sup>
p		0.47	0.13	0.20	0.91	<0.01	<0.01

1. Means and standard deviations (SD) are provided for continuous variables that were normally distributed. Medians and first and third quartiles (Q1, Q3), are reported for continuous variables that were not normally distributed.

2. ANOVAs were used to test differences in continuous variables that were normally distributed. Kruskal–Wallis test were used for continuous variables that were not normally distributed.

3. Mean or median values with different superscript letters (a, b) were significantly different from one another ( $p < 0.05$ ).

have sometimes been described as possessing the “barrio advantage”, a paradoxical situation in which certain sociocultural benefits of living in high-density Mexican American neighborhoods (e.g., intact family structures, community institutions, increased shelter from negative aspects of American culture) outweigh the disadvantages of high rates of poverty (Aranda et al., 2011; Eschbach et al., 2004). However, while such settings may confer various social and cultural advantages that can promote health, it is important that lower income or immigrant-heavy areas also possess quality environmental resources, including parks, that do not attenuate, and preferably augment, the likelihood of positive health behaviors and outcomes among this vulnerable population group (Fields et al., 2013). Future research should explore the interaction of income and diverse cultural markers (e.g., foreign-born population, language use) in predicting the availability of resources (e.g., parks) and residents’ health status (e.g., physical activity, chronic disease).

Despite providing a detailed assessment of multiple aspects of park access in a novel and significant setting, this study was subject to several limitations. For example, it was limited to a primarily Hispanic community which may not be generalizable to other U.S. or border communities. As well, we examined CTs as the unit of analysis, but other geographic or culturally-defined areas (e.g., zip codes, municipal or culturally-defined neighborhoods) may be equally useful for considering such issues. Likewise, we did not collect physical activity or health data and therefore cannot make inferences about individual behavior, but this would be an important next step. Further, this study excluded park-related facilities that were not designated for public use, such as school playgrounds, state or national parks, and other pay-for-use resources. We also did not include Colonias, unincorporated immigrant-heavy neighborhoods along the border lacking diverse resources and often suffering from environmental justice concerns; doing so likely would have revealed even greater social disparities in park access given the dearth of recreational infrastructure and other services in these areas. As well, more detailed analyses about the density of specific facilities per population would be valuable. Finally, factors other than household income or the percentage of foreign-born residents (e.g., level of acculturation) would be useful to examine in such contexts in future.

Future research should consider policies which may contribute to or may rectify resource disparities across communities, as well as identify how access or lack thereof, to quality park environments affects physical activity and other health outcomes for at-risk populations. This study did not consider whether improvements in access to parks in El Paso would result in health benefits to the community, but other research has reported that park renovations can lead to increased usage and physical activity among both children and adults (Veitch et al., 2012). To facilitate such improvements and investments, especially in traditionally under-empowered and under-resourced communities, using tools like the CPAT, citizens, health researchers, and policy makers should collectively engage in evaluating community environments to advance partnerships and collaborative efforts to make parks and other recreational facilities more accessible, attractive, and safe in order to encourage physical activity and health for all (DeBate et al., 2011).

#### Conflict of interest

The authors declare that there are no conflicts of interests.

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