School Neighbourhood Built Environment and Active Transport to School in Adolescents

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School Neighbourhood Built Environment

Built environment refers to the entirety of human designed and built places and facilities

In relation to active transport to school (ATS):

- Provision/maintenance of supportive environmental infrastructure
- Neighbourhood aesthetics (absence of litter; maintained green spaces)
- Home neighbourhood intersection density
- Distance to school
- Personal and traffic safety concerns

Associations between ATS and school neighbourhood built environment are context-specific due to differences in built environment design, cultural and social norms, and neighbourhood safety.
School Neighbourhood Built Environment

Micro-scale features
- Environmental details that directly influence activity experiences
- Easier/cheaper to modify

Macro-scale features
- Overall community design and structure
- General environmental supportiveness for activity

Perceived features
- Perceptions correlate with ATS behaviour
- BUT may not accurately reflect the availability of features
Built Environment Assessment

Observational neighbourhood street audit tools
• Provide a comprehensive assessment of micro-scale and (to a lesser extent) macro-scale features
• Micro-scale environment is best assessed through direct observation

Geographic Information Systems (GIS) analysis
• Predominantly macro-scale environmental features

Perceptions
• Exploration of temporal aspects (such as traffic volume) not captured in street audits or GIS analysis

Complementary sources of information to improve our understanding of physical, spatial and temporal factors associated with ATS.
Study Purpose

To examine associations between the school neighbourhood built environment, active transport to school and adolescents’ perceptions of the school route across all twelve Dunedin secondary schools.

Built environment assessment
- Perceived environment
- Micro-scale (observed)
- Macro-scale (objective)
Among adolescents living ≤2.25 km from school:

- Transport to school habits
- Adolescents’ perceptions of the route to school

**Perceived Built Environment**

<table>
<thead>
<tr>
<th>Traffic Volume</th>
<th>Dangerous Crossings</th>
<th>Safety of route for walking and cycling</th>
<th>Absence of footpaths and cycle lanes</th>
</tr>
</thead>
</table>

**Total sample (n=471)**

- Age (years): 15.2 ± 1.4
- Gender: Female 56.3%
- Ethnicity: NZ European 71.1%, Māori 11.5%
Micro-Scale Built Environment (Observed)
MAPS Global Auditing

<table>
<thead>
<tr>
<th>MAPS Global sections</th>
<th>Total number assessed</th>
<th>Range between schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route</td>
<td>934</td>
<td>10-160</td>
</tr>
<tr>
<td>Segment</td>
<td>934</td>
<td>10-160</td>
</tr>
<tr>
<td>Crossing</td>
<td>767</td>
<td>3-118</td>
</tr>
<tr>
<td>Cul-de-sac</td>
<td>14</td>
<td>0-6</td>
</tr>
</tbody>
</table>

Total sum of street segment lengths: 106.6 km!
Macro-Scale Built Environment (Objective)

- School neighbourhood = geographic unit of analysis
- 0.5 km street-network buffer-zone

- Intersection density
- Residential density
- Land use mix

Walkability index
Results
Results: School Characteristics

Large across-school variability in ATS rates for adolescents living ≤2.25 km from their school (range: 47.8% - 70.0%)
Results: Bivariate Analysis

School neighbourhood built environment characteristics

Micro-scale environment

Sub-scales/Scores
- Overall grand score
- Pedestrian infrastructure
- Pedestrian design
- Bicycle facilities

Macro-scale environment

GIS measures
- Intersection density
- Residential density
- Land use mix
- Walkability index

Homogeneity of MAPS Global scores around all schools
Results: Bivariate Analysis

Adolescents’ perceptions

Traffic Volume

Dangerous crossings

Safety of route for walking and cycling

Absence of footpaths and cycle lanes

School neighbourhood built environment characteristics

Micro-scale environment

Adolescents’ perceptions

Sub-scales/Scores

Overall grand score

Pedestrian infrastructure

Pedestrian design

Bicycle facilities

r=-0.18 to r=0.10; all p<0.05

GIS measures

Intersection density

Residential density

Land use mix

Walkability index

r=0.09 to r=0.24; all p<0.05

Macro-scale environment

Micro-scale environment

Sub-scales/Scores

Overall grand score

Pedestrian infrastructure

Pedestrian design

Bicycle facilities

r=-0.18 to r=0.10; all p<0.05
Results: Bivariate Analysis

ATS

Concern over high traffic volume along the route

Concern over safety of walking to school

Concern over safety of cycling to school

Adolescents’ perceptions

Traffic Volume

$r = -0.17; p < 0.001$

$r = -0.12; p = 0.012$

$r = -0.10; p = 0.024$

Dangerous crossings

Safety of route for walking and cycling

Absence of footpaths and cycle lanes

Therefore, features of the school neighbourhood built environment influence adolescents’ perceptions of the school route, including safety for walking and cycling.
Adolescents’ perception of the safety of walking to school was the strongest correlate of ATS among adolescents living ≤2.25 km of school.

Consistently higher odds of ATS among adolescents with less safety concerns (p=0.016).
Brief Conclusions

- Although school neighbourhood built environment features were not significantly correlated with ATS among Dunedin adolescents, they are likely to mediate adolescents’ perceptions of walking safety.

- To encourage uptake of ATS:
  - School neighbourhood should be considered as a part of efforts aimed at enhancing perceptions of safety among adolescents.
  - Interventions should aim to improve adolescents’ perceptions of walking safety (such as providing appropriate pedestrian infrastructure and reducing traffic volume).
Physical and spatial assessment of school neighbourhood built environments for active transport to school in adolescents from Dunedin (New Zealand)

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