Differences in Transportation and Leisure Physical Activity by Neighbourhood Design

GR McCormack[1,2], A Blackstaffe[1], J Koohsari, K Oka, L McLaren[1], C Friedenreich[1,4], B Sandalack[2], F Uribe Alaniz[2], A Nettel-Aguirre[1], M Potestio

[1]Cumming School of Medicine, University of Calgary, Canada
[2]Faculty of Environmental Design, University of Calgary, Canada
[3]Faculty of Sports Sciences, Waseda University, Tokorozawa, Japan
[4]Alberta Health Services, Canada

UNIVERSITY OF CALGARY

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INTRODUCTION

- The built environment can enable and restrict physical activity and have varied effects on different types of physical activity[1].
- Increased pedestrian connectivity, high mix of destinations, higher residential densities, and availability of pedestrian and cycling infrastructure are more supportive of walking and cycling versus other types of physical activity and more supportive of transportation versus leisure physical activity[1].
- Residential self-selection may bias associations between the built environment and physical activity[2,3].
- The lack of adjustment for residential self-selection in observational studies limits causal inference[4,5].

OBJECTIVE

- Compare transportation and leisure physical activity between three neighbourhood types, defined by their block pattern (grid, warped-grid, and curvilinear)
- ***Hypothesis:*** *Transportation walking and cycling will be higher among those residing in grid ("more walkable") versus warped-grid and curvilinear neighbourhoods ("less walkable").*

METHOD

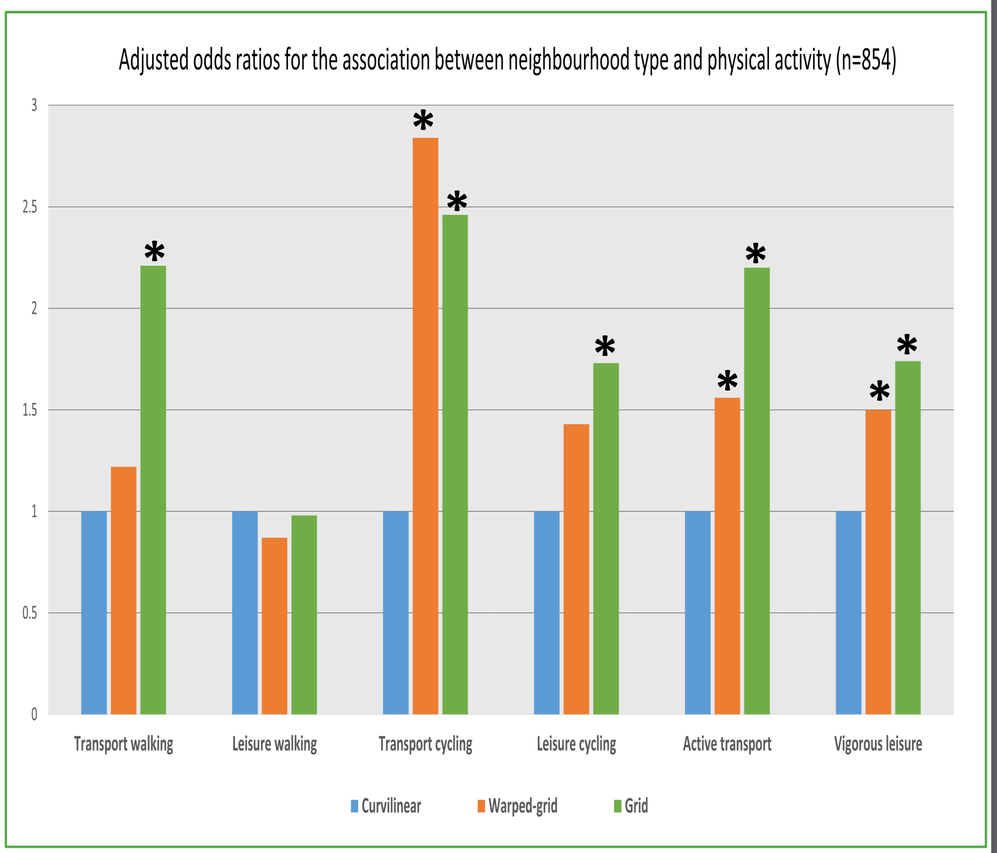
- Stratified random sample of households from 12 established (pre-early 1980) Calgary neighbourhoods with different block patterns (grid, warped-grid, curvilinear) and socioeconomic status (SES)[6].
- April 2014, 1023 adults (response rate=10.1%) completed an online questionnaire capturing physical activity, sociodemographic characteristics, and reasons for neighbourhood choice.
- **Past Year Total Physical Activity Questionnaire** captured transportation and leisure physical activity undertaken during the previous 12-months[7].
- Physical activities assigned Metabolic Equivalents (low-intensity: <2.5 METS; moderate-intensity: 2.5 to 5.9 METS; and, vigorous-intensity: ≥6 METs) and MET-hours/week estimated[8].
- 13 items captured reasons for neighbourhood choice (e.g., proximity and quality of destinations, proximity to work, highway access, aesthetics)[9].
- Sociodemographic variables: age, sex, ethnicity, education, household income, marital status, number of children aged <18 years, dog ownership, motor vehicle access, and injury.
- Logistic and linear regression estimated associations between neighbourhood block pattern, and transportation and leisure physical activity (participation and MET-hours), adjusting for reasons for neighbourhood choice, neighbourhood SES, and sociodemographic variables.

RESULTS

Table 1. Sociodemographic characteristics and reasons for neighbourhood choice by neighbourhood block pattern

	Curvilinear (n=290) Estimate	Warped-grid (n=336) Estimate	Grid (n=228) Estimate
Age (years)*	57.5±13.9	53.9±13.7	50.7±13.3
Sex (women)*	57.9%	65.2%	60.1%
Dependents < 18 years (any)	22.8%	34.5%	36.8%
Ethnicity (non-white)	12.1%	9.2%	11.8%
Education (university)*	63.8%	71.7%	82.9%
Household income (≥$120K)*	32.4%	44.3%	54.4%
Marital status (married/common-law)	81.4%	75.0%	76.8%
Dog ownership (owner)	29.7%	32.4%	30.7%
Motor vehicle access (never/don't drive)	19.0%	12.8%	14.9%
Injury in past year (no)	60.3%	58.3%	67.5%
Neighbourhood SES (advantaged)	74.1%	55.7%	71.1%
Proximity to stores/services (important)*	76.6%	76.5%	87.3%
Proximity to recreation (important)*	80.3%	81.3%	89.0%
Proximity to downtown (important)*	58.3%	81.3%	93.0%
Proximity to work (important)*	66.6%	79.5%	87.3%

**p<.05 for differences between neighbourhood types*



***p<.05 relative to curvilinear neighbourhood**

- **N=854** cases provided complete data and reported residing in their neighbourhood for at least 12-months.
- Relative to curvilinear neighbourhoods, grid neighbourhood participants had higher adjusted odds ($p < .05$) of participating in transportation walking (OR = 2.21), transportation and leisure cycling (OR = 2.46 and OR = 1.73), and vigorous leisure physical activity (≥6 METs; OR = 1.74).
- No differences in weekly transportation or leisure MET-hours by neighbourhood type; however, combined MET-hours/week was higher for warped-grid versus curvilinear neighbourhoods (143.7 vs. 124.1, $p < .05$)

CONCLUSIONS

- Neighbourhood design may shape physical activity patterns in adults, even taking reasons for neighbourhood choice, sociodemographic factors, and neighbourhood socioeconomic status into account.
- Neighbourhood design may impact different types of physical activity – grid neighbourhoods in Calgary support transportation and leisure physical activity including walking, cycling, and vigorous-intensity physical activity among adults.
- More evidence on the role of neighbourhood design for enabling or restricting different types of physical activity is necessary to inform local urban planning and public health interventions that might result in net gains in population-levels of physical activity.

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CONTACT

Dr. Gavin McCormack, Cumming School of Medicine, University of Calgary, Canada,
gmccorma@ucalgary.ca

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