Social Inclusion
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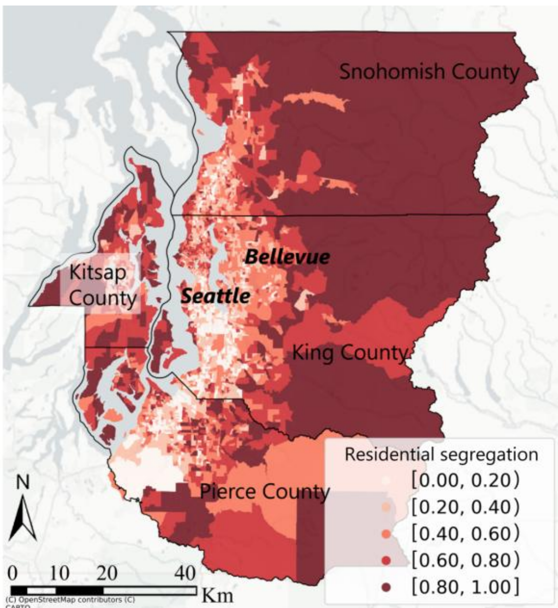
Supplementary File

Appendix A. Definition of Residential Neighborhoods and Sensitivity to Spatial Scale

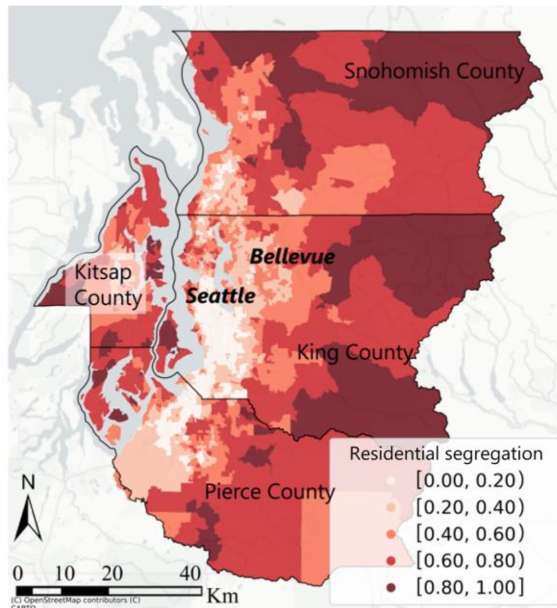
The definition of residential neighborhoods is subject to the modifiable areal unit problem (MAUP), whereby measured segregation varies with the spatial scale and zoning of areal units. To assess the sensitivity of residential segregation to neighborhood definition, we compared alternative distance- and adjacency-based operationalizations. Distance-based approaches, such as k-nearest neighbor (KNN) methods, offer spatial consistency across urban and suburban contexts by defining neighborhoods based on proximity rather than administrative boundaries. However, expanding residential neighborhoods—whether distance- or contiguity-based—inevitably increases population size and spatial extent, introducing spatial smoothing effects that attenuate local variation in segregation. Our comparisons show that expanding residential neighborhoods to include additional census block groups (e.g., k = 3, 5, or 7) progressively smooths segregation patterns by aggregating larger and more heterogeneous populations. This effect is even more pronounced when census tracts are used as the base unit, as tract-based neighborhoods already encompass relatively large areas and populations, further diluting fine-scale socio-spatial differentiation. Conceptually, census block groups represent the finest spatial resolution at which residential context can be meaningfully approximated in the U.S. context. With typical populations of 1,000–1,500 residents, block groups align more closely with lived residential environments than larger census units. Using the home census block group alone therefore minimizes arbitrary neighborhood expansion, limits MAUP-related bias, and preserves local heterogeneity central to residential segregation analysis.

