Acknowledgments

The BEATS Research Programme is a interdisciplinary and multi-sector collaboration between the University of Otago, the Dunedin Secondary Schools’ Partnership, the Dunedin City Council and New Zealand Transport Agency.

The BEATS Study (2014-2018) was supported by the Health Research Council of New Zealand Emerging Researcher First Grant (14/565), National Heart Foundation of New Zealand (1602 and 1615), Lottery Health Research Grant (Applie 341129), University of Otago Research Grant (UORG 2014), Dunedin City Council and internal grants from the School of Physical Education, Sport and Exercise Sciences, University of Otago.

The BEATS Rural Study (2018-2019) is supported by University of Otago Research Grant (UORG 2018) and Otago Energy Research Centre (Seed Grant 2018).

The BEATS Study Symposium 2018 has been supported by the School of Physical Education, Sport and Exercise Sciences and Continuing Education Fund, University of Otago.

BEATS Study Symposium Proceedings 2018
Editors: Sandra Mandic and Kirsten Coppell
Publisher: University of Otago, Dunedin, New Zealand
Publication date: November 2018

PDF version is available on the Active Living Laboratory website: www.otago.ac.nz/active-living
Table of Contents

Welcome .......................................................................................................................... 5
Symposium Details .......................................................................................................... 6
Symposium Web Page ...................................................................................................... 6
Sponsors ............................................................................................................................. 6
Questions? Let us know .................................................................................................. 6
Speakers ............................................................................................................................. 7
Symposium Programme .................................................................................................. 11
Abstracts: Verbal Presentations ...................................................................................... 13
  Travel to School Patterns across Otago, New Zealand: Findings from the BEATS and
  BEATS Rural Studies .................................................................................................... 13
  Rural Adolescents’ Perceptions of Walking versus Cycling to School ......................... 14
  Attitudes towards Cycle Skills Training in Adolescents in Rural New Zealand............... 15
  Adolescents’ Perceptions of the School Neighbourhood Environment in Small-to-Medium
  Urban Areas versus Rural Settlements ......................................................................... 16
  Inspiring, Empowering and Supporting Adolescents in Rural Areas to Be Agents of
  Change: The Catalyst Project ....................................................................................... 17
  Geospatial Science in the BEATS Study ...................................................................... 18
  Physical and Spatial Assessment of School Neighbourhood Built Environments for Active
  Transport to School in Dunedin Adolescents ................................................................ 19
  Built Environment Associates of Active School Travel in New Zealand Children and Youth:
  A Systematic Meta-Analysis Using Individual Participant Data .................................... 20
  Spatial Analysis and Geovisualisation for Active Transport ........................................ 21
  Adolescents’ Dietary Patterns and Obesity-Promoting Food Environments across Otago,
  New Zealand .............................................................................................................. 22
  Relevancy of Equity Approaches in Research: Health Behaviours of Urban and Rural
  Dwelling Māori Adolescents ...................................................................................... 23
  Parents, parenting and adolescents’ transport to school .............................................. 24
  School Facilities and Academic Results: Parental Reasons for School Choice ............ 25
  Running the BEATS Rural Study behind the Scene: Project Management Side of the Story
  ....................................................................................................................................... 26
Abstracts: Posters Presentations ..................................................................................... 27
  Objectively-Measured Physical Activity in Rural Adolescents: Effect of Gender and
  Transport to School Mode ......................................................................................... 27
  School Bag Weight as a Barrier to Active Transport to School among New Zealand
  Adolescents .................................................................................................................. 28
  Would New Zealand Adolescents Cycle to School More if Allowed to Cycle without a
  Helmet? ....................................................................................................................... 29
The Importance of Social Capital for Young People’s Active Transport and Independent Mobility in Rural Areas .......................................................... 30
Perceptions of Travelling to School by Car: Insights from Adolescents, Parents, Teachers and Principals ........................................................................... 31
Taking a Bus to Secondary School: Adolescents’, Parental, Teachers’ and Principals’ Perceptions ........................................................................................................ 32
Policy Recommendations for Encouraging Public Bus Use to School in Dunedin........ 33
Highlights from Published BEATS Study Articles (Presented at Previous BEATS Study Symposia) ........................................................................................................ 34
Welcome

Dear Colleagues,

Welcome to the BEATS Study Symposium 2018 held on 16 November 2018 in Dunedin, New Zealand. This symposium has been designed to celebrate interdisciplinary and multisector collaborations and share the BEATS Study findings to date.

This symposium is bringing together individuals from academia, government, public health, urban design, transportation and environment to share knowledge and discuss challenges and opportunities for encouraging active transport to school.

As organizers, we hope that during this symposium you will:
- Learn about BEATS Study findings to date and future directions
- Gain insights from BEATS Study investigators, collaborators and research students and symposium attendees
- Exchange ideas about opportunities for encouraging active transport in urban and rural areas
- Engage in an interdisciplinary and multi-sector dialogue about active transport, and
- Extend your networks beyond the discipline(s) and sector(s) you currently work in.

Here are a few programme details:
- 1 full action-packed day
- 21 abstracts
- 14 speakers
- 6 poster presentations
- Registration is free.

Thank you for joining us. We hope you will enjoy this symposium, gain new knowledge, become inspired, make new friends and take many new ideas to extend your current work.

Kind regards,
BEATS Symposium 2018 Organizing Committee

Associate Professor Sandra Mandic (Chair)
School of Physical Education, Sport and Exercise Sciences
University of Otago

Dr Kirsten Coppell
Dunedin School of Medicine
University of Otago
Symposium Details

Dates and Location
16 November 2018
University of Otago
Dunedin | New Zealand

Symposium Venue
School of Physical Education, Sport and Exercise Sciences
55 Union St West
Seminar Room 213/214
Dunedin, 9054
(see map)

Symposium Web Page
For detailed information, please refer to the BEATS Study website:

www.otago.ac.nz/beats

Sponsors
We would also like to acknowledge the great help of Angela Findlay and Kimberley King who helped with the organization of this symposium.

Questions? Let us know…

BEATS Study
Phone: +64 3 479 9112 | Email: beats@otago.ac.nz

Active Living Laboratory
Phone: +64 3 479 9112 | Email: active.living@otago.ac.nz

School of Physical Education, Sport and Exercise Sciences, University of Otago
55 Union Street West, Office 211/212 | PO Box 56
Dunedin 9054, NEW ZEALAND
Speakers

**Associate Professor Sandra Mandic**
Active Living Laboratory, School of Physical Education, Sport and Exercise Sciences, University of Otago, Dunedin, New Zealand

Associate Professor Sandy Mandic is an exercise scientist with research expertise in the Physical Activity and Health. Her current research encompasses multidisciplinary and multi-sector approach to physical activity and health with implications for transport, urban design and education sectors. Sandy is the Principal Investigator for the BEATS Research Programme and an academic leader of the Active Living Laboratory at the University of Otago. Sandy has extensive experience in the implementation and coordination of research projects, establishing collaborations with local organizations, and working in multidisciplinary research teams.

**Associate Professor Antoni Moore**
School of Surveying, University of Otago, Dunedin, New Zealand

Associate Professor Antoni Moore - Ph.D. in Geographical Information Science. Dr Moore’s research interests have always included a strong social decision support element, namely the use of technology to help coastal zone managers in the UK, to empower Bluff community members at the grassroots level and latterly to help manage planting of flora with medicinal properties on an Iwi-owned farm on Banks’ Peninsula. He has experience in both supervising and conducting questionnaires (and follow up interviews) that elicit both quantitative and qualitative data. More recently, he has been involved with network spatial analysis to provide built environment data for the BEATS Study.

**Dr Kirsten Coppell**
Dunedin School of Medicine, University of Otago, Dunedin, New Zealand

Dr Kirsten Coppell is a specialist in Public Health Medicine and Senior Research Fellow in the Department of Medicine, University of Otago. Her research interests and expertise is in the area of diabetes, prediabetes, non-alcoholic fatty liver disease (NAFLD), nutrition and public health approaches to diabetes prevention, particularly community-based approaches. Kirsten’s current interdisciplinary research projects also include the PIP: Prediabetes intervention package in primary care, and the Delivering optimal weight gain advice to pregnant women – the DOT study. Kirsten is the NZ College of Public Health Medicine Training Programme Supervisor for the South Island. She joined the BEATS Research Team in 2017.
Dr Debbie Hopkins
Research Fellow, the Transport Studies Unit, School of Geography and the Environment, University of Oxford, Oxford, United Kingdom

Dr Debbie Hopkins is an environmental social scientist and human geographer, working on socio-spatial experiences and practices of mobility with a particular focus on socio-technical transitions to a low-carbon transport system. Debbie previously worked at the Centre for Sustainability at the University of Otago on the Energy Cultures II project. Her research interests include modal shift from motorised to active modes, urban freight delivery, and the emergence of automated vehicle technologies. Debbie is an Associate Investigator on the BEATS Study, leading qualitative investigations of active transport to school.

Dr Susan Sandretto
College of Education, University of Otago, Dunedin, New Zealand.

Dr Susan Sandretto works at the University of Otago where she contributes to education studies and teacher education programmes at the undergraduate and postgraduate levels, teaches qualitative research and supervises at the postgraduate level. Her research interests include critical multiliteracies, critical literacy, gender issues in education, educational policy, second language acquisition and practitioner research. She is a member of the University of Otago Human Ethics Committee (Non-Health). Her book, Planting seeds: Embedding critical literacy into your classroom programme (NZCER Press, 2011) was the result of three years of research with primary and secondary teachers. Susan is a former primary school teacher.

