Final report on 'Children's Activities, Perceptions And Behaviour in the Local Environment (CAPABLE)'

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For further information about the research please see the project website at http://www.cts.ucl.ac.uk/research/chcaruse/ or contact Professor Roger Mackett (e-mail: rlm@transport.ucl.ac.uk)

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1 INTRODUCTION

This is the final report on the CAPABLE project (Children's Activities, Perceptions And Behaviour in the Local Environment), which has been carried out at University College London (UCL), with funding from EPSRC (Engineering and Physical Sciences Research Council), under grant GR/T09378/1. This report is identical to that submitted to EPSRC, apart from the addition of some explanatory information and the deletion of some administrative information. This is not a comprehensive report covering all the findings. Please see the Appendix for a list of outputs for further information on the findings.

CAPABLE followed on from a project to investigate the effects of the car on children's volume of physical activity and long-term car dependency (see http://www.cts.ucl.ac.uk/research/chcaruse/). CAPABLE involved staff from the Centre for Transport Studies, the Centre for Advanced Spatial Analysis, the Bartlett School of Planning (including the Young Foundation) and the Department of Psychology all at UCL.

The rationale of the project was to develop and apply a set of methodologies to explore how children aged 8-12 interact with the local environment. This includes issues such as how the children travel, whether they are allowed to travel without an adult, whether they behave differently when they are not accompanied by an adult, the influence of social networks on their behaviour and use of the environment, the role of parents in influencing where they go and what they do, and whether there are differences between boys and girls in these factors and processes.

Because of the exploratory nature of the project it was decided to adopt a range of methodologies. A key feature of the project was the use of GPS (Global Positioning Satellite) monitors fitted to the children to determine their location. By also asking the children to keep activity and travel diaries and fitting them with RT3 physical activity monitors, it has been possible to tell the location of the children in time and space (from the GPS monitors), what they were doing and whom they were accompanied by (from the diaries) and how active they were (from the RT3s). The collection of data by fitting monitors on individuals is novel, particularly on children; the only comparable work that is known about is for adults being carried out at the University of Texas, and it is at a similar stage of development. The social environment in which children live, forming social networks and developing relationships is another important aspect of their environment, and methods have been devised to capture these activities. A third element to understanding how children interact with the environment is to explore how they perceive it by asking them to draw maps of their journey to school and the local area. This project is distinctive in having GPS traces to show where the child actually travelled, so that the subjective world portrayed in the drawing can be compared with the objective world represented by the GPS trace. In addition, questionnaires have been completed by children and parents, covering topics such as whether the children are allowed to go out without and adult and differences between how the parents behaved when they were young and how their children now behave.

2 THE RESEARCH

2.1 The fieldwork

The fieldwork was spread over two areas: Hertfordshire and Lewisham. Hertfordshire County Council was included as a non-academic partner. The London Borough of Lewisham indicated a desire to be involved in the research and offered the opportunity to examine the effects of a more urbanised area in contrast to the suburban nature of Hertfordshire.

All the children and their parents were contacted initially through schools. The large number of dimensions to the issues being addressed and the serious risk of survey fatigue if all the fieldwork were concentrated on a single cohort of children, led to the decision to focus the fieldwork using the GPS and activity monitors in Hertfordshire and the fieldwork on social networks in Lewisham. Identical questionnaires were distributed to children in the two areas, and to parents, so that comparisons could be made, for example, in the age at which children were allowed out without an adult in the two areas. The schools were selected on the basis of their willingness to co-operate and provide facilities. A total of six schools were involved in Hertfordshire. Two of the schools, New Briars Primary in Hatfield and St Bernadette's RC Primary in London Colney were used in the development of the questionnaires to children, which needed extensive pilot work to ensure that the children understood the questions and that the range of answers were suitable. The parent's questionnaires were piloted in Holy Family RC Primary in Welwyn Garden City. Two schools, Holy Family RC Primary and St Paul's Walden Primary in Whitwell, were used to pilot the use of the GPS and RT3 monitors and the diaries. This is the first time that these three instruments have been used together for children and so considerable effort was put into ensuring that they produced results that could be integrated, and developing the protocols for using the GPS monitors, because fitting such equipment to children for research purposes is new. It was decided to include some Year 7 children (aged 11-12) in the social networks research in Lewisham because this is an interesting age at which children have transferred to secondary school, gained more independence and were expected to be establishing independent mobility based on friendship in peer groups. This also enabled extension of the comparison of ages: children from the two primary schools in Lewisham transfer to these secondary, amongst others.

The questionnaires completed by the children served as an analytical framework through which other data sets could be linked together. During subsequent visits to schools, data were collected to test the children's spatial skills through map drawing activities and spatial reasoning tests. In Lewisham children were asked to annotate maps in order to provide information on places visited and their social networks. In addition interviews were carried out with parents and children. These latter materials provide the details which shed light on the data emerging in the children's and parents' questionnaires.