As a robustness check, we estimated alternative models using tract-based residential definitions. While substantive relationships among telework, activity behavior, and experienced segregation remain consistent, larger neighborhood definitions systematically reduce observed differences between residential and activity-space segregation, indicating that broader spatial aggregations primarily introduce spatial smoothing rather than additional analytical insight. Based on these considerations, the main analysis adopts the home census block group (k = 0) as the primary definition of residential neighborhoods.

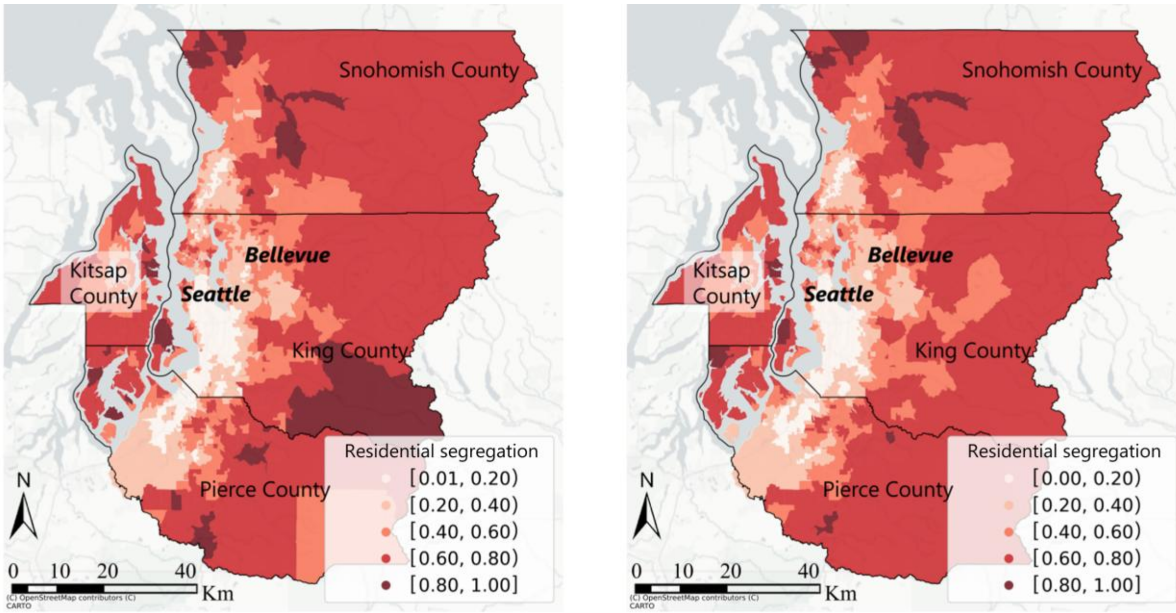
(a) Census block group as the basic unit



(a)K = 0(only include self cbg)
1326 people accounted
1 km2 neighborhoods accounted



(b)K = 3 (home cbg and 3 nearest cbgs)
5288 people accounted
7 km2 neighborhoods accounted

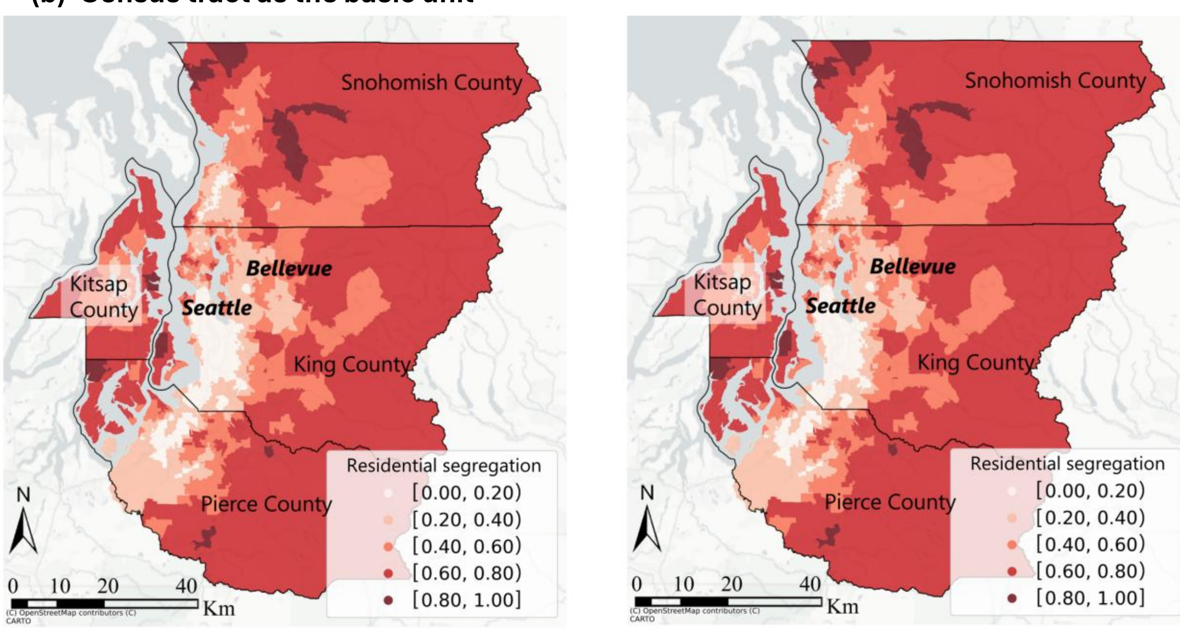


(c)K = 5 (home cbg and 5 nearest cbgs)
7946 people
11 km2 neighborhoods accounted

(d)K = 7 (home cbg and 7 nearest cbgs)
10631 people
15 km2 neighborhoods accounted

Figure A1. Spatial distribution of residential segregation at the census block group level

(b) Census tract as the basic unit

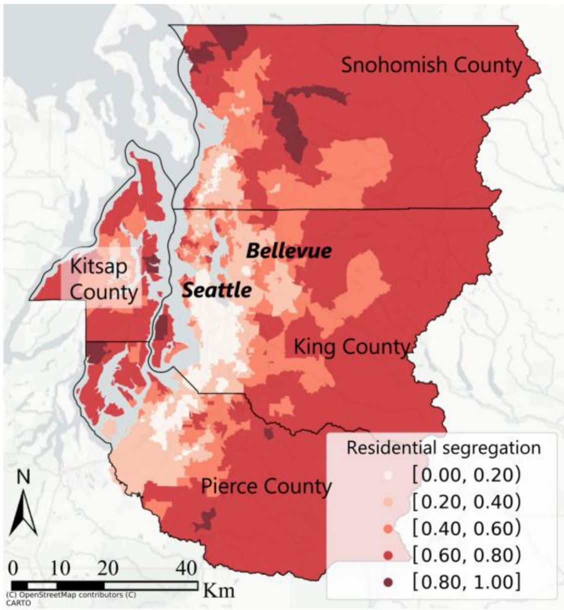


(a)K = 0(only include self census tracts)
4295 people accounted

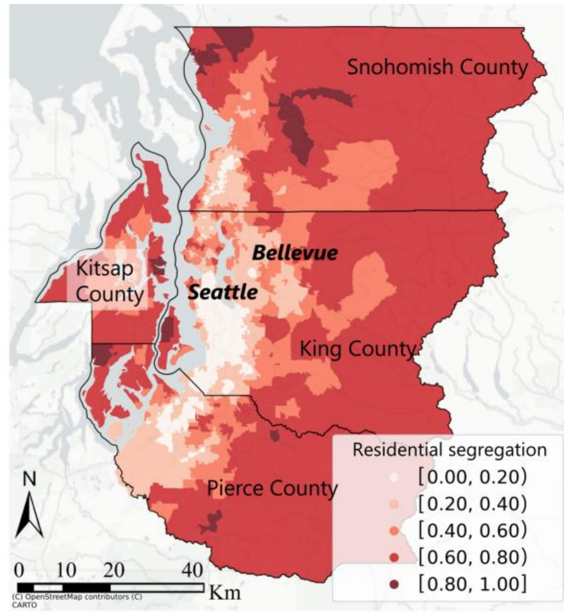
(b)K = 3 (home census tract and 3 nearest census tracts)

6 km2 neighborhoods accounted

16894 people accounted
26 km2 neighborhoods accounted



(c)K = 5 (home census tract 5 nearest census tracts)
25329 people accounted
39 km2 neighborhoods accounted

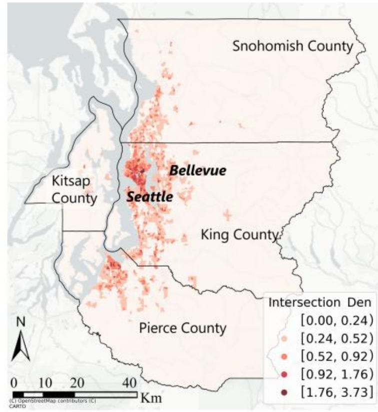


(d)K = 7 (home census tract 7 nearest census tracts)
33807 people accounted
53 km2 neighborhoods accounted

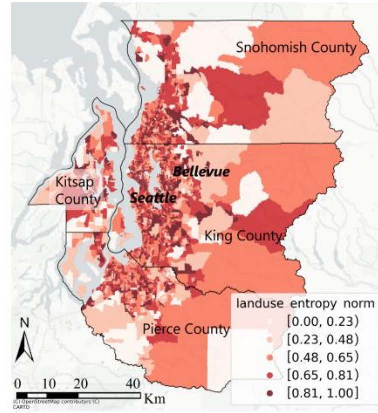
Figure A2. Spatial distribution of residential segregation at the census tract level

Appendix B

(a)Population density (1000 persons/ km^2)

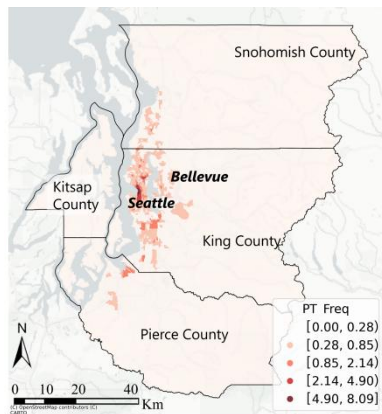


(b)Intersection density (100 counts/km^2)



(c)Land-use entropy normalized

(d)Job accessibility (10^5 Jobs reached by public transit within 45 minutes)



(d)Transit service frequency (100/within a 0.25-mile (approximately 400 meters, using international units) buffer of the CBG boundary)

Figure B1. Spatial distributions of built environment in the Puget Sound Region

Appendix C

Table C1. SEM model performance indicator

Fit Index	Meaning	Interpretation
Chi-square (χ^2)	Tests the null hypothesis that the model fits the data perfectly.	A significant χ^2 ($p < 0.05$) suggests poor fit, but it's very sensitive to sample size and model complexity.
Degrees of Freedom (DoF)	Number of independent pieces of information available to estimate parameters.	Used in computing the chi-square statistic. Higher degrees often mean a more constrained model.
CFI (Comparative Fit Index)	Compares model fit to a baseline model (typically a null model).	Values ≥ 0.90 indicate acceptable fit; ≥ 0.95 indicate good fit.
TLI (Tucker-Lewis Index)	Similar to CFI but penalizes for model complexity more strongly.	Values ≥ 0.90 indicate good fit. Sensitive to sample size and model parsimony.
GFI (Goodness-of-Fit Index)	Proportion of variance accounted for by the model.	Values ≥ 0.90 indicate acceptable fit; however, sensitive to sample size and model complexity.
AGFI (Adjusted GFI)	Adjusts GFI based on degrees of freedom and number of parameters.	Values ≥ 0.90 indicate acceptable fit; more conservative than GFI.
RMSEA (Root Mean Square Error of Approximation)	Measures lack of fit per degree of freedom; penalizes complexity.	Values ≤ 0.06 indicate good fit; ≤ 0.08 acceptable; > 0.10 poor fit. Confidence intervals are often used.

Appendix D

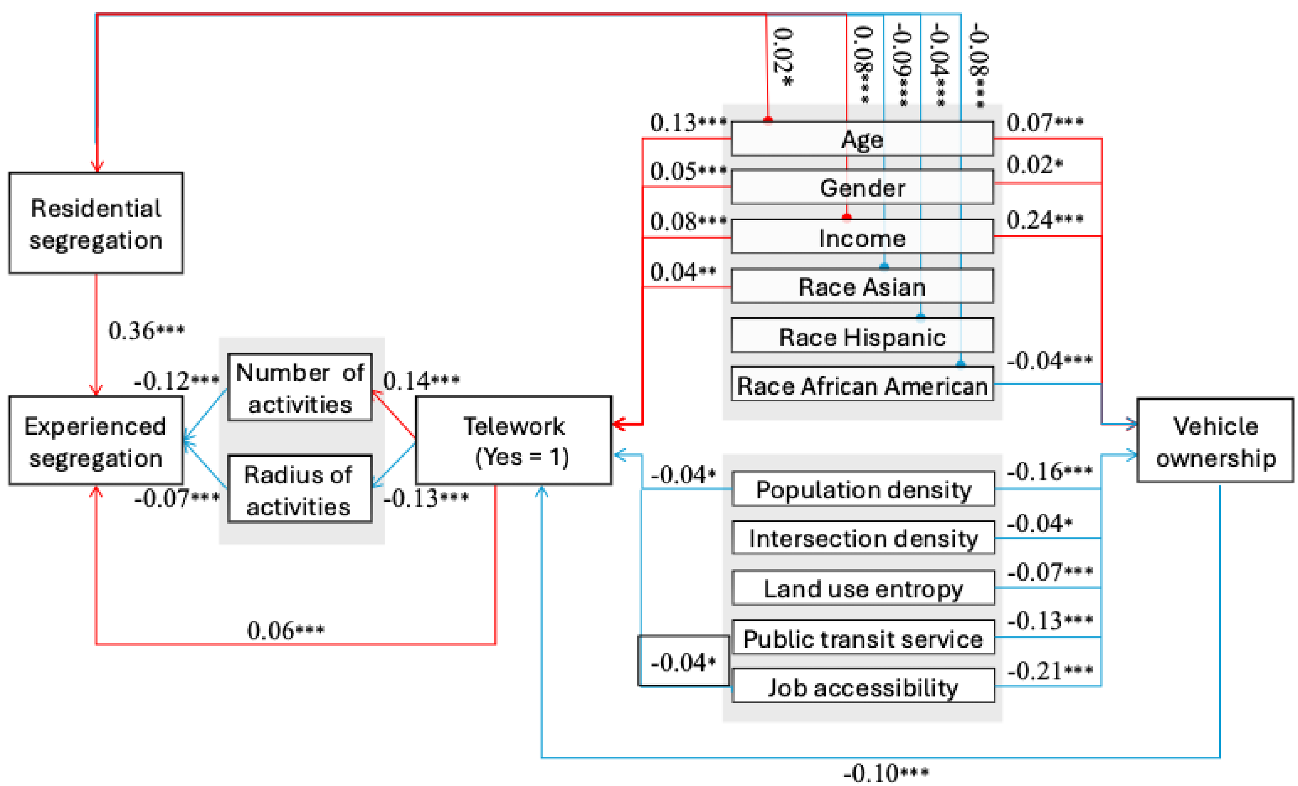


Figure D1. Illustrations of how telework influences experienced segregation (Residential neighborhood is defined at the census tract level)