Dr Anna Rolleston
University of Waikato, Hamilton, New Zealand

Dr Anna Rolleston is director of The Centre for Health Ltd in Tauranga which specialises in lifestyle management of chronic disease. She is also a senior research fellow with the University of Waikato in the Faculty of Health, Sport and Human Performance. Anna’s research areas include clinical exercise physiology, lifestyle management, kaupapa Māori and equity. Anna joined the BEATS Research Team in 2017.

Mrs Charlotte Flaherty
Active Living Laboratory, School of Physical Education, Sport and Exercise Sciences, University of Otago, Dunedin, New Zealand

Mrs Charlotte Flaherty worked as Safe and Sustainable Travel Coordinator for Dunedin City Council from 2008 to 2017. Her role involved working with schools to develop travel plans. Travel plan parent surveys show parents are reluctant to allow their child to ride on the road, citing safety concerns and lack of cycle skills. Charlotte set up a cycle skills training programme for Dunedin primary and secondary schools, was involved in the Young
People and Bus Use section of the recently completed Otago School Students Lifestyle Survey and has been involved in the BEATS Study since 2013.

**Tessa Pocock**  
Active Living Laboratory, School of Physical Education, Sport and Exercise Sciences, University of Otago, Dunedin, New Zealand

Tessa Pocock has a Bachelor of Physical Education with Honours and has recently completed her Masters of Physical Education (both University of Otago, Dunedin) as an extension of the BEATS Study. Tessa has been involved in data collection and coordination of the BEATS Parental Survey. Her research interests include disability studies, urban design and physical activity promotion across all ages and abilities. She will be pursuing PhD studies at School of Nursing, The University of Auckland, Auckland, New Zealand as of 2019.

**Erika Ikeda**  
School of Sport and Recreation, Faculty of Health and Environmental Sciences, Auckland University of Technology, Auckland, New Zealand

Erika Ikeda has a passion for research on children’s physical activity, active transport and independent mobility. Her PhD research focuses on associations between environmental attributes and children’s active travel to school in Auckland in relation to the Neighbourhoods for Active Kids project.

**Long Chen**  
School of Surveying, University of Otago, Dunedin, New Zealand

Long Chen is currently in the first year of his PhD research at the University of Otago. His research focuses on applying spatial analysis and geovisualisation methods and models in understanding active transport choices of adolescents in Dunedin through space and time. Long finished his Master in the University of Edinburgh (Land use detection of Lowland Savana in Belize) and his Bachelor (Surveying) in China.

**Jessica Calverley**  
Active Living Laboratory, School of Physical Education, Sport and Exercise Sciences, University of Otago, Dunedin, New Zealand

Jessica Calverley is currently completing her Master’s degree at the University of Otago. Her research examines active transport rates and perceptions in rural adolescents as part of the overall BEATS Rural Study. Jessica completed her Bachelor of Science in Physiology and
Microbiology and her Postgraduate Diploma of Science in Physiology, both at the University of Otago. Jessica enjoys being outdoors and being active and, as she has great interest in and passion for the relationship between physical activity and health, is enthusiastic to continue her studies in this area.

**Brittany White**

Active Living Laboratory, School of Physical Education, Sport and Exercise Sciences, University of Otago, Dunedin, New Zealand

Brittany White is a current BPhEd(Hons) student at the School of Physical Education, Sport and Exercise Sciences at the University of Otago. Her honours research project was part of the BEATS Rural Study. Progression through her degree in physical education has inspired her to be a catalyst for positive change throughout the community. Brittany will be staying on the BEATS research team next year to complete her MSc in Sport, Exercise and Health.

**Kimberley King**

Active Living Laboratory, School of Physical Education, Sport and Exercise Sciences, University of Otago, Dunedin, New Zealand

Kimberley King works as a research assistant on the BEATS Study. Her expertise is in the area of Public Health and Sport Development. Kimberley managed and delivered the Ministry of Health initiative Green Prescription for the Otago region from 2009-2016, working alongside general practitioners, nurses, hospital specialist, physical activity and health providers and the Southern District Health Board. Kim has extensive work experience in the implementation and coordination of physical activity health intervention programmes and developing multidisciplinary collaborations between Health, Education, Community and Sport sectors.
# BEATS Symposium Programme 2018

Friday, 16 November 2018  
School of Physical Education, Sport and Exercise Sciences, Seminar Room 213/214  
University of Otago, Dunedin, New Zealand

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30am</td>
<td></td>
<td>Registration with tea &amp; coffee</td>
</tr>
<tr>
<td>9:00am</td>
<td></td>
<td>Welcome</td>
</tr>
<tr>
<td>9:10am</td>
<td>Sandra Mandic</td>
<td>5 Years of the BEATS Study: Past, Present and Future Travel to School Patterns across Otago, New Zealand</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Findings from the BEATS Rural Study</strong></td>
</tr>
<tr>
<td>9:30am</td>
<td>Jessica Calverley</td>
<td>Rural Adolescents’ Perceptions of Walking versus Cycling to School</td>
</tr>
<tr>
<td>9:45am</td>
<td>Charlotte Flaherty</td>
<td>Attitudes towards Cycle Skills Training in Adolescents in Rural New Zealand</td>
</tr>
<tr>
<td>10:00am</td>
<td>Britanny White</td>
<td>Adolescents’ Perceptions of the School Neighbourhood Environment in Small-to-Medium Urban Areas versus Rural Settlements</td>
</tr>
<tr>
<td>10:15am</td>
<td>Kimberley King</td>
<td>Inspiring, Empowering and Supporting Adolescents in Rural Areas to Be Agents of Change: The Catalyst Project</td>
</tr>
<tr>
<td>10:30am</td>
<td></td>
<td>Morning tea</td>
</tr>
<tr>
<td>11:00am</td>
<td>Antoni Moore</td>
<td>Geospatial Science in the BEATS Study</td>
</tr>
<tr>
<td>11:15am</td>
<td>Tessa Pocock</td>
<td>Physical and Spatial Assessment of School Neighbourhood Built Environments for Active Transport to School in Dunedin Adolescents</td>
</tr>
<tr>
<td>11:30am</td>
<td>Erika Ikeda</td>
<td>Built Environment Associates of Active School Travel in New Zealand Children and Youth: A Systematic Meta-Analysis Using Individual Participant Data</td>
</tr>
<tr>
<td>11:45am</td>
<td>Long Chen</td>
<td>Spatial Analysis and Geovisualisation for Active Transport</td>
</tr>
<tr>
<td>12:00pm</td>
<td>Kirsten Coppell</td>
<td>Adolescents’ Dietary Patterns and Obesity-Promoting Food Environments across Otago, New Zealand</td>
</tr>
<tr>
<td>12:15pm</td>
<td></td>
<td><strong>Lunch and Poster Session</strong></td>
</tr>
<tr>
<td>1:00pm</td>
<td>Anna Rolleston</td>
<td>Relevancy of Equity Approaches in Research: Health Behaviours of Urban and Rural Dwelling Māori Adolescents</td>
</tr>
<tr>
<td>1:15pm</td>
<td>Debbie Hopkins</td>
<td>Parents, Parenting and Adolescents’ Transport to School</td>
</tr>
<tr>
<td>1:30pm</td>
<td>Susan Sandretto</td>
<td>School Facilities and Academic Results: Parental Reasons for School Choice</td>
</tr>
<tr>
<td>1:45pm</td>
<td>Sandra Mandic</td>
<td>Running the BEATS Rural Study behind the Scene: Project Management Side of the Story</td>
</tr>
<tr>
<td>2:00pm</td>
<td></td>
<td>Discussion and feedback</td>
</tr>
<tr>
<td>2:30pm</td>
<td></td>
<td><strong>Symposium closes</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Informal discussions and light refreshments</td>
</tr>
</tbody>
</table>
Symposium posters:

<table>
<thead>
<tr>
<th>First author</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chris Tait</td>
<td>Objectively-Measured Physical Activity in Rural Adolescents: Effect of Gender and Transport to School Mode</td>
</tr>
<tr>
<td>Sandra Mandic</td>
<td>School Bag Weight as a Barrier to Active Transport to School among New Zealand Adolescents</td>
</tr>
<tr>
<td>Javier Molina-García</td>
<td>Would New Zealand Adolescents Cycle to School More if Allowed to Cycle without a Helmet?</td>
</tr>
<tr>
<td>Tessa Porskamp</td>
<td>The Importance of Social Capital for Young People's Active Transport and Independent Mobility in Rural Areas</td>
</tr>
<tr>
<td>Olivia Eyles</td>
<td>Perceptions of Travelling to School by Car: Insights from Adolescents, Parents, Teachers and Principals</td>
</tr>
<tr>
<td>Isobelle Lane</td>
<td>Taking a Bus to Secondary School: Adolescents’, Parental, Teachers’ and Principals’ Perceptions</td>
</tr>
<tr>
<td>Christina Ergler</td>
<td>Policy Recommendations for Encouraging Public Bus Use to School in Dunedin</td>
</tr>
</tbody>
</table>
Abstracts: Verbal Presentations

Travel to School Patterns across Otago, New Zealand: Findings from the BEATS and BEATS Rural Studies

Sandra Mandic1, Debbie Hopkins2, Enrique Garcia Bengoechea3,4, Charlotte Flaherty1, Antoni Moore1, Susan Sandretto1, Kirsten Coppell1, Christina Ergler1, Michael Keall5, Anna Rolleston6, Gordon Wilson7, Gavin Kidd7, Angela Findlay1, Brittany White1, Chris Tait1, Jessica Calverley1, Michael Jensen1, Roman Keller1, Tessa Porskamp1, Judy Rodda1, Long Chen1, Kimberley King1, John C. Spence8.

