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GEOLOCATING NEIGHBORHOOD RECREATIONAL SPACES: UNDERSTANDING INEQUALITIES BY NEIGHBORHOOD ECONOMIC CONDITIONS

Madeline Engel (David Curtis)
Family and Consumer Studies

Introduction

Residents in economically deprived neighborhoods often have less access to spaces that facilitate physical activity, such as parks, recreation centers, and walking trails (Estabrooks et al., 2003; Boone et al., 2009). However, the prior evidence is mixed, such that economic inequities in access to recreational spaces are likely to vary between cities (Rigolon, 2016). The presence and quality of such recreational spaces may impact community health outcomes by providing opportunities to safely recreate (Singh et al., 2010). Thus, where communities are lacking adequate recreational spaces, health inequalities may be exacerbated. Additionally, urban areas have more densely distributed populations, creating a higher demand for nearby recreational spaces.

Objective

To determine how neighborhood deprivation is associated with the number and total acreage of parks, schools, and trails in Davis, Weber, Salt Lake and Utah county at the neighborhood level.

Methods

Geospatial data for parks, trails, and schools come from the Automated Geographic Reference Center (AGRC), administered by the state of Utah. Data are available at https://gis.utah.gov/. To ensure accuracy of park data, I (Madeline Engel) manually reviewed all parks within the study area—namely, Weber, Davis, Salt Lake, and Utah counties along the Wasatch Front in Utah. The main goal of this quality check was to merge duplicate park entries (e.g., some parks appeared to be incorrectly split into two or more parks). In particular, parks were merged when they had the same name, and either shared borders or were in close proximity and connected by a trail. Additional reasons parks were merged together were: if unnamed parks shared borders and had no visible barriers; or if two parks shared fully overlapping geographic spaces. Decisions were confirmed based on satellite imagery from Google Maps. A total of 133 parks were merged due to incorrect divisions. Our decisions to merge parks will generally not influence measures of block group total park acreage, yet data were cleaned because we are adding assessments of park quality that necessitated the correct specification of parks. A small number of parks were removed because it is unlikely to be a usable recreation area due to the location and size of the park (e.g., designated parkland included landscaped parking strips and the center island of a roundabout).

We used AGRC data to assess the number of parks, total park acreage, and length of trails within each block group. To compute the number of parks, we counted parks that were intersecting or contained within each block group and the number of public primary and secondary education schools (i.e., public K-12 schools due to the presence and accessibility of playgrounds and other facilities within these places). To measure total park acreage, the park size located within each block group was determined and summed across all parks within a block group. Finally, the length of all trails contained within each block group was determined.

Neighborhood deprivation was measured using data from the American Community Survey 2013-2017 five-year estimates. In particular, sixteen indicators were selected that represent the socioeconomic conditions and household characteristics of residents within Census block groups. These include educational and occupational levels, median income, poverty rate, and the share of houses that are owner-occupied. The indicators were selected based on prior research (Kind et al., 2014).

Results

Descriptive statistics for the sample of block groups are shown in Table 1. We conducted Moran's I tests to determine whether the outcome variables (namely, the count of parks, park acreage, and length of trails) were spatially clustered. All Moran's I tests demonstrated strong spatial dependence (p values < .001), such that we proceeded with spatial autoregressive models in our hypothesis tests.

Regression models results are shown in Table 2. Model 1 depicts results from a model with relatively few control variables (i.e., county fixed effects, racial composition, and the share of the population who are youth or young adults [less than 25 years old]). Model 2 includes further adjustment for population density, total land area, and the median age of housing stock. Results are shown for three outcomes at the block group level—total count of parks, total park acreage, and total length of trails, respectively. In model 1, neighborhood economic deprivation is associated with the number of parks, total park acreage, and walking trails, such that more deprived neighborhoods have poorer access to parks and trails (all p values < .01). However, when adjusting for population density, total land area, and age of housing stock, neighborhood deprivation was not significantly associated with the total count of parks or park acreage. Of these covariates, population density was the only significant predictor and thus appears to be a potential explanation for the link between deprivation and park availability. The association between neighborhood deprivation and hiking trails remained significant and of a comparable magnitude in Model 2. Due to the connection between proximity and use of recreational spaces, we conducted sensitivity analyses where only block groups of less than 1.5 square miles were included. This criterion was selected due to the likelihood of recreational spaces within these smaller block groups being more accessible. The findings were similar to the results shown in Table 2.

