Rethinking Walkability

Exploring the Relationship Between Urban Form and Social Cohesion

Andrew Sonta
Data Science Institute

Xiaofan (Fred) Jiang
Data Science Institute | Electrial Engineering

Andrew Smyth
Data Science Institute | Civil Engineering

Background

Walkability is a popular design goal, shown to improve:

- Carbon emissions
- Localized pollution
- Health ouctomes (physical) [1]

Neighborhood-level social cohesion is linked with:

- Social resiliency
- Health outcomes (non-physical)
- Wellbeing [2]

It is hypothesized that the urban design influences cohesion, but relationship is unclear [3]

	Built Environment				
	Density	Design	Destination	Diversity	Overall
Collective efficacy	?	?	?	?	?
Attachment	?	?	?	?	?
Social capital	?	?	?	?	?
Social cohesion	?	?	★↑	?	★↑
Overall	?	★↑	★↑	?	★↑

Reframing walkability: Breaking down the different components of walkable design that impact social experiences

Need a nuanced, data-driven analysis

Hypothesis

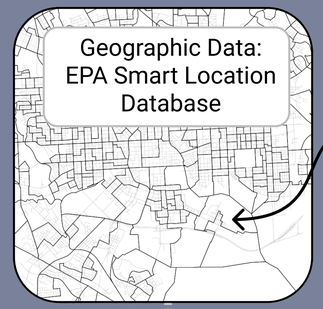
Each of the following aspects of urban design positively impacts social cohesion:

- Density
- Diversity (mix of use)
- Connectedness

Methods + Results

Data and approach

Leveraging a blend of geographic and survey data



Census Block Group 500–3,000 residents

Baltimore Ecosystem Study Survey n = 9670 5 cities

Demographics
- Age
- Education
- Race
- Income
- Sex

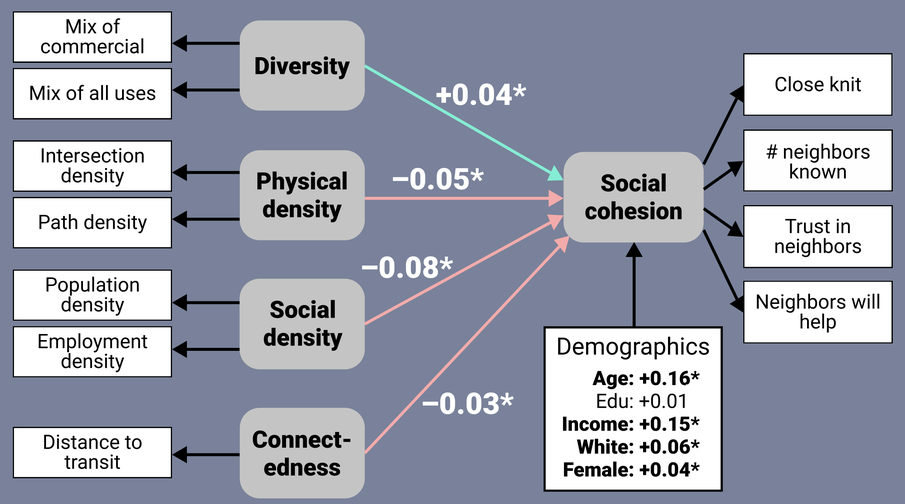
Design of Built Environment
- Diversity (mix of use)
- Physical density (streets)
- Social density (people)
- Accessibility (transit stops)

Statistical analysis

Social Cohesion
- Close knitedness
- # of neighbors known
- Trust in neighbors
- Neighbor helpfulness

Statistical analysis and results

Structural Equation Modeling (SEM) with Partial Least Squares (PLS)



* significant at 99% confidence level

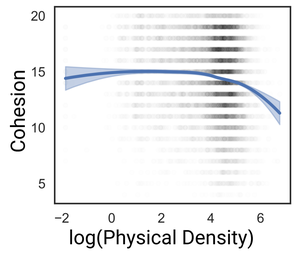
Takeaways

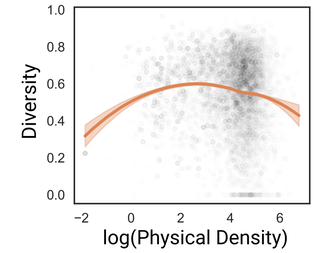
Density vs. **Diversity**

Higher density associated with less cohesion

Higher diversity (mix of use) associated with more cohesion

Highest physical density neighborhoods have weakest cohesion and a drop-off in diversity.





Large opportunity to improve the densest parts of our cities.

Limits

- Limited to 5 cities
- Limited to surveys
- Weak model fit

Outlook

- Expand scope
- Data-driven inference of cohesion?
- Novel descriptors of social experience

References

1. Rogers, S., Gardner, K., and Carlson, C. (2013). "Social Capital and Walkability as Social Aspects of Sustainability." Sustainability, Multidisciplinary Digital Publishing Institute, 5(8), 3473–3483.
2. Kawachi, I., and Berkman, L. F. (2015). "Social Capital, Social Cohesion, and Health." Oxford University Press, Oxford, UK.
3. Mazumdar, S., Learnihan, V., Cochrane, T., and Davey, R. (2018). "The Built Environment and Social Capital: A Systematic Review." Environ. Behav., SAGE PublicationsSage CA: Los Angeles, CA, 50(2), 119–158.