1University of Otago, Dunedin, New Zealand; 2Oxford University, Oxford, United Kingdom; 3University of Limerick, Limerick, Ireland; 4Victoria University, Melbourne, Australia; 5University of Otago, Wellington, New Zealand; 6Waikato University, Hamilton, New Zealand; 7Dunedin Secondary Schools’ Partnership, Dunedin, New Zealand; 8University of Alberta, Edmonton, Canada.

Background: Most studies examining active transport (AT) to school in adolescents have been conducted in main urban centers, including those in New Zealand. Since AT to school behaviour is context-specific, differences in travel behaviours and factors influencing AT to school in rural versus urban environments are likely. This study compared adolescents’ travel to school patterns in a main urban center (Urban), small-to-medium urban areas (Semi-Urban) and rural settlements (Rural) across the Otago region, New Zealand.

Methods: Data were collected during the 2014/2015 BEATS Study in Dunedin (12 schools; 1,663 adolescents) and 2018 BEATS Rural Study in the rural Otago region, New Zealand (10 schools; 993 adolescents). Adolescents (1,663 Urban; 814 Semi-Urban; 179 Rural) completed a questionnaire about their school travel. Optimal threshold for walking to school was determined using Receiver Operating Curve analysis.

Results: Overall, school travel (55.0% motorised transport, 29.8% AT, 15.2% combined transport; p=0.686) and average distance to school (Urban/Semi-Urban/Rural: 6.2±7.4/7.9±10.1/9.3±9.8 km; p=0.386) were not different across settings. Optimal distance for walking to school was ≤2.25 km (0.85/0.86/0.93). Among adolescents ineligible for the subsidised school bus (living ≤4.8 km from school), AT rates differed across settings (Urban/Semi-Urban/Rural: 38.7%/47.9%/58.5%; p<0.001). Use of AT modes (walking [Urban/Semi-Urban/Rural]: 27.4%/23.2%/29.7%; p=0.013; cycling: 1.1%/12.2%/6.8%; p<0.001).

Conclusions: Although less urbanised areas had higher rates of active transport if adolescents resided ≤4.8 km from school, motorised transport dominated adolescents’ travel to school across Otago. AT to school should be promoted in both urban and rural settings.

Keywords: active transport; rural; adolescents; walking; cycling; perceptions

Highlights: active transport; rural; adolescents; walking; cycling; perceptions

- Motorised transport dominates adolescents’ travel to school across Otago.
- Walking was predominant mode of active transport to school in adolescents.
- Less urbanised areas had higher rates of active transport within 4.8 km from school.
- Rates of walking and cycling to school differed across urbanisation settings.
Rural Adolescents’ Perceptions of Walking versus Cycling to School

Jessica R Calverley, Sandra Mandic.

Active Living Laboratory, University of Otago, Dunedin, New Zealand.

Background: Although active transport to school has been extensively studied in urban settings, perceptions of active transport among rural adolescents remain largely unknown. This study compared perceptions of walking versus cycling to school among rural adolescents in New Zealand.

Methods: Adolescents (n=427; age: 13-18 years; 11 schools) from rural Otago living ≤4.8 km from school completed a questionnaire about school travel and perceptions of walking and cycling to school. Data were analysed using paired t-test and Chi-square tests.

Results: Overall, 48% of adolescents walked and 17% cycled to school regularly. Most adolescents believed that both walking (92.7%) and cycling (86.9%) to school were great ways to get exercise. Compared to cycling, adolescents perceived walking to school as safer (92.7% vs 80.3%) and more pleasant (62.3% vs 44.3%), had less logistic-related barriers (such as need for planning, getting sweaty), offered better opportunity to socialise (57.4% vs 25.5%), received greater support from peers (60.7% vs 28.6%), parents (70.7% vs 39.8%) and school (37.0% vs 25.3%) and had better infrastructure support (more footpaths vs cycle paths) (85.2% vs 43.3%) (all p<0.001). In contrast, adolescents perceived trip duration (walking vs cycling: 42.2% vs 12.9%), distance (18.3% vs 6.8%), feeling tired (44.3% vs 37.7%) and cold/wet weather (58.3% vs 47.3%) as greater barriers for walking versus cycling to school (all p<0.001).

Conclusions: Rural adolescents perceived that walking to school was safer, with greater social and infrastructure support compared to cycling. Therefore, different approaches are required to promote walking versus cycling to school in rural settings.

Keywords: active transport; rural; adolescents; walking; cycling; perceptions

Highlights:
- Walking to school is more popular than cycling among rural Otago adolescents.
- Walking to school was perceived as safer and had less logistical barriers.
- Walking also had greater social and infrastructure support compared to cycling.
- Distinct interventions are required to promote walking versus cycling to school.
Attitudes towards Cycle Skills Training in Adolescents in Rural New Zealand

Charlotte Flaherty, Sandra Mandic.
Active Living Laboratory, University of Otago, Dunedin, New Zealand.

Background: Cycle skills training (CST) improves cycle-related skills and knowledge in children and adolescents. One in four adolescents and three quarters of parents at urban schools in Dunedin, New Zealand, believed that CST would make adolescents safer in traffic. Perceptions of CST among adolescents and parents living in rural areas remain unknown. This study examined adolescent and parental attitudes towards CST in a rural setting.

Methods: Adolescents (n=925; age 15.2±1.3 years; 50.3% girls) and parents (n=64; age 47.2±6.4 years; 95.3% female) from 11 secondary schools in rural Otago, New Zealand, completed student and parental surveys, respectively. Questions addressed demographics, transport to school habits and attitudes towards CST. Data were analysed using descriptive statistics.

Results: Over half of surveyed adolescents (55.2%) used active transport to school and 13.4% cycled to school ≥1 day per week. Overall, 38.9% of adolescents and 71.9% of parents agreed that CST would make them/their adolescents safer in traffic. Among those participants, 39.5% of adolescents and 78.3% of parents perceived that they and their adolescents, respectively, would take CST if it was offered at secondary school.

Conclusions: One in four adolescents and nearly three out of four parents living in rural New Zealand perceived that CST training would make adolescents safer in traffic. Therefore, New Zealand National Cycle Skills Education programme launched in 2018 should consider raising awareness of the benefits of CST among rural adolescents and exploring the appropriate avenues for delivering CST to adolescents in rural areas.

Keywords: Adolescents; parents; cycle skills training; rural setting

Highlights:
- One in four rural adolescents perceived cycle skills training as beneficial.
- Nearly three quarters of parents thought adolescents would benefit from such training.
- Parents thought adolescents would take such training at their school.
- Future cycle skills training initiatives should make use of parental interest.
- National programmes should explore avenues for training delivery in rural areas.
Adolescents' Perceptions of the School Neighbourhood Environment in Small-to-Medium Urban Areas versus Rural Settlements

Brittany White, Sandra Mandic.

Active Living Laboratory, University of Otago, Dunedin, New Zealand.

Background: Active transport to school (ATS) in an easy and effective way to increase physical activity (PA) in adolescents. Perceptions of the school neighbourhood environment can influence an adolescents' transport to school behaviours. This cross-sectional study compared adolescents' perceptions of the school neighbourhood environment in small-to-medium urban areas (SMU) versus rural settlements (RS) in Otago, New Zealand.

Methods: Adolescents from 10 secondary schools (5 located in SMU and 5 in RS), living ≤4.8 km from school reported their perceptions of the school neighbourhood environment. All adolescents completed an online survey (n=459; 54.2% female; age 15.2±1.3 years) and a subgroup of adolescents completed Neighbourhood Environment Walkability Scale for Youth questionnaire (NEWS-Y) (n=166; 50.6% female; age 15.2±1.4 years).

Results: Compared to RS, SMU adolescents expressed greater concerns about unsafe road crossings (SMU vs RS: 43.5% vs 29.9%; p=0.027), high traffic volume (37.4% vs 19.5%; p=0.003), and too many vehicles stopping/parking around school (41.1% vs 23.4%; p=0.003). SMU adolescents reported higher residential density (64.60±21.56 vs 57.64±14.29; p= 0.018), and mix use access (3.19±0.33 vs 3.04±0.35; p= 0.005), lower diversity of land use (SMU vs RS: 2.95±0.64 vs 3.21±0.51; p=0.005), access to recreation facilities (3.28±0.78 vs 3.72±0.55; p=0.001), street connectivity (2.79±0.54 vs 2.97±0.60; p=0.044) and overall walkability of their school neighbourhoods (-0.30±2.40 vs 0.43±2.17; p=0.044).

Conclusions: Compared to RS schools, SMU schools had higher traffic volume and lower walkability of school neighbourhoods. School neighbourhood environment should be considered when designing future initiatives for promoting ATS among adolescents.

