BEATS Study (2013-2016): Preliminary Findings

Dr Sandy Mandic
Active Living Laboratory
School of Physical Education, Sport and Exercise Sciences
University of Otago

21 July 2016
Active Living Laboratory
Working with the community, for the community

www.otago.ac.nz/active-living
Travel behaviour

Active Transport

Health

Enjoyment

Environment

Preferences

Constraints

Cost

Destination characteristics

Discomfort

Safe routes

Personal factors

Family factors

Environmental factors

Active Transport

Endurance

Health

Enjoyment

Environment

Preferences

Constraints

Cost

Destination characteristics

Discomfort

Safe routes

Personal factors

Family factors

Environmental factors
The BEATS Study investigates:

- transport to school habits,
- the neighbourhood environment and
- physical activity habits of Dunedin adolescents.

The results will suggest potential ways to encourage students’ active transport to school and increase physical activity levels in adolescents.

Mandic S et al. BMJ Open. 2016; 6:e011196
BEATS Study Framework: Ecological Model for Active Transport

Adapted from Sallis JF et al. Circulation. 2012;125:729-737

Policy Environment

Built Environment

Social/Cultural Environment

Individual

School policy for ATS
School’s road safety procedures

Social support
Social norms

Sociodemographics
Behaviour
Motivations/barriers

Walkable community design
Pedestrian & bicycle facilities

Mandic S et al.
BMJ Open. 2016; 6:e011196

www.otago.ac.nz/beats
Built Environment and Active Transport to School: BEATS Study

Otago and NZ Academic Collaborations

- Dr Sandra Mandic (Exercise Sciences)
- Dr John Williams (Marketing), Dr Jillian Frater (Canterbury)
- Dr Antoni Moore (Surveying)
- Dr Susan Sandretto (Education)

International Academic Collaborations

- Dr Debbie Hopkins (Oxford University, Oxford, United Kingdom) (University of Otago: 2013-Feb 2016) (Transport)
- Prof John C Spence (University of Alberta, Edmonton, Canada) (Behavioural Medicine)
- Dr Enrique García Bengoechea (McGill University, Montreal, Canada) (Health Promotion)

Community Collaborations and Partnerships with Stakeholders

- Mrs Charlotte Flaherty (Dunedin City Council)
- Gordon Wilson (Dunedin Secondary Schools’ Partnership)
- Getting Dunedin Active Initiative
BEATS Research Team

Principal Investigator:
Dr Sandy Mandic, School of Physical Education, Sport and Exercise Sciences

Associate Investigators:
Dr Tony Moore, School of Surveying, University of Otago
Dr John Williams, Department of Marketing, University of Otago
Prof John C Spence, University of Alberta, Edmonton, Canada
Dr Enrique García Bengoechea, McGill University, Montreal, Canada
Dr Debbie Hopkins, Oxford University, Oxford, UK
Ms Charlotte Flaherty, Safe and Sustainable Transport Coordinator, DCC

Advisory Board:
Dr Janet Stephenson, Centre for Sustainability: Agriculture, Food, Energy, Environment
Mr Gordon Wilson, Chair, Dunedin Secondary School Principals Association
Mr Andrew Lonie, Recreation Planning Officer, Dunedin City Council (2013-2015)
Ms Ruth Zeinert, Project Manager, Getting Dunedin Active, Dunedin (2013-2016)
Dr Tara Duncan, Department of Tourism, University of Otago
Dr Susan Sandretto, College of Education, University of Otago

Project Coordinators: Leiana Sloane, Emily Brook (2015); Ashley Mountfort (2014)
BEATS Research Students and Research Assistants (2013-2016)

Research Students

- Kek Chiew Ching (Master’s)
- Leiana Sloane (Honours)
- Lauren Keaney (Honours)
- Tessa Pocock (Summer research)
- Alex Mintoft-Jones (Summer research)
- Ashley Mountfort (Summer research)

20+ volunteers

Technical and admin support:
Hamish Gould, Nigel Barrett, Kimberley Lamond

Research Assistants

- Judith Rodda, PhD
- Daniela Aldabe, PhD
- Alex Mintoft-Jones
- Tessa Pocock
- Emily Brook, BSc PGDip
- Candice Perring, BPhEd
- Daria Gibbons, BSc
- Hayley Horwood, MPhEd
- Claire Hodge, PGDip
- Angela Findlay, PhD student
- Chelsea Cunningham, BPhEd
- Madeep Kaur, PhD student
- Lizhou Liu, PhD student
- Priya Kannan, PhD student
- Arum Balasundaram, PhD student
- Kareem Diab, PhD
- Manal Aziz, PhD
BEATS Study School Recruitment:
100% (12 schools in Dunedin)
Published Journal Articles

Built Environment and Active Transport to School (BEATS) Study: Multidisciplinary and Multi-Sector Collaboration for Physical Activity Promotion

El estudio «Entorno construido y desplazamiento activo a la escuela (BEATS)»: colaboración multidisciplinaria y multisectorial para la promoción de la actividad física


*University of Otago, Dunedin, New Zealand. **Dunedin City Council, Dunedin, New Zealand. ***Dunedin Secondary Schools’ Partnership, Dunedin, New Zealand

Open Access

BMJ Open

Built Environment and Active Transport to School (BEATS) Study: protocol for a cross-sectional study


Sandra Mandic,1 John Williams,2 Antoni Moore,3 Debbie Hopkins,4 Charlotte Flaherty,5 Gordon Wilson,6 Enrique García Bengoechea,7 John C Spence8
Schools’ Representation in the BEATS Student Survey 2014/15

1,663 adolescents with valid data

Age: 15.3±1.4 yrs (range: 13-19 yrs)
44.4% Boys
73.2% NZ European
10.4% Māori
10.2% boarders
4.1% international

12 out of 12 secondary schools in Dunedin
BEATS Focus Groups & Interviews

Focus Groups
• Students
  – 10 focus groups
  – 54 students from 10 schools
• Parents
  – 6 focus groups
  – 24 parents
• Teachers
  – 2 focus groups
  – 14 participants

Interviews
• All 12 Dunedin secondary school principals

Mandic S et al. BMJ Open. 2016; 6:e011196
Still Recruiting for the BEATS Parental Survey

BEATS Study
Built Environment and Active Transport to School

“How do your teens get to school?”
Parents needed for research

As a parent/guardian of a secondary school student, we invite you to complete a 15 to 20 minute online survey. Enter into a draw to win an iPad or $250 grocery/petrol vouchers. Sign up and complete survey online: http://goo.gl/aubw4u

For more information contact:
BEATS Study Coordinator | Tel 479 9112
Email beats@otago.ac.nz | Web otago.ac.nz/beats

This project has been reviewed and approved by the University of Otago Human Ethics Committee. Reference 13/2013.
BEATS Study Research Outputs (2013-2016)

- **Journal articles**
  - 2 Published
  - 5 Submitted
  - 7 in preparation

- **Conference abstracts**
  - 8 International
  - 6 National
  - 27 Local

- **Technical Reports**
  - 18 Published

- **Presentations**
  - 2 Keynotes
  - 12 Academic
  - 13 Non-academic

- **Symposia**
  - 2 Local (2014, 2016)
  - 1 International (2017)

3-Year progress report available online:
www.otago.ac.nz/beats
Who is Interested in the BEATS Study Findings?

Dunedin Secondary Schools’ Partnership
Dunedin Secondary Schools
Getting Dunedin Active Initiative
Physical Activity and Nutrition Network Otago
Health Promoting Schools Network

Scientific community

Ministry of Transport
Ensuring our transport system helps New Zealand thrive

Ministry of Health
Manatū Hauora
International Symposium: “Active Living and Environment: Towards a Healthier and More Sustainable Future”

28 - 30 August 2017 | University of Otago | Dunedin | New Zealand

This symposium will gather international and national experts from multiple disciplines including academia, public health, urban design, transportation and environment to exchange ideas.

Register your interest online: goo.gl/aqulDj
For details, visit the Active Living Laboratory website:
otago.ac.nz/active-living/news
Snapshot of Initial Findings

BEATS Study
Built Environment and Active Transport to School

School of Physical Education, Sport and Exercise Sciences
University of Otago
Clustering of (Un)Healthy Behaviours
Factors that Influence Walking to School
Adolescents’ Perceptions of Cycling versus Walking to School
Sandy Mandic, John Williams, Antoni Moore, Debbie Hopkins, Enrique García Bengoechea, John C Spence, Charlotte Flaherty, Leiana Sloane
Weight Status of Dunedin Adolescents

- Underweight: 3.2%
- Normal Weight: 69.6%
- Overweight: 20.5%
- Obese: 6.8%

Source: BEATS Student Survey 2014/2015
n=1,300 (measured heights and weights)

Mandic et al. (In review)
Health Behaviours in Dunedin Adolescents

**Physical Activity**
- Guidelines: ≥60 min per day
- Average: 4.2 ± 2.1 days/week
- 17.9% meeting guidelines

**Screen Time**
- Guidelines: ≤2 hrs per day
- Average: 5.4 ± 2.9 hours/day
- 14.2% meeting guidelines

**Fruit and Vegetable Intake**
- Guidelines: More than once a day for both fruit and vegetables
- 29.8% met guidelines

Less than 1/3 of adolescents met individual guidelines

Source: BEATS Student Survey 2014/2015
n=1,300 (self-reported data)

Mandic et al. (In review)
Meeting Physical Activity, Screen Time and Fruit and Vegetable Intake Guidelines

None 54.2%
Two 11.2%
Three 2.5%
One 32.1%

17.1% overweight or obese
37.2% underweight or normal weight

Source: BEATS Student Survey 2014/2015 n=1,300 (self-reported data)
Mandic et al. (In review)
Figure 1. Six clusters identified based on meeting guidelines for physical activity, screen time, fruit and vegetable intake and healthy weight.
Implications

• Presence of multiple risk behaviours in Dunedin adolescents may lead to negative health outcomes in future
  ➢ Need for comprehensive health promotion interventions

• Reducing screen time may have positive effects on improving diet in adolescents

• Current guidelines: too strict or difficult to meet and therefore discouraging?

• Adolescents may not believe that poor health will result from insufficient PA, too much screen time or poor eating habits
  – Especially adolescents with healthy weight may show low interest in participating in healthy alternatives

Mandic et al. (in review)
Implications for Future Interventions

- Health promotion strategies in adolescents
  - Need to address multiple behavioural risk factors
  - Focus on addressing obesogenic risk factors in adolescents with healthy weight

Mandic et al. (in review)
Transport to School Habits in Dunedin Adolescents

<table>
<thead>
<tr>
<th>Mode</th>
<th>Most of the time / All of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driven by others</td>
<td>48.7%</td>
</tr>
<tr>
<td>Walk</td>
<td>30.4%</td>
</tr>
<tr>
<td>School bus</td>
<td>13.3%</td>
</tr>
<tr>
<td>Public bus</td>
<td>6.7%</td>
</tr>
<tr>
<td>Driving myself</td>
<td>5.1%</td>
</tr>
<tr>
<td>Other</td>
<td>2.1%</td>
</tr>
<tr>
<td>Bike (n=22)</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

50.4% liked bike riding for recreation
18.2% often cycled with friends
22.4% often cycled with parents

n=1,476 (boarders excluded)

89.9% liked how they travel to school
76.3% had a bicycle at home
69.2% had 2+ vehicles at home
Distance to school: 6.2±7.4 km
Being Driven to School*

Variation by School

*Most of the time / all of the time

n=1,476
(boarders excluded)
Using only Active Transport (Walking)* to School

Variation by School

*Most of the time / all of the time

n=1,476
(boarders excluded)
Cycling* to School

Variation by School

*Most of the time / all of the time

n=1,476
(boarders excluded)
Probability of Walking to School by Distance

Source: BEATS Student Survey
Walkable and Cycleable Distance to Secondary School in Dunedin

