Replication of the Neighborhood Active Living Potential Measure in Saskatoon, Canada

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Background: Few neighborhood observational measures have been replicated by separate research teams in different cities.

Purpose: This study replicates the neighborhood active living potential observation measure in Saskatoon, Saskatchewan, Canada.

Methods: Observers (n=5) participated in a 3-day neighborhood active living potential training session. Observers rated 60 neighborhoods in Saskatoon during the summer of 2009 by following a predetermined walking route constructed by joining ten randomly selected street segments for each neighborhood. Pairs of observers independently rated neighborhoods using an 18-item observation grid. Items represented three a priori–defined domains of active living potential: activity friendliness (six items); safety (four items); and density of destinations (eight items). Data analysis was conducted in autumn 2009.

Results: Application of ecometric multilevel modeling analyses showed that once inter-item and inter-observer variability were statistically controlled, one third of the variability in observations was among neighborhoods. Reliability estimates for observers were 0.84 for items measuring activity friendliness, 0.82 for safety, and 0.91 for density of destinations. Convergent validity showed that neighborhood income was associated negatively with density of destinations, positively with safety, and not associated with activity friendliness. Percentage of people in the neighborhood walking to work was positively associated with density of destinations and not associated with safety or activity friendliness.

Conclusions: Results replicate findings from Montreal, Canada, that the three dimensions of the neighborhood active living potential measure have good reliability and convergent validity. Neighborhood active living potential appears to be a stable measure capturing three essential elements of neighborhoods.
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Background

There is growing recognition[1,2] that the neighborhoods in which we live affect our health. A wide range of health behaviors, including physical activity[3,4] and diet,[5] and health outcomes, such as asthma[6] and coronary heart disease,[7] has been associated with neighborhood characteristics.

A variety of approaches have been used to measure neighborhood characteristics. Typically, researchers rely on census data or household surveys to assess neighborhood characteristics.[8] The use of census data has been criticized[9–11] for being unable to capture the properties of "natural" neighborhood environments because census data may not capture all the salient characteristics of a neighborhood. Advances in neighborhoods and health research require the development of reliable and valid measures that better capture properties of the built environment.[12,13] Neighborhood observation is an increasingly popular method to measure neighborhood environments because it captures observable properties of the environment not captured in census data.[14]

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In spite of their increasing popularity, there is considerable variability in how neighborhood observations are conducted, data-analyzed, and reported.[14] It is difficult to confidently compare findings across studies. Because it is still a relatively new method, neighborhood observational measures rarely have been replicated in different cities, by those who are independent of the researchers who developed the measures. The challenge inherent in replication is considerable given the intensive observer training and contextual differences between cities. The purpose of this study is to replicate the neighborhood active living potential (NALP) observation measure, originally developed in Montreal, Canada, in a different urban context in Saskatoon, Canada.[4,15,16]

Methods

Study methods are described in detail elsewhere[15,16] for the Montreal NALP measure. Here the methods for the Saskatoon NALP measure are briefly described.

Definition and Sampling of Neighborhoods

Saskatoon is a medium-sized city in western Canada. According to the 2006 Canadian census the population of Saskatoon was 233,893. Saskatoon is divided into 60 residential neighborhoods, defined by the city, and alternatively, into 53 census tracts defined by the Government of Canada. City neighborhoods were chosen as the unit of analysis, rather than census tracts, because citizens of Saskatoon identify with city neighborhoods (e.g., neighborhood associations have been created that respect city-defined neighborhood boundaries). Observers rated all 60 residential neighborhoods in Saskatoon.

Measures

Eighteen items were used to assess NALP.[16] NALP items were coded on a 6-point scale. The items were grouped based on the Montreal NALP to represent three domains: activity friendliness (AF, six items); safety (SAFE, four items); and density of destinations (DD, eight items).

Training of Observers

Observers participated in a 3-day training session. The training session provided in-class background information on the relationship between the built environment and physical activity, descriptions, photographic examples, and discussion about each item. Training was also done using field observations. Five observers conducted neighborhood ratings. Three were male, aged, on average, 25 years (range 23–30 years). Observers were third- and fourth-year undergraduate students in regional/urban planning and environmental studies.

Observations

Pairs of observers independently coded observations using an 18-item observational grid. Observers followed a predetermined walking route constructed by joining ten randomly selected street segments for each neighborhood. Observations were recorded between June 1, 2009, and September 30, 2009, on weekdays between 9AM and 5PM, and when there was no precipitation. Observers met once a month to discuss difficult cases and ensure consistency in ratings.