Keywords: Adolescents; school; neighbourhood; built environment; active transport; rural setting

Highlights:
- Schools in urbanised areas had more road crossings and traffic volume concerns.
- Areas around urbanised schools had higher residential density and facilities.
- Rural school neighbourhoods had more land use diversity and recreational areas.
- School neighbourhoods in urbanised areas were less walkable than in rural areas.
- School neighbourhood environment should be considered in future interventions.
Inspiring, Empowering and Supporting Adolescents in Rural Areas to Be Agents of Change: The Catalyst Project

Kimberley King¹, Gavin Kidd², Andrew King³, Susan Sandretto¹, Sandra Mandic¹.

¹University of Otago, Dunedin, New Zealand; ²Dunedin Secondary Schools’ Partnership, Dunedin, New Zealand; ³Tokomairiro High School, Milton, New Zealand.

**Background:** Lack of physical activity and increasingly sedentary lifestyles among adolescents contribute to poor health. Comprehensive findings from the BEATS Rural Study (BEATS-R) present a unique opportunity to inspire, empower and support secondary school students from the rural Otago to engage with science and develop innovative ways to encourage healthy lifestyle behaviours in their schools and communities.

**Description:** The Catalyst Project will consist of several school-based events and activities designed for adolescents to engage with and utilise their school-specific BEATS-R findings and develop their own projects:

1. **BEATS Roadshow** by researchers (presentation, video and infographics) at each school to showcase a snapshot of school-specific findings;
2. Two workshops delivered by researchers for interested students at each school to (#1) teach students how to analyse, interpret and identify the issues affecting their school/community using the school-specific research findings (infographics and BEATS-R technical report) and (#2) give students the opportunity to conceptualise their projects to address identified issues, explore community consultation options and learn how to present projects/outcomes;
3. School/community interventions designed and implemented by students to address identified issue(s) (honing ideas, writing proposals, consulting community and implementing projects with guidance from researchers and existing online education tool(s));
4. Student project presentations at regional mini-symposia.

**Conclusions:** Unlocking the minds of adolescents by presenting them with the scientific facts and giving them the platform to create a ‘call to action’ will inspire, empower and support adolescents to engage with science and may represent a powerful tool for encouraging healthy lifestyle behaviours among youth.

**Keywords:** Adolescents; science; engagement; project; education; research

**Highlights:**
- The Catalyst Project will inspire, empower and support youth to engage with science.
- The project will include a roadshow, workshops, student-led projects and symposia.
- Adolescents will be working on school-specific data from a research project.
- Adolescents will be given a platform to create a ‘call to action’ in their community.
- Engaging youth with science may be a powerful tool for promoting behaviour change.
Geospatial Science in the BEATS Study

Antoni Moore¹, Judy Rodda¹, Long Chen¹, Tessa Pocock², Christina Ergler¹, Jessica Calverley¹, Sandra Mandic¹.

¹University of Otago, Dunedin, New Zealand; ²University of Auckland, Auckland, New Zealand.

Introduction: Active transport to school (ATS) has physical and social but fundamentally geographical dimensions. Methods now exist to support spatial data collection, analysis and visualisation aspects (a geospatial science, or Geographical Information Systems – GIS - approach) of adolescents’ routes to school and the areal environments that they travel through. This overview presentation covers these enabling GIS methods, applied in the BEATS Study since 2014.

Methods: GIS serves two fundamental roles: as an engine for answering geographical questions through analysis and the communication of those answers through maps. In the Dunedin-based BEATS Study, spatial analysis was applied to home and school neighbourhoods / route to school for route length, the complexity of transport infrastructure, land use and topography along the route. Results from this process were subsequently used in statistical analyses. Mapping of travel patterns across Dunedin (as flow densities), adolescents’ transport modes (active or motorised transport) and motivations for travelling a specific route (including avoiding unsafe areas) was derived from student- and parent- drawn sketch maps. This broad GIS approach has been extended to analyse in detail Dunedin urban school neighbourhoods, built environment in rural Otago, multi-temporal intervention analysis and geographically intensive approaches (distribution mapping, spatial modelling and geovisual analytics).

Results: Spatial analysis was applied to data from 1780 students in BEATS, supporting statistical analyses that were subsequently reported in 10 journal publications. Density mapping of drawn routes of 740 students was reported through 3 refereed international conference abstract presentations. Results for parent (355) and rural (995, 195 drawn routes) data are forthcoming.

Conclusion: This presentation reports on 5 years of GIS in BEATS. Each of the current GIS projects have their own challenges, in scale of effort for the areal approach, geographic scale and land use effects in the rural study, and the handling of time and multiple dimensions with the spatiotemporal efforts.

Keywords: Geographical Information Systems, spatial analysis, mapping, adolescents, transport

Highlights:
- Geospatial science has been used in the BEATS Study since 2014.
- Spatial analysis results such as distance to school have been used in publications.
- Mapping showed where and how adolescents travel, along with associated factors.
- GIS analysis is currently being conducted on BEATS Rural Study data.
- The BEATS geospatial approach will be extended to modelling and visual analytics.
Physical and Spatial Assessment of School Neighbourhood Built Environments for Active Transport to School in Dunedin Adolescents

Tessa Pocock, Antoni Moore, Sandra Mandic.

University of Otago, Dunedin, New Zealand.

Background: Relationship between school neighbourhood built environment (SN-BE) and adolescents’ active transport to school (ATS) remains largely unexplored. This study examined associations between adolescents’ ATS rates and observed, objectively-measured and perceived SN-BE across twelve Dunedin secondary schools.

Methods: SN-BE was assessed through environmental audit (MAPS Global; 0.5 km street-network buffer-zone) and Geographic Information Systems (GIS) spatial analysis (0.5/2.25 km street-network buffer-zone). Optimal walking distance to school (≤2.25 km) was determined using Receiver Operating Characteristic curve analysis. School-specific ATS rates and school route perceptions were obtained from student survey.

Results: Among 471 adolescents living ≤2.25 km from school (15.2±1.4 years; 56.2% female), school-level ATS rates were not significantly correlated with MAPS Global, GIS measures or adolescents’ perceptions. MAPS Global pedestrian design sub-scale (r=0.62), GIS-determined intersection density (0.5/2.25 km: r=0.77/r=0.64), land use mix (2.25 km: r=0.64) and walkability (0.5/2.25 km: r=0.86/r=0.73) positively correlated with adolescents’ perception of dangerous crossings (p<0.05). MAPS Global pedestrian infrastructure sub-scale (r=0.66) negatively correlated with walking safety concerns (p<0.05). Intersection density positively correlated with concern over cycling safety (0.5 km: r=0.68) and cycle lane absence (0.5 km: r=0.65), while land use mix correlated with perceived high traffic volume (2.25 km: r=0.72; all p<0.05). Walkability positively correlated with concern over walking/cycling safety (0.5 km [cycling]: r=0.72; 2.25 km [walking/cycling]: r=0.68/r=0.66), traffic volume (0.5 km: r=0.73), footpath (0.5 km: r=0.62) and cycle lane absence (2.25 km: r=0.71; all p<0.05).

Conclusions: Near-school built environment characteristics correlated with adolescents’ perceptions of the school route, but not with ATS rates in Dunedin adolescents.

Keywords: School; Built Environment; Active Transport; Adolescents; Environmental Audit; GIS.

Highlights:
- Optimal distance for walking to school in Dunedin adolescents was ≤2.25 km.
- Dunedin secondary schools had similar school neighbourhood built environments.
- Near-school built environment did not correlate with active transport to school.
- Perceptions of school route correlated with near-school built environment features.
- Near-school built environment features may encourage active transport to school.

Publication: Pocock T, Moore A, Keall M, Mandic S. Physical and Spatial Assessment of School Neighbourhood Built Environments for Active Transport to School in Adolescents from Dunedinit (New Zealand). Health & Place. (in press; accepted on 15 Oct 2018)
Built Environment Associates of Active School Travel in New Zealand Children and Youth: A Systematic Meta-Analysis Using Individual Participant Data

Erika Ikeda¹, Tom Stewart¹, Nicholas Garrett¹, Victoria Egli¹, Sandra Mandic², Jamie Hosking³, Karen Witten⁴, Greer Hawley⁵, El Shadan Tautolo¹, Judy Rodda⁶, Antoni Moore⁶, Melody Smith³.

¹Auckland University of Technology, Auckland, New Zealand; ²University of Otago, Dunedin, New Zealand; ³University of Auckland, Auckland, New Zealand; ⁴Massey University, Auckland, New Zealand; ⁵Mackie Research, Auckland, New Zealand; ⁶University of Otago, Dunedin, New Zealand.

Background: Despite health and environmental benefits, the prevalence of active travel to school (ATS) has been less than half among all children and youth in New Zealand (NZ). There is a need for robust and consistent evidence on the built environment associates of ATS in the NZ context. This systematic review and meta-analysis examined the associations between ATS and the neighbourhood built environment in children and youth by systematically identifying and collating data from NZ studies.

Methods: Data from five studies involving 2844 children and youth aged 6-19 years were included in the meta-analysis. Data on participant demographics and school characteristics were obtained from each study, and built environment features within 400 m and 1 km buffers around home were calculated in a consistent manner using geographic information systems (GIS). A one-step individual participant data meta-analysis was performed in SAS. Using stepwise logistic regression, age, school socioeconomic status, distance to school, dwelling density and intersection density (400 m and 1 km buffers) were taken forward from bivariate analyses into a multiple variable model.