2.2 The methodology

Questionnaires were completed by 1073 children, 497 at six schools in Hertfordshire and 576 at five schools in Lewisham. Complementary questionnaires were completed

by 486 parents, 213 with children at three schools in Hertfordshire and 273 at five schools in Lewisham, to provide useful background information on physical activity, car use and children's independent mobility. The children's questionnaires contained a battery of questions on journeys made to and from school, friends and relatives, and other local activities, including playing outside the home. The modes of travel, trip frequency, time and distance, who was responsible for the child during travel, and what the child was allowed to do independently at various ages, were all recorded. Children were grouped into categories according to their overall level of independence.

The core of the research was the collection of a set of data for over 200 children, building on the experience in the project on Children's Car Use (CCU) in which children were fitted with RT3 physical activity monitors and asked to keep travel and activity diaries. The RT3s combine all three acceleration vectors to produce an overall vector magnitude expressed in terms of activity counts. These can be converted into activity calories using formulae programmed into the equipment using data on the age, gender, weight and height of the child. This meant that data on the height and weight of each child had to be collected. The RT3s were set to record movements on a minute-by-minute basis.

The diaries were based in those used successfully in the CCU project, with the addition of a question about who accompanied the child, where the child was asked to indicate whether he or she travelled alone, with an adult or with other children or both, in order to explore children's independent use of the local environment. The events recorded in the children's were classified, using a typology developed in the CCU project and put into an Access database.

Twenty four GPS satellites are orbiting the earth at a very high altitude. By picking up signals from these satellites, a GPS receiver can tell the user position over the ground with an accuracy of several metres. The initial plan was to use the Vanguard Solo Tracker, which is the UK name for the Follow-it Locator. One unit was bought for evaluation. It was fairly heavy and there were difficulties with the software for downloading the data. An examination of the specifications of handheld GPS units, particularly those manufactured by Garmin, suggested that the most suitable was the Foretrex 201, which is worn on the wrist, can store 10,000 points and weighs 78g. This equipment (and similar units) had two disadvantages: the battery life meant that it would need to be recharged every 24 hours, and it was not very precise in terms of location. About this time, a dialogue was entered with Jean Wolf who has set up the Geostats Company in Atlanta, Georgia, to develop GPS equipment for data collection on journeys and similar local movements. At the time, the Geologger was being developed, which includes a sensor which is worn on the shoulder and a data logger and battery carried in a bag. A prototype version was obtained and tested. It was found to be more precise than the Garmin Foretrex 201 and did not need recharging. However, it weighs 450g and field trials with children wearing it showed that they found it unacceptably heavy and inconvenient to wear: it was clear that this was not practical. Consequently it was decided to use the Garmin Foretrex 201, and ask the children (and their parents) to recharge it every night. This worked better than expected and the children who participated showed no sign of resistance to wearing it.

Having explained about the project to the children and obtained their, and their parents', written consent, groups of about 15 children were surveyed over a week. The procedure was that the researchers went into the school on a Wednesday to weigh and measure the children, issue them with the GPS and RT3 monitors and diaries, and brief them on their use. The children wore the monitors from the Wednesday until the following Monday, with data being collected for the four days Thursday, Friday, Saturday and Sunday. They were asked to keep wear the equipment all the time except while they were asleep and when equipment might get wet. On the Monday the researchers went back to the school to collect the equipment and download the data at UCL for processing. Individual debriefing meetings were held with each child for initial reconciliation of the outputs from the three research instruments.

Because the RT3s and diaries had been used on the children's car use project, procedures for verifying and classifying the data had already been developed. However, it was necessary to develop new procedures to check and analyse the results from the GPS monitors, as well as integrating the results with those from the RT3s and diaries. There are a number of known difficulties in using GPS monitors including the unavailability of satellite signals and random points, possibly caused by the signal bouncing off buildings. Because the GPS monitors record the location and time of each point it is possible to calculate the implied speed between points. Points that implied unrealistically high speeds were deleted. The data cleaning left 65,549 useable GPS points.

The data were initially entered into Excel spreadsheets. Programs written in Visual Basic were used to integrate the data from the GPS and RT3 monitors into an Access database to give greater flexibility for analysis. The data from the three sources had to be reconciled using the times given. The GPS monitors were regarded as accurate. The RT3s were set to collect activity data in minute intervals using times set from a computer, and so it was straightforward to integrate these two data sets. It was much more complex to reconcile these two data sets with the children's diaries. Travel diaries have long been suspected of under-recording trips: this is one of the first opportunities to demonstrate explicitly that trips are missed out from diaries. There were cases when the GPS trace made it clear that the child had gone out and the diary showed no such entry. Considerable effort was put into adjