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**DELINEATING NEIGHBOURHOOD AND
EXPOSURE IN BUILT ENVIRONMENT AND
PHYSICAL ACTIVITY RESEARCH**

**A thesis presented in partial fulfilment of the requirements for
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ABSTRACT

Several decades worth of public health research has shown that characteristics of people's environment are associated with health-related behaviours and outcomes. Much of this research has used the concept of a residential neighbourhood to delineate the relevant environment. However, there is no uniformity in the neighbourhood delineation methods used in the literature and little consideration is given to whether they adequately capture people's exposure to the environmental characteristics under investigation, or whether the choice of delineation methods influences results. This dissertation has addressed these issues and suggested some methods researchers may use to delineate spatial context more precisely.

The first part of the thesis used data from a study of neighbourhood environment and physical activity in adults to examine the impact of different methodological choices on modelling results. Both neighbourhood delineation method and scale were shown to determine whether significant associations were found between the built environment and physical activity. Modelling results also varied depending on the built environment and outcome measures used. A detailed exploration of different methods of operationalising the road network buffer demonstrated that, even for a single neighbourhood delineation method, methodological choices can alter the results.

The second part of the thesis used GPS data from a study of children's physical activity and independent mobility to examine how well a number of road network buffers and activity space delineation methods represented exposure to the environment. Results showed less than half of children's seven-day activity was

captured by residential road network buffers at a range of scales. Most activity space delineations were better representations of where children spent time than road network buffers. However, the measures of activity space commonly used in health research - the convex hull and standard deviation ellipse – were poor representations of exposure.

Activity space delineations require detailed location data that is not always available. Therefore, there is a need for delineation methods that do not require this data. Five enhancements to standard road network buffers were proposed. One enhancement - including school and home in the buffer - was tested and shown to be an improvement on standard road network buffers.

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ABBREVIATIONS

| | |
|------|---|
| BMI | Body Mass Index |
| CATI | Computer-Aided Telephone Interview |
| CAU | Census Area Unit |
| CBD | Central Business District |
| CCD | Census Collection District |
| CVD | Cardiovascular Disease |
| DA | Dissemination Area |
| DPA | Daily Path Area |
| dph | Dwellings per hectare |
| ED | Enumeration District |
| GIS | Geographic Information Systems |
| GPS | Global Positioning System |
| Ha | Hectare |
| IPEN | International Physical Activity and Environment Network |
| KDE | Kernel Density Estimation |
| KITC | Kids In The City |
| km | Kilometres |
| m | Metres |

| | |
|-------|--|
| MAUP | Modifiable Areal Unit Problem |
| MB | Meshblock |
| mi | Mile |
| MVPA | Moderate-Vigorous Physical Activity |
| NA | Not Applicable |
| NDAI | Neighbourhood Destination Accessibility Index |
| NO2 | Nitrogen Dioxide |
| RNB | Road Network Buffer |
| s | Seconds |
| SD | Standard Deviation |
| SDE | Standard Deviation Ellipse |
| SES | Socio-Economic Status |
| UGCoP | Uncertain Geographic Context Problem |
| UK | United Kingdom |
| URBAN | Understanding the Relationship Between physical Activity and Neighbourhood |