Conclusion

In summary, we find that within the four most populous counties of Utah, neighborhoods with greater economic deprivation have poorer access to parks and trails. One potential explanation is that deprived neighborhoods tend to be more densely populated, which could influence decisions about where to locate parks due to higher land costs in densely populated areas. However, due to the greater proximity of persons, provision of park spaces in dense areas is likely to be more efficient, with the potential to increase utilization. The consideration of proximate users needs to be considered alongside land costs to ensure that sufficient park access is provided in dense areas.

Economic differences in trail access persisted even when controlling for population density and other important factors that likely influence trail development. This finding suggests that additional research is needed to understand the factors undergirding local decisions to provide trails and the potential population health effects of disparate access.

Important limitations remain in this work. First, the use of block groups to define neighborhoods is coarse and may not align with resident perceptions. Block groups may be defined for a relatively large land area wherein all of the included parks and trails are unlikely to be perceived as accessible. In addition, parks and trails in neighboring block groups may be more accessible to residents near the border and may be sufficiently proximate in dense areas. Lastly, consideration of recreational facilities and programming is important to consider when examining neighborhood-based differences in access to recreational spaces. In conclusion, recreational spaces are spatially clustered in the Wasatch Front. More research is needed to ascertain specific factors underlying this discrepancy. Additionally, more research is needed to understand how access to recreational spaces impacts community-wide health.

Table 1.

Block group variables	Mean	Range
Number of parks	0.92 ±1.36	0 - 11
Total park acreage	11.80 ±42.25	0 - 769.0
Miles of trails	2.15 ±18.50	0 - 525.51
Neighborhood deprivation (standardized)	0.00 ±1.00	-2.61 - 3.36
Racial/ethnic composition (% non-Hispanic white)	0.78 ±.17	0.07 - 1
Population density (persons in 1000s / sq mi)	4.93 ±3.27	0 - 38.58
Youth population (% < 25 years)	0.40 ±.10	0.05 - 0.79
Median age of housing stock	1980.25 ±15.97	1940 - 2012

Table 2.

Outcomes:	Count of parks		Park acreage		Trail length	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Predictors	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
Neighborhood deprivation	**-0.20 (.07)**	-0.10 (.07)	**-0.19 (.07)**	-0.08 (.08)	**-0.09 (.03)**	**-0.07 (.02)**
Percent white	0.48 (.39)	0.37 (.39)	0.07 (.40)	-0.08 (.40)	-0.22 (.14)	-0.52 (.13)
Youth pop.	**1.56 (.54)**	**1.68 (.56)**	1.21 (.55)	**1.30 (.56)**	0.35 (.18)	0.30 (.18)
Pop. density		**-0.07 (.02)**		**-0.08 (.02)**		-0.01 (.01)
Spatial lags						
Neighborhood deprivation	0.18 (.10)	0.16 (.09)	0.10 (.10)	0.05 (.10)	0.00 (.03)	-0.10 (.03)
Outcome	**0.73 (.09)**	**0.64 (.10)**	**0.80 (.10)**	**0.58 (.12)**	**1.06 (.08)**	**0.33 (.08)**

Note. Unstandardized regression estimates and standard errors are shown, with statistically significant associations (i.e., $p < .05$) shown in bold font. All models include county fixed effects. Model 2 is further adjusted for total land area and age of housing stock.

References

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