Average distance to secondary school in Dunedin: $6.2 \pm 7.4$ km

- $\leq 2.2$ km: $31.7\%$
- $\leq 4.0$ km: $53.4\%$ (31.7\% + 21.7\%)
- Beyond 4.0 km: 46.6\% (n=1,475, boarders excluded)
Conceptual Framework for Environmental Determinants of Active Travel in Youth

**Physical Environmental Factors**
- Attributes of neighbourhood
  - Provision of facilities
  - Personal safety
  - Road safety
  - Social interaction
  - Facilities to assist walking and cycling
  - Urban form
  - Aesthetics

- Attributes of destination and surroundings
  - Destination
    - Facilities at destination*
    - School size
    - School policy*
  - Characteristics of surroundings
    - Level of urbanisation
    - Urban form
    - Sidewalk completeness

- Attributes of route
  - Length
  - Route directness
  - Road safety
  - Urban form and topography
  - Friends house/shops*
  - Parks/greenspaces*

**Individual factors**
- Parental characteristics
  - Household income
  - Car access
  - Occupational status

- Parental attitudes
  - Attitudes towards active transport
  - Attitudes to environment and climate change

**Perceptions of the environment**
- Parental Perceptions
- Youth Perceptions

**Operates on child**

**Operates on Adolescent**

**Decision making process on mode choice**

**Outcomes**
- Walk or cycle to destination
- Inactive travel to destination

**Main moderators**
- Youth TPA
- Age of youth
- Gender
- Distance to destination

**External factors**
- eg. Weather
- Cost of travel
- Government policy

Panter JR et al. IJBNPA. 2008:5:34
Multivariate Predictors of Walking to School

**Positive correlates**
- Parental encouragement
- Peers walking to school
- Opportunity to socialize with friends
- Walking to school perceived as interesting
- Low neighbourhood traffic speed/volume
- Uninteresting route to school

**Negative correlates**
- Distance to school
- Convenience of being driven to school
- Walking takes too much time
- Need for planning
- After-school schedule
- Lack of interest

Taking into account distance and time constraints, beliefs about walking to school and transport safety were important. Positive peer and parental support are needed.

Mandic et al. (2016) Abstract accepted to ISPAH. (Related)
Perceptions of Route to School for Walking or Cycling

- Too much traffic: 35.6%
- Too many hills: 32.9%
- Boring route: 33.3%
- Dangerous crossing(s): 32.4%
- Convenience of being driven to school by someone on the way to something else: 52.9%

Mandic et al. (2016) Abstract. (Accepted to ISPAH)

(n=753 non-boarders; living ≤4km from school)
Route to School

Too much traffic

- ALL: 36%
- OG: 58%
- StH: 53%
- Kai: 43%
- Kav: 41%
- OB: 40%
- Col: 40%
- Que: 33%
- Tai: 32%
- Bay: 29%
- Kin: 27%
- Joh: 25%
- Log: 22%

n=753 (non-boarders; living ≤4km from school)

Dangerous crossing(s)

- ALL: 32%
- OG: 62%
- StH: 53%
- Kav: 41%
- Col: 37%
- OB: 37%
- Kin: 32%
- Kai: 29%
- Que: 26%
- Log: 26%
- Tai: 26%
- Bay: 25%
- Joh: 23%

n=753 (non-boarders; living ≤4km from school)
Cycling to School in NZ Adolescents

1989/90 travel to school
- 19% of secondary school children biked
- 12% of primary school children biked

2010-2014 travel to school
- 3% of secondary school children biked
- 2% of primary school children biked

Cycling versus Walking to School in Dunedin

Travel behaviour

- Personal factors
- Family factors
- Environmental factors
- Destination characteristics

Preferences
- Cost
- Constraints
- Health
- Environment
- Enjoyment

Constraints
- More logistics-related barriers
- Less intended
- Less preferred

Preferences
- Less infrastructure support
- Less preferred
- Less intended

Health
- Less positive attitudes

Environment
- Less safe

More personal barriers

Discomfort
- Less social support

Safe routes
- Less

More social support

BEATS Student Survey (n=764) (students living ≤4 km from school)

Mandic et al. (2016) Abstract accepted to ISPAH. (Related)
## Walking vs Cycling to School: Social Support

<table>
<thead>
<tr>
<th></th>
<th>Walking</th>
<th>Cycling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peer Support</strong></td>
<td>48.3%</td>
<td>19.1%</td>
</tr>
<tr>
<td>One or more friends</td>
<td>83.4%</td>
<td>17.8%</td>
</tr>
<tr>
<td>walk/cycle to school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not considered cool</td>
<td>9.6%</td>
<td>32.8%</td>
</tr>
</tbody>
</table>

*Less peer, parental and school support for cycling*  

*p < 0.05 walking vs cycling*

**BEATS Student Survey (n=774)**  
(students living ≤4 km from school)
Walking vs Cycling to School in Dunedin

**Adolescents**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is unsafe</td>
<td>38.6%</td>
</tr>
<tr>
<td>My parents think it is unsafe</td>
<td>29.0%</td>
</tr>
<tr>
<td>No footpaths / bike lanes along the way</td>
<td>62.5%</td>
</tr>
</tbody>
</table>

**Parents**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is not safe for my child to walk/cycle to school</td>
<td>61.5%</td>
</tr>
<tr>
<td>No footpaths / bike lanes along the way</td>
<td>68.3%</td>
</tr>
</tbody>
</table>

*Less infrastructure support and more safety concerns for cycling*
**Perceived Safety**

"It is unsafe to walk/cycle to school."

```
<table>
<thead>
<tr>
<th>Location</th>
<th>Walking</th>
<th>Cycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL</td>
<td>40%</td>
<td>11%</td>
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<td>OB</td>
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<td>40%</td>
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</tr>
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</tr>
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</tr>
<tr>
<td>OG</td>
<td>40%</td>
<td>11%</td>
</tr>
<tr>
<td>StH</td>
<td>40%</td>
<td>11%</td>
</tr>
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```

"My parents think it unsafe to walk/cycle to school."

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<td>12%</td>
</tr>
</tbody>
</table>
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n=784 (non-boarders; living ≤4km from school)
## Walking vs Cycling to School

### Intention, Confidence and Control

<table>
<thead>
<tr>
<th></th>
<th>Walking vs Cycling</th>
<th><em>p</em>&lt;0.05 walking vs cycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wants to</td>
<td>43.3%*</td>
<td>8.1%</td>
</tr>
<tr>
<td>Intends to</td>
<td>52.8%*</td>
<td>4.0%</td>
</tr>
<tr>
<td>Confident</td>
<td>80.5%*</td>
<td>56.1%</td>
</tr>
<tr>
<td>Capable</td>
<td>-</td>
<td>56.8%</td>
</tr>
<tr>
<td>Personal control</td>
<td>66.8%*</td>
<td>70.5%</td>
</tr>
<tr>
<td>Does not want to</td>
<td>31.8%*</td>
<td>62.4%</td>
</tr>
<tr>
<td>or like to</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BEATS Student Survey (n=774)**

(students living ≤4 km from school)
Potential Interventions to Promote Cycling to School

- Cycle-friendly uniform: 41.4%
- Safer bike storage at school: 40.1%
- Slower traffic: 36.4%
- Bus bike racks free of charge: 26.2%
- Bike ownership: 32.7%
- Cycling without a helmet: 22.1%

Mandic et al. (2016) Abstract accepted to ISPAH. (Related)
Summary (Part 1)

• More than half of Dunedin adolescents did not meet any recommended guidelines for physical activity, screen time and fruit and vegetable intake, and a substantial portion of these had healthy weight.

• More than half of Dunedin adolescents used motorized transport to school and one quarter used active transport only.

• Taking into account distance and time constraints, beliefs about walking to school and traffic safety were important correlates of walking to school among Dunedin adolescents.
Summary (Part 2)

• Compared to walking, cycling to school among Dunedin adolescents was less common, perceived as less safe and had less social and infrastructure support.

• Future interventions should focus on:
  – Creating supportive social environments with positive parental and peer support
  – Creating supportive physical environments, and
  – Improving road safety for cyclists in New Zealand.
Thank you!

www.otago.ac.nz/beats

www.otago.ac.nz/active-living