Results: ATS was positively associated with intersection density (p<0.001) (1 km buffer) and negatively associated with school socioeconomic status (p=0.001), dwelling density (p=0.004) (1 km buffer), and distance to school (p<0.001), including age, sex, ethnicity and number of siblings as fixed effects in the final model.

Conclusions: The findings of this meta-analysis can be used to guide and support the development of policies on school location and catchment, and pedestrian and cycling infrastructure for children and youth to actively and safely travel to school.

Keywords: Active travel to school; built environment; geographic information systems; meta-analysis; children; systematic review

Highlights:
- Distance to school was the strongest predictor of active travel to school
- Increased street connectivity around schools was related to active travel to school
- Dwelling density was negatively associated with active travel to school
- School socioeconomic status was negatively associated with school travel mode
- Distance to school is a key consideration for school zoning and catchment policies


Spatial Analysis and Geovisualisation for Active Transport

Long Chen, Antoni Moore, Sandra Mandic.

University of Otago, Dunedin, New Zealand.

**Background:** Geographical information science (GIS) is widely used in public health care and transport planning in its spatial analysis and visualisation aspects. However, in active transport to school (ATS) research, including the BEATS Study so far, GIS has only been used as a mapping tool for demonstration or for preparing variables for non-spatial statistical analysis. This PhD research will apply GIS methods such as quantitative spatial analysis tools, visual analytics and other geovisualisation methods to BEATS and BEATS-2 Study data.

**Methods:** The following is proposed for the thesis programme. Distribution, density and flow maps and indicators will initially help mapping and analysing the spatial patterns and distributions of adolescents’ ATS behaviours (employing kernel density estimation, clustering analysis and local indicators of spatial association). Geographically weighted regression modelling will be used to examine the relationship between adolescents’ choice of ATS and relevant factors, supported by the application of visual analytics. In addition to the direct effects of the ATS correlates, a Decision Making Trial and Evaluation Laboratory will be used to evaluate the level of influence between ATS factors which might have indirect effects on ATS. Because of the 5-year time gap between BEATS and BEATS-2 Study, spatio-temporal analysis will be used on spatio-temporal variables of ATS. Geovisualisation methods will be applied to create a decision making support package, to be presented to local government and schools. This package will include images, thematic maps, flow maps, web-based GIS applications such as ESRI Story Maps, non-spatial figures, plots, tables/charts, and description stories.

**Keywords:** Active transport; Geographical information Science; Spatial analysis; Spatio-temporal analysis; Decision making

**Highlights:**
- The spatial patterns and distribution of active transport correlates will be mapped.
- The relationships over space will be examined using visual analytics and local spatial analysis.
- Indirect effects of active transport to school correlates will be analysed using DEMATEL.
- Spatio-temporal analysis method will examine the change in variables over time.
- A decision making support package will be created for schools and local government.
Adolescents’ Dietary Patterns and Obesity-Promoting Food Environments across Otago, New Zealand

Kirsten Coppell¹, Anna Rolleston², Sandra Mandic¹.

¹University of Otago, Dunedin, New Zealand; ²University of Waikato, Hamilton, New Zealand.

Background: More than one-third of New Zealand adolescents are overweight or obese. Context such as the home environment, school environment and consumer environment are likely to influence dietary choices. We examined dietary patterns among adolescents attending secondary schools in urban and rural areas in the Otago region, New Zealand.

Methods: Adolescents (n=1887; age: 15.3±1.4 years; 52.7% females; 11.8% Māori) from Dunedin city (n=1149), small-to-medium urban areas (n=596) and rural settlements (n=142) in Otago completed an online survey about their dietary habits. Adolescents’ height and weight were measured, and weight status calculated and categorised (healthy and overweight/obesity). Comparisons were made between the three geographical locations using ANOVA and Chi-square tests.

Results: Among adolescents in Otago, 26.4% were overweight/obese, with some differences across geographical settings (Dunedin/small-to-medium urban areas/rural settlements: 27.9%/24.5%/23.2%; p=0.214). Frequency of consumption of fruit (74.5% ≥5 days/week) and vegetables (84.0% ≥5 days/week) did not differ by weight category or geographical location. Significant differences were observed across the geographical locations (Dunedin/small-to-medium urban areas/rural settlements) in the consumption of sweets (confectionary) ≥5 days/week (22.5%/19.8%/10.6%; p=0.007), sugar sweetened beverages ≥5 days/week; (17.6%/10.9%/9.2% p<0.001) and fast foods ≥2 days/week (17.6%/15.3%/7.7%; p=0.009). Mode of transport to school was not related to adolescents’ dietary patterns.

Conclusions: Dietary patterns appear to differ between adolescents dwelling in urban and rural areas in Otago. Identifying reasons for more frequent consumption of obesity-promoting junk foods among adolescents in urban versus rural environments could inform obesity prevention policies and actions.

Keywords: Obesity; adolescents; food environments; dietary behaviours

Highlights:
- Fruit and vegetable consumption did not differ across geographical settings.
- Junk food consumption was more frequent in urban versus rural adolescents in Otago.
- Excess body weight among youth may be less prevalent in rural versus urban Otago.
Relevancy of Equity Approaches in Research: Health Behaviours of Urban and Rural Dwelling Māori Adolescents

Anna Rolleston¹, Enrique García Bengoechea²,³, Kirsten Coppell⁴, Sandra Mandic⁴.

¹Waikato University, Hamilton, New Zealand; ²University of Limerick, Limerick, Ireland; ³Victoria University, Melbourne, Australia; ⁴University of Otago, Dunedin, New Zealand.

Background: Māori are disproportionately represented in most health measures compared to non-Māori. Approaching health research with an equity lens is a potentially powerful mechanism to facilitate meaningful change in health status for those with the most need. Health researchers have a responsibility to ensure that research does not contribute to continuing health disparities, but that research influences the change that is needed to enable equitable health outcomes for Māori. This presentation will illustrate how traditional research findings about health behaviours in Māori adolescents can contribute to equity.

Methods: Māori adolescents (n=265; mean age: 15.1±1.4 years; 57.4% females) from Dunedin city (n=160) and the rural Otago region, New Zealand (n=105) completed an online survey about their family structure, physical activity, screen use, and dietary habits. Data were analysed using descriptive statistics, t-test and Chi-square tests.

Results: The proportion of urban and rural dwelling Māori adolescents meeting national guidelines for physical activity, screen time and fruit and vegetable intake will be presented through a Western science lens. Commentary about traditional approaches to the interpretation of these findings and the impact of this on equity for Māori will be integrated into the presentation.

Conclusions: Western scientific investigations will always contribute to the understanding of some aspects in Māori. The challenge for health researchers and health professionals is to be skilled in interpreting Western evidence through an equity lens. A shift in focus when deciphering research findings will be beneficial for the health and wellbeing of Māori and for all health research.

Keywords: Equity; adolescents; Māori; health behaviours

Highlights:
- Māori are disproportionately represented in health statistics compared to non-Māori.
- Researchers have an obligation to ensure their work does not compound disparities.
- A critical challenge is skilful interpretation of Western evidence through an equity lens.
- Use of an equity lens will benefit Māori through improved health outcomes.
Parents, parenting and adolescents’ transport to school

Debbie Hopkins¹, Sandra Mandic².

¹Oxford University, Oxford, United Kingdom; ²University of Otago, Dunedin, New Zealand.

Background: Parents and caregivers are frequently noted as critical gatekeepers in students’ travel to school behaviours. Yet despite this acknowledgement, little is known about the practices – performed by parents, siblings, care-givers or others – that underpin students’ travel. This study examined parental perceptions of adolescents’ transport and mobility gaining detailed qualitative insights into complex family dynamics and interactions.

Methods: This paper presents in-depth qualitative material gained from a series of six focus groups with a total of 24 parents from Dunedin, New Zealand. Each focus group lasted sixty minutes, and involved discussion of topics including: household travel decision making, parental mobilities (e.g. for work, caring responsibilities) and perceptions of transport modes. Data were analysed using Nvivo10 qualitative software, and iterative thematic coding.

Results: Our research points to the interconnections between identities of ‘good parents’ and travel-to-school modes. The paper also highlights the multiple and varied conditions within which decisions on travel-to-school are made, for instance, perceptions of risk, safety, comfort, stress, tiredness, health and capabilities, as well as wider family dynamics including siblings’ mobilities and parental employment away from the home.

Conclusions: Practices of travel to school cannot, and should not, be understood in isolation from home/family life dynamics. This includes the role(s) of parents and parenting. Oversimplifications of transport to school decision making are likely to overlook family dynamics, pressures and complexities across the life-course. It is critical that policies aiming to increase active transport to school account for these home-based dynamics and include parenting at early stages of development.

Keywords: Parents; Parenting; Caregivers; Decision-making; Home/ family life; Mobilities

Highlights:
- Parents are a neglected part of the transport-to-school equation for adolescents.
- Transport to school decision are made within the context of complex circumstances.
- Family life practices, dynamics and relationships influence transport decisions.
- Active transport initiatives should include parents and account for family factors.
School Facilities and Academic Results: Parental Reasons for School Choice

Susan Sandretto¹, Enrique García Bengoechea²,³, Debbie Hopkins⁴, Gordon Wilson⁵, Gavin Kidd⁵, Sandra Mandic¹.

