Does Physical Activity Spatially Cluster? Preliminary Findings from an Analysis of Older Women Living in Three U.S. States

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Background

Among public health practitioners and researchers, there has been a growing recognition of the need for environmental and policy approaches to effectively promote physical activity (PA).[1] Evidence of relationships between the built environment and PA has accumulated in recent years. However, little is known about how PA may be spatially clustered, and whether demographic, health-related, and built environment factors can explain these clusters.[2]

Objectives

To identify spatial clustering of PA among older women in three states and determine whether the geographic distribution of demographic, health-related, and built environment variables account for spatial clusters.

Methods

Participants
- 22,961 Nurses' Health Study (NHS) participants in California, Massachusetts, and Pennsylvania with geocoded home addresses and complete information on PA items from 2004 NHS survey

Physical activity outcome
- Meeting guideline of 500 MET-min/week via walking[3]

Covariates
- Demographic: age, nurse's education, husband's education
- Health-related: walking limitations, obesity
- Built environment: population density, intersection density, facility density

Statistical analyses
- Spatial scan statistic[4] used to test for areas with higher and lower likelihood of meeting PA guideline at county level
- Unadjusted models and models adjusted for geographic distribution of covariates
- Monte Carlo test for statistical significance (p-value <0.05).

Results

Sample characteristics
- Age = 70.0 ± 6.9 years; 97% White; 21% Obese
- 23 % met PA guideline

Massachusetts
- Spatial cluster for higher likelihood of meeting PA guideline not explained by covariates
- No clusters found for lower likelihood of meeting guideline

Pennsylvania
- Spatial cluster for higher likelihood of meeting PA guideline partially explained by geographic distribution of walking limitations
- No clusters found for lower likelihood of meeting guideline

California (See Table 1 and Figure 1)
- Overall, spatial clusters for higher and lower likelihood of meeting PA guideline partially explained by covariates
- Spatial clusters not explained by geographic distribution of nurse's education, population density, and facility density
- Spatial cluster for lower likelihood of meeting guideline fully explained by intersection density

Table 1. Spatial clusters for higher and lower likelihood of meeting PA guideline, California

Cluster*	Models**	Explanation***
1	Unadjusted - higher	-
2	Age	Partial - size
2	Husband's education	Partial - size
2	Obesity	Partial - size
3	Walking limitations	Partial - size, location
4	Unadjusted - lower	-
5	Age	Partial - size
5	Husband's education	Partial - size
5	Obesity	Partial - size
5	Walking limitations	Partial - size
-	Intersection density	Full

Note: * Cluster shown in Figure 1. ** Models adjusted for one covariate at a time. *** "Partial" means that the covariate affected either the size or both size and location of the cluster, as compared to unadjusted cluster. "Full" means that the covariate fully explained the cluster (i.e., cluster disappeared).

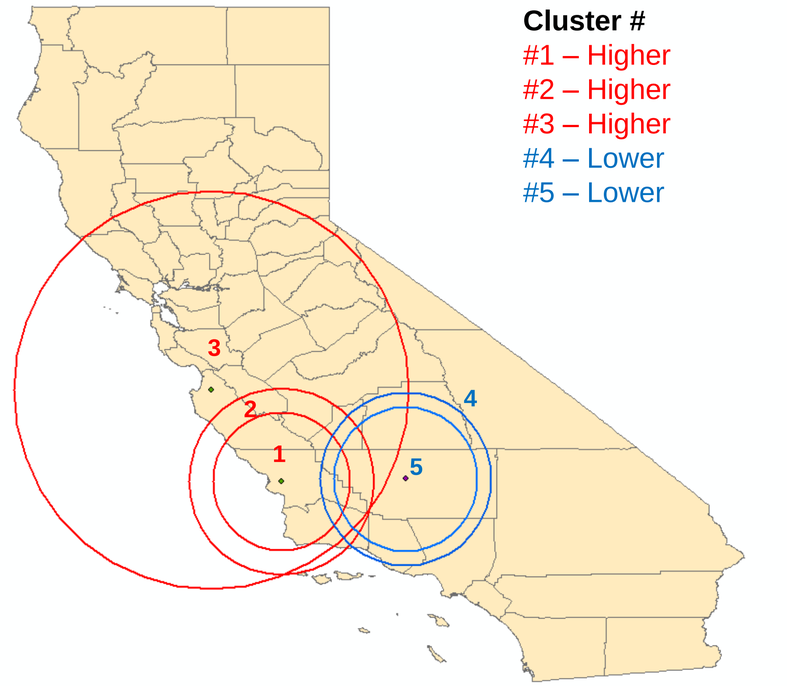

Figure 1. Spatial clusters of meeting PA guideline in California

Conclusions

Significant spatial clusters of meeting PA guideline were found for older women in three states. The geographic distribution of covariates did not fully explain spatial clusters, except for intersection density, which explained the lower likelihood spatial cluster in California. Further examination of the effects of demographic and built environment variables on spatial clusters of PA is needed.

References

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