Analysis

Data analysis was conducted in autumn 2009. Following descriptive analyses, a multilevel model was fit to the data. Multilevel modeling is a generalization of linear regression that accounts for correlated data within a hierarchically structured unit of measurement. In the ecometric application of multilevel modeling, observations (n=2160) were nested within observers (n=5), which were nested within neighborhoods (n=60). The multilevel analysis for each dimension of NALP proceeded in four steps. First, variance was partitioned into inter-item, inter-observer, and inter-neighborhood sources. Second, variance was partitioned while controlling for inter-item and inter-observer variance. Third, the internal consistency of the domains was estimated while controlling for inter-item and inter-observer variance. Fourth, convergent validity of the domains was examined by estimating multilevel correlations between NALP domains, average neighborhood income, and percentage of people walking to work in the neighborhood. Data on neighborhood income and percentage of people walking to work were available in the 2006 Canadian Census.[17]

Results

Descriptive statistics showed NALP items were normally distributed within domains. The null models for each domain showed that between-neighborhoods variance ranged from 32% and 36%. After controlling for inter-item and inter-observer variability, the variance proportion for each domain within neighborhoods increased from 36% to 39%. Inter-observer variability was small (<5%) and not significant, suggesting that results were not systematically different among observers.

Internal consistency of NALP domains was high once inter-item and inter-observer variability were controlled. The average ecometric reliability coefficients, after accounting for correlated structure of the data, across neighborhoods were 0.84 for AF, 0.82 for SAFE, and 0.91 for DD (see Table 1).

Table 1. Ecometric inter-observer reliability for each NALP domain from Saskatoon and Montreal[15]

NALP domain	Saskatoon	Montreal[a]
Activity friendliness	0.84	0.78
Safety	0.82	0.76
Density of destinations	0.91	0.83

[a]Results from Reference 15
NALP, neighborhood active living potential

Table 2. Correlations between NALP domains from Saskatoon and Montreal[15]

NALP domain	Activity friendliness	Safety	Density of destinations
Saskatoon			
Activity friendliness	1.00	—	—
Safety	0.44	1.00	—
Density of destinations	0.05	–0.61	1.00
Montreal[a]			
Activity friendliness	1.00	—	—
Safety	0.71	1.00	—
Density of destinations	–0.31	–0.78	1.00

[a]Results from Reference 15
NALP, neighborhood active living potential

Findings from the multilevel model showed that AF and SAFE were positively correlated (r=0.44) and that SAFE and DD were negatively correlated ($r = -0.61$). AF and DD shared a small positive correlation (r=0.05; see Table 2). Multilevel associations of the NALP dimensions to average family income and the percentage of people walking to work in Saskatoon neighborhoods were estimated. These showed that average family income in neighborhood was associated negatively with DD (coefficient=–0.000027, SE=0.000004, $p<0.00$); positively with SAFE (coefficient=0.000029, SE=0.000004, $p<0.00$); and was not associated with AF (coefficient= –0.000003, SE=0.000005, $p>0.05$). Percentage of people walking to work was positively associated with DD (coefficient=0.001966, SE=0.000869, $p<0.05$); not associated with SAFE (coefficient=–0.000757, SE=0.000534, $p>0.05$); and not associated with AF (coefficient= –0.000652, SE=0.001112, $p>0.05$).

Discussion

The present study replicated the NALP measure in Saskatoon, a midsize prairie city in Canada. The results show similar findings with the original NALP in Montreal, Canada, reported in this journal.[15] Inter-observer reliability was high, and correlations between domains were similar. The consistency of the findings from Saskatoon and Montreal suggest that separate research teams in different cities can successfully replicate the NALP, thereby demonstrating the stability and utility of the NALP measure.

The replication of the NALP observation included some challenges. How raters should interpret differences in elements comprising density of destinations, activity friendliness, and safety across neighborhoods needed to be resolved. Should raters have been giving their ratings for each item response scale based on an ideal neighborhood (either a composite idealized neighborhood or a real neighborhood from another city) or within the context of the city being observed? The NALP data were coded based on the context of the city, in order to maximize between-neighborhood variability in the NALP domains within Saskatoon. Using the local context also facilitates comparisons among Saskatoon neighborhoods. However, choosing to rate neighborhoods relative to other neighborhoods in the city may limit the ability to compare NALP domains among cities.

Conclusion

Few neighborhood observational measures have been replicated in different cities by independent researchers. The present study replicated the NALP neighborhood observation measure by independent researchers in a different city and found similar results to the original report. The results showed that the NALP is a stable and reliable neighborhood observational measure with utility in more than one city.

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