¹University of Otago, Dunedin, New Zealand; ²University of Limerick, Limerick, Ireland; ³Victoria University, Melbourne, Australia; ⁴Oxford University, Oxford, United Kingdom; ⁵Dunedin Secondary Schools Partnership, Dunedin, New Zealand.

Background: New Zealand educational policy supports students to attend a school outside of their home zone, permitting greater choice. Research identified co-educational schools preference, friends’ attendance, positive student peer comments, facilities and sports programmes as influencing student school choice. This paper examines parental perspectives on school choice in the New Zealand context.

Methods: Parents of Dunedin adolescents participated in an online survey (n=365; 77.5% female) between 2014-2017. Survey data were analysed using descriptive statistics. Inductive coding was used to analyse open-ended survey responses.

Results: According to the parents’ survey responses, most school choice decisions were made by parents and students together (72.9%) with 12.3% of parents making the choice independently. Overall, only 38.6% of students initially enrolled in the closest school. The most frequent reasons for parental school choice decisions included school facilities (80.6%), positive comments from parents (74.5%) and students (67.8%) at a particular school, preference for a co-educational school (68.2% among parents of students who attended a co-educational school), and sports programmes (58.2%). In the open-ended survey comments, parents stated academic performance, school culture, special character (e.g. religious), and school staff as influencing their choice. Only one third of parents reported distance to school as a reason underlying parental school choice (32.7%).

Conclusions: From a parental perspective, reasons including school facilities and programmes, school characteristics and social factors were prioritised over proximity to home in school choice decisions. Parents also considered academic standing, school culture, the religious nature of the school, and staffing.

Keywords: Secondary schools; school choice; New Zealand; parents

Highlights:
- Two-third of school choice decisions were made together by parents and their adolescents.
- School facilities were most frequent parental reasons for school choice.
- Favourable comments from parents and students were also important for school choice decisions.
- Parents also considered the school’s academic performance, culture and character for school choice decisions.
- School characteristics rather than proximity are driving school choice decisions.
Running the BEATS Rural Study behind the Scene: Project Management Side of the Story

Sandra Mandic, Angela Findlay.

Active Living Laboratory, University of Otago, Dunedin, New Zealand.

Background: As an extension of the Dunedin BEATS Study, the BEATS Rural Study engaged 1008 adolescents from 11 out of 15 rural Otago secondary schools during 2018. This mixed methods study employed the published BEATS Study methodology using a range of data collection methods. This abstract summarises the project management side of running a research project of this scope in rural settings.

Methods: During February-July 2018, the BEATS research team surveyed 995 adolescents, delivered and collected accelerometers from 178 adolescents, conducted mapping sessions with 195 adolescents and focus groups with 71 adolescents. Organising and conducting this data collection required extensive preparations of study material (including 241-page manual with standard operating procedures) and training of research personnel (15 research assistants/students), in-person visits to 12 rural schools prior to data collection, extensive organisation prior to, during and after data collection visits, 15 days of data collection in schools (17 research staff; 753 hours of research staff time in schools only), 4,271 km driven (more than twice the length of New Zealand), $5,925 (NZD) spent in rewards for participants, 17 research staff involved in data collection/management (investigators/research assistants, Master's/honours/internship students/volunteers: 2/9/1/2/3/1), 1,746 hours of paid research assistant hours, >500 hours of primary investigator’s time and thousands of emails and phone calls (cost per student: $75 (range per school: $57-$112)).

Conclusions: Running a large research project in rural schools requires extensive preparations, extremely well organised study coordinator, dedicated research team members, appropriate budget and research team’s ability and readiness to adjust to school-specific circumstances.

Keywords: Research, schools, project management, rural setting

Highlights:
- Project management side of running a large research project is often overlooked.
- Conducting research in rural areas requires extensive organization and preparation.
- Competent, experienced and dedicated research staff members are key to success.
- Efficient study processes, appropriate budget and flexibility are essential.
- The importance of the well-organized study coordinator cannot be overstated.
Objectively-Measured Physical Activity in Rural Adolescents: Effect of Gender and Transport to School Mode

Chris Tait, Sandra Mandic.
Active Living Laboratory, University of Otago, Dunedin, New Zealand.

Background: Adolescents’ physical activity (PA) levels have been declining in developed countries for the last few decades. Most previous studies examined PA in adolescents living in urban centres whereas PA levels of rural adolescents remain largely unknown. This cross-sectional study examined PA by gender and mode of transport to school in adolescents living in rural New Zealand.

Methods: Adolescents (n=103; 61.5% female; age: 15.2±1.4 years) from 7 schools in rural Otago self-reported travel to school habits in a survey and wore an accelerometer (ActiGraph wGT3X-BT) for 7 days. Data were analysed using Chi-square tests, t-test for independent samples and ANOVA.

Results: Overall, 22.1% of adolescents met PA guidelines based on accelerometer-measured PA. On average, adolescents accumulated 48.5±20.2 min/day of moderate-to-vigorous PA with no statistically significant difference between males and females (54.2±27.7 vs 44.8±14.83; p=0.105). In addition, a greater proportion of adolescents using active (39.4%) or combined active-and-motorised transport to school (35.7%) met PA guidelines compared to adolescents relying solely on motorised transport to school (8.8%) (p=0.001).

Conclusions: Approximately one in five rural adolescents met PA guidelines with a great proportion of males and users of active transport to school compared to their counterparts. Future physical activity initiatives in rural areas should focus on girls and those using motorised transport to school.

Keywords: Physical activity; adolescents; rural; accelerometer; gender; transport

Highlights:
- One in five rural adolescents met minimum physical activity guidelines.
- A greater proportion of males met physical activity guidelines compared to females.
- More users of active versus motorised transport to school met the guidelines.
- Future physical activity promotion efforts in rural areas should focus on girls.
- Future initiative should also encourage active transport to and from school.
School Bag Weight as a Barrier to Active Transport to School among New 
Zealand Adolescents

Sandra Mandic¹, Roman Keller¹, Enrique García Bengoechea²,³, Antoni Moore¹, 
Kirsten J. Coppell¹.

¹University of Otago, Dunedin, New Zealand; ²University of Limerick, Limerick, Ireland; ³Victoria 
University, Melbourne, Australia.

Background: Excessive school bag weight is a barrier for walking and cycling to school. This 
study examined parental and adolescents’ perceptions of how much adolescents carry to 
school and actual school bag weights in New Zealand adolescents.

Methods: Parents (n=331; 76.7% women) and adolescents (n=682; age 15.1±1.4 years; 57.3% boys) completed a survey. Adolescents also completed anthropometry and school bag 
weight measurements.

Results: Overall, 68.3% of parents perceived that adolescents’ school bags were too heavy 
to carry to school. This parental perception differed by adolescents’ mode of transport to school 
(active/motorized/combined: 35.1%/78.4%/68.8%, p<0.001). More than half of adolescents 
perceived that their school bags were too heavy to carry to walk (57.8%) or cycle (65.8%) to 
school. Adolescents perceptions differed by mode of transport to school (for walking 
[active/motorized/combined]: 30.9%/69.2%/55.9% agree, p<0.001; for cycling: 
47.9%/72.8%/67.7%; p<0.001). Actual school bag weight was 5.6±2.1 kg. Relative school bag 
weights (% of body weight) differed by gender (boys: 9.7±4.1%, girls: 8.7±3.5%; p=0.005) and weight status (underweight/healthy weight/overweight/obese: 
15.0±5.2%/9.7±3.7%/7.9±2.8%/5.7±2.5%; p<0.001). Neither absolute nor relative school bag 
weight differed by mode of transport to school (absolute [active/motorized/combined]: 
5.4±2.1/5.7±2.1/5.5±2.0 kg; p=0.432; relative: 9.3±3.8%/9.4±4.0%/9.1±3.8%; p=0.866).

Conclusions: Adolescents and their parents perceived that adolescents’ school bags were 
too heavy to walk or cycle to school. Their perceptions differed by adolescents’ mode of 
transport to school, despite no differences in actual school bag weights by transport mode. 
Perceived but not actual school bag weights represent barriers to ATS in New Zealand 
adolescents and should be considered in future ATS interventions.

Keywords: Active transport; school; school bag; adolescents; parents

Highlights: 
- School bag weight was perceived as a barrier for active transport to school.
- Heavy school bags were seen as a greater barrier for cycling versus walking.
- Active transport users were less likely to report heavy school bags.
- On average, adolescents’ school bags weighted 5.6 kg.
- Actual school bag weights did not differ by mode of transport to school.

Publication: Mandic S, Keller R, García Bengoechea E, Moore A, Coppell KJ. School bag 
weight as a barrier to active transport to school among New Zealand adolescents. Children. 
2018, 5, 129; DOI: https://doi.org/10.3390/children5100129
Would New Zealand Adolescents Cycle to School More if Allowed to Cycle without a Helmet?

Javier Molina-García¹, Ana Queralt¹, Enrique García Bengoechea²,³, Antoni Moore⁴, Sandra Mandic⁴.

¹University of Valencia, Valencia, Spain; ²University of Limerick, Limerick, Ireland; ³Victoria University, Melbourne, Australia; ⁴University of Otago, Dunedin, New Zealand.

Background: Mandatory helmet-use legislation is present in multiple countries including New Zealand. Use of bicycle helmets is effective in preventing head injuries but may represent a barrier for adolescents’ cycling to school. This study examined the correlation of New Zealand adolescents’ perception of cycling to school and the repeal of helmet legislation.

Methods: Adolescents (n=774; age: 13-18 years; 12 schools) from Dunedin, New Zealand, completed an online questionnaire about their cycling behaviours (to school and in general) and their perceptions of bicycle helmet use as a barrier to cycling to school. Data were examined using multivariate linear regression.

Results: Overall, 22.1% of adolescents stated they would cycle to school more often if helmet use was not mandatory. In the multivariate model, perception of the required helmet use as a barrier to cycling to school was positively associated with the actual distance to school, Māori and other ethnicities, perception that cycling to school is not ‘cool’, boring route to school, and the cycling frequency with friends (p<0.05). Conversely, required helmet use as a barrier for cycling to school was negatively associated with adolescents’ perception that cycling to school is a good way to get exercise (p<0.05).

Conclusions: The majority of adolescents did not perceive helmet use to be a barrier to cycling to school. Diverse demographic, interpersonal and environmental factors were identified as significant correlates. These findings can be used to design educational interventions among adolescents to raise awareness that wearing a bicycle helmet provides protection from head injuries.

Keywords: helmet legislation; active transport; cycling; school; physical activity; youth.

Highlights:
• 22% of youth stated they would cycle more to school if helmet use was not mandatory.
• Distance to school and route perceptions were identified as significant factors.
• Ethnicity and social norms emerged also as significant factors.
• Cycling often with friends explained additional variance.
• These findings can be used to design educational interventions for adolescents.

The Importance of Social Capital for Young People’s Active Transport and Independent Mobility in Rural Areas

Tessa Porskamp¹, Christina Ergler², Preeti Sushama¹, Eva Pilot¹, Sandra Mandic².

¹Maastricht University, Maastricht, The Netherlands; ²University of Otago, Dunedin, New Zealand.

Background: Obesity rates are rising globally, with physical inactivity as a major contributor. Increasing active transport (AT) and independent mobility (IM) in adolescents can increase their physical activity. Social capital and social trust both influence adolescents’ granted licenses for AT and IM behaviours through parental decision making and danger perceptions. These perceived dangers include traffic, strangers, and an overall feeling of lack of safety. Social norms regarding supposed good parenting also play a role. These factors combined lead to the importance of social capital. This study examined the influence of social capital on AT and IM in adolescents living in a New Zealand rural area.

Methods: We conducted interviews with 20 parents and 10 focus groups with 67 adolescents from the rural Otago region, New Zealand. Thematic qualitative analysis was utilized to explore the data.

Results: Participants identified clear links between AT, IM, and physical health, but also with psychosocial processes and mental health. Social capital played a major role in decision making and adoption of behaviours, with a change over time in social capital and community trust being prominent influencers. Parents perceived decrease in social capital since their childhood. Parental perceptions of stranger and traffic dangers, influenced by social capital, was perceived to limit AT and IM in adolescents.

Conclusions: Social capital and social trust had major influence in adolescents’ licenses for AT and IM in rural areas. Health policy targeting these issues should therefore incorporate social capital measures to successfully increase AT and IM and thereby physical activity in adolescents.

Keywords: Independent mobility; active transport; social capital; social trust

Highlights:
• Social capital influenced youth transport and independent mobility behaviors.
• Rural parents perceived decrease in social capital since their childhood.
• Barriers to independent mobility were viewed as too great for actual behavior change.
• Parental concerns for personal and traffic safety had negative influence.
• Social capital should be included in health policy targeting physical inactivity.
Perceptions of Travelling to School by Car: Insights from Adolescents, Parents, Teachers and Principals

Olivia Eyles1, Christina Ergler1, Debbie Hopkins2, Sandra Mandic1.

1University of Otago, Dunedin, New Zealand; 2Oxford University, Oxford, United Kingdom.

Background: Driving is a common transportation mode for adolescents traveling to school. In New Zealand, 32% of journeys to secondary schools were made by car in 2014 compared to 21% in the 1990s. Driving reduces the opportunities for physical activity in adolescents. This research investigated the enablers and barriers for adolescents being driven or driving to schools in Dunedin, New Zealand.

Methods: A mixed-method approach was used drawing on data from parental surveys (275 parents whose adolescents' were driven/drive to school), focus groups with students (10 sessions; 54 participants), parents (6 sessions; 25 participants), teachers (2 sessions; 12 participants) and semi-structured interviews with 12 principals to investigate perceptions of driving. Data were collected from all 12 Dunedin secondary schools in 2014-2017.

Results: Enablers of adolescents’ being driven/driving to school included distance to school, perceptions of convenience, safety, independence, personal freedom associated with driving and school choice if adolescents had to travel great distances. Barriers comprised of dependence on parents when being driven and the cost and the environmental consequences of driving. Social aspects of driving were identified as both an enabler (e.g., allowing parents and adolescents to spend time together) and a barrier (e.g., embarrassment).

Conclusions: Convenience, distance, safety, independence and in some cases school choice were the main enablers of adolescents being driven/driving to school in Dunedin. Driving to school could be reduced by encouraging alternatives such as improving the public transport, ensuring appropriate infrastructure and safety of walking/cycling and reconsidering the school choice policy.

Keywords: Driving; school; adolescents; parents; teachers; principals

Highlights:
- Convenience, distance, independence and personal freedom enabled driving.
- Choosing a distant school encouraged travelling by car for some adolescents.
- Barriers included the dependence on parents, the cost and environmental impacts.
- Encouraging alternatives such as public and active transport could reduce driving.
Taking a Bus to Secondary School: Adolescents’, Parental, Teachers’ and Principals’ Perceptions

Isobelle Lane¹, Christina Ergler¹, Debbie Hopkins², Sandra Mandic¹.

¹University of Otago, Dunedin, New Zealand; ²Oxford University, Oxford, United Kingdom.

Background: Multimodal journeys including public transport present a practical way to incorporate active transport to school. Approximately one third of New Zealand children and adolescents travel to school by bus. Bus users are generally more physically active compared to students who are driven or drive to school. However, little is known about attitudes towards busing to school. Therefore, this study explored adolescents’, their parents’, teachers’ and school principals’ perceptions of the perceived barriers and enablers of adolescents taking the bus to school.

Methods: Parents of adolescents (n=350; age: 47.5±5.2 years; 77.1% females) were surveyed. Survey data was analysed using descriptive statistics. Qualitative data was obtained from focus groups with students (10 sessions), parents (6 sessions) and teachers (2 sessions), and semi-structured interviews with school principals (12 participants). All focus groups and interviews were recorded, transcribed and coded into NVivo.

Results: The most frequently reported parental barriers to bus use were adolescents’ extracurricular activities (64.4%), perceived convenience of driving (58.6%) and the cost (45.1%). Other factors mentioned in focus groups and interviews included weather, social aspects, dissatisfaction with current bus systems, convenience/inconvenience of journey duration, and multimodal journeys.

Conclusions: Inconvenience, distance and shortfalls in the bus services were main barriers to bus use. Enablers included convenience and busing as part of a multimodal journey. Family, social, and political factors influence perceived enablers and barriers for busing to school.

Keywords: Bus; school; perceptions; adolescents; parents; teachers; principals.

Highlights:
- Enablers included convenience and bus use as a part of a multimodal journey.
- Barriers were bus service shortfalls (cost; routes; timetable) and long journeys.
- Parental barriers were adolescent’s extra-curricular activities and convenience of driving.
- Family, social and political factors influence perceptions of bus use.
Policy Recommendations for Encouraging Public Bus Use to School in Dunedin

Christina Ergler¹, Logan Copland¹, Debbie Hopkins², Sandra Mandic¹.

¹University of Otago, Dunedin, New Zealand; ²Oxford University, Oxford, United Kingdom.

Background: Presently, many adolescents are being driven to school. Public transport journeys usually involve some active transport and therefore could contribute to increasing adolescents’ physical activity when active transport to school is not feasible. This study examined the environmental, policy and personal factors as well as perceptions of barriers and enablers of public transport to school among Dunedin adolescents.

Methods: A mixed-method approach was used drawing on the public bus survey from Otago School Students Lifestyle Survey (1398 adolescents), BEATS Study focus groups (54 adolescents, 25 parents, 12 teachers) and semi-structured interviews (12 principals), 3 key informants interviews and a policy analysis of 10 relevant local, regional and national transport plans and strategies.

Results: Distance to school, cost, parental trip chaining, built environment features and the weather represent major barriers to using public transport to school in Dunedin adolescents. Current transport planning documents do not favour public health concerns and focus on economic growth and efficiency. However, stakeholder interviews suggested a slow change with new investment in Dunedin’s public bus network and real-time information technology to increase the user-friendliness of public transport. Alternative ways of funding public transport were also explored.

Conclusions: Public transport use could be enticed by increasing parking prices to disincentivise driving and trip-chaining for parents, improving bus infrastructure and subsidies and by changing bus/bus users perceptions, which requires collaboration between different government authorities. A policy specific for secondary school students should be developed to address parental, adolescents and school concerns and encourage collaborations between government authorities and schools.

Keywords: Public transport; adolescents; parents; school; policy

Highlights:
- Convenience, costs, distance, safety and weather hindered public transport use.
- New Zealand transport documents favour economic growth over public health.
- Investment in bus infrastructure to increase user-friendliness are under way.
- Enablers could include making driving more expensive and changing bus perceptions.
- Collaborations between different government authorities and schools is required.

Clustering of (Un)Healthy Behaviors in Adolescents from Dunedin, New Zealand

Sandra Mandic, Enrique García Bengoechea, Kirsten J. Coppell, John C. Spence.

Highlights:
- Few Dunedin adolescents met recommended health behaviour guidelines, yet two-thirds had a healthy weight.
- This study identified six clusters based on health behaviours and weight status.
- Clusters had distinct sociodemographic and lifestyle characteristics.
- Future public health strategies for adolescents should be comprehensive and consider socioeconomic structural factors.


Adolescents’ Perceptions of Cycling versus Walking to School: Understanding the New Zealand Context

Sandra Mandic, Debbie Hopkins, Enrique García Bengoechea, Charlotte Flaherty, John Williams, Leiana Sloane, Antoni Moore, John C. Spence.

Highlights:
- Low rates of cycling to school in New Zealand adolescents may be context-specific.
- Compared to walking, cycling to school was less common and perceived as less safe.
- Cycling also received less social and infrastructure support.
- More supportive physical and social environments are needed for promoting cycling.

Perceptions of Cycling amongst High School Students and their Parents

Debbie Hopkins, Sandra Mandic.

Highlights:
- Key findings relate to perceived safety, implicit messages, and social norms.
- A complex range of factors contributed to perceived safety of cycling, including features and perceptions of the built environment, traffic safety, previous cycling experiences and adolescents’ cycling skills and on-road experiences.
- Overcoming concerns through behavioural and cultural interventions coupled with up-skilling and infrastructure changes may present a pathway to increasing cycling rates.


A tale of Two New Zealand Cities: Cycling to School among Adolescents in Christchurch and Dunedin

Jillian Frater, John Williams, Debbie Hopkins, Charlotte Flaherty, Antoni Moore, Simon Kingham, Roeline Kuijer, Sandra Mandic.

Highlights:
- Despite higher rates of cycling to school in Christchurch than Dunedin, attitudes towards cycling to school are similar in both cities.
- Norms, capability, autonomy and intention to cycle were lower in Dunedin.
- Norms were the dominant influence in Christchurch and attitude in Dunedin.
- This study shows that norms, social needs and capability are relevant for adolescents’ cycling initiatives.

Attitudes towards Cycle Skills Training in New Zealand Adolescents
Sandra Mandic, Charlotte Flaherty, Tessa Pocock, Alex Mintoft-Jones, Jillian Frater, Palma Chillón, Enrique García Bengoechea.

Highlights:
- Little is known about adolescents’ attitudes towards cycle skills training.
- Over a third of adolescents perceived that cycle skills training could make them safer in traffic.
- Enjoyment, usefulness and desire to cycle were associated with a positive attitude towards cycle skills training.
- Parental behaviour and school’s encouragement were also important.
- Schools may be an appropriate setting for provision of cycle skills training to adolescents.


Parental Perceptions of Cycle Skills Training for Adolescents
Sandra Mandic, Charlotte Flaherty, Tessa Pocock, Kek Chiew Ching, Palma Chillón, Christina Ergler, Enrique García Bengoechea.

[This abstract was not previously presented at BEATS Study Symposium 2016 but was published as a full article in the meantime.]

Highlights:
- Parents perceived cycle skills training would make adolescents safer in traffic.
- Parental perceptions of cycling to school as important and unsafe were essential.
- Having fewer vehicles at home was also associated with favourable perceptions.
- Parents thought adolescents would benefit from such training at their school.
- Interventions should capitalize on parental interest in cycle skills training.

“I Wanted to Go Here”: Adolescents’ Perspectives on School Choice

Sandra Mandic, Susan Sandretto, Debbie Hopkins, Gordon Wilson, Antoni Moore, Enrique García Bengoechea

Highlights:
- New Zealand legislation removing school zones radically reshaped school choice
- The most common reasons for school choice included: preference for a co-educational school, school’s facilities, positive comments from parents/students and friends’ enrolment.
- Reasons for school choice differed by who is making the decision.
- Social factors and school programmes/facilities rather than proximity to home influence school choice decisions in Dunedin.


Enrolling in the Closest School or Not? Implications of School Choice Decisions for Active Transport to School

Sandra Mandic, Susan Sandretto, Enrique García Bengoechea, Debbie Hopkins, Antoni Moore, Judith Rodda, Gordon Wilson

Highlights:
- Without school zoning, half of adolescents enrolled in the closest school.
- Distance to school and importance of school’s proximity influenced school choice.
- Co-educational school status and peer feedback were also important.
- Students attending closest school had five times higher rates of active transport.
- School choice has implications for education, health, transport and environment.

Investigators:

**Associate Professor Sandy Mandic**, Principal Investigator, School of Physical Education, Sport and Exercise Sciences, University of Otago

**Associate Professor Antoni Moore**, School of Surveying, University of Otago

**Dr Debbie Hopkins**, Transport Studies Unit, School of Geography and the Environment, University of Oxford, United Kingdom

**Dr Enrique García Bengoechea**, Limerick University, Limerick, Ireland

**Prof John C Spence**, Faculty of Kinesiology, Sport and Recreation, University of Alberta, Edmonton, Canada

**Dr Christina Ergler**, Department of Geography, University of Otago

**Dr Susan Sandretto**, College of Education, University of Otago

**Dr Kirsten Coppell**, Dunedin School of Medicine, University of Otago

**Dr Anna Rolleston**, University of Waikato, Hamilton, New Zealand

**Associate Professor Michael Keall**, Department of Public Health, University of Otago, Wellington

Collaborators:

**Associate Professor Palma Chillón Garzón**, Faculty of Sport Sciences, University of Granada, Granada, Spain

**Associate Professor Javier Molina García**, University of Valencia, Valencia, Spain

**Associate Professor Ana Queralt**, University of Valencia, Valencia, Spain

**Associate Professor Melody Smith**, University of Auckland, Auckland, New Zealand

**Dr Judy Rodda**, School of Surveying, University of Otago

**Dr Jillian Frater**, Canterbury University, Christchurch, New Zealand (2014-2016)

Study Coordinators:

2018: **Ms Angela Findlay**, MA

2016/17: **Ms Tessa Pocock**, BSc (Hon)

2015: **Ms Emily Brook**, PGDip

2014: **Mrs Ashley Mountfort**, BSc

Advisory Board:

**Mr Gordon Wilson**, Chair, Dunedin Secondary Schools’ Partnership (2013-2017)

**Mr Gavin Kidd**, Chair Dunedin Secondary Schools’ Partnership (2018-present)

**Associate Professor Janet Stephenson**, Director, Centre for Sustainability: Agriculture, Food, Energy, Environment (2013-present)

**Mr Nick Sargent**, Dunedin City Council (2017-present)

**Mrs Charlotte Flaherty**, Dunedin City Council (2013-2017)

**Mr Graeme Rice**, New Zealand Transport Agency

**Dr Tara Duncan**, Department of Tourism, University of Otago (2013-2016)

**Mr Andrew Lonie**, Recreation Planning Officer, Dunedin City Council (2013-2015)

**Mrs Ruth Zeinert**, Project Manager, Getting Dunedin Active (2013-2015)
PhD Students:
Long Chen (2017-present)

Master’s Students:
Jessica Calverley (2018-present)
Tessa Pocock (2017-2018)
Logan Copland (2017)
Chiew Ching Kek (2016-2018)

Honours Students:
Brittany White (2018)
Chris Tait (2018)
Leiana Sloane (2015)
Lauren Keaney (2014)

Summer Research Students:
Brittany White (2018/19)
Jessica Calverley (2018/19)
Olivia Eyles (2017/18)
Isobelle Lane (2017/18)
Tessa Pocock (2015/16; 2016/17)
Chiew Ching Kek (2016/17)
Siobhan McArthur (2016/17)
Dana Lawrie (2016/17)
Alex Mintoft-Jones (2015/16)
Ashley Mountfort (2014/15)

Internship Students:
Roman Keller (ETH University, Zurich, Switzerland; 2018)
Michael Jensen (University of Alberta, Edmonton, Canada; 2018)
Tessa Porskamp (Maastricht University, Maastricht, the Netherlands; 2018)

Research Assistants (2017-2018):
Angela Findlay, MA; Kimberley King, MSc; Tessa Pocock, MPHEd; Chiew Ching Kek, MPHEd; Charlotte Flaherty, BCom; Jessica Calverley BSc; Brittany White; Ann-Maree Fox; Judith Rodda, PhD; Long Chen, MSc; Aprille Mincher, BPhEd.

Volunteers:
Fanny Monnet; Dana Lawrie; Susie Ferkins; Paige Clarke; Megan Mendenhall; Shanyrn Ruthe; Nicole O’Loughlin; Edee Harris; Brady Gore; Zoe Willis; Kayla Inwood; Julia Flett; Sam Babe; Dayne Tiffany; Aliesha Shuttle; Rachel Storer; Nykia Miles; Tegan McNeish; Paige Aichenson; Alana Cannistraci; Luiza Gheorghe.
Working together we can encourage walking and cycling to become a part of everyday lives in our towns and cities.

Thank you for joining us on this journey!

We look forward to continuing to work together with you.

BEATS Study Symposium 2018
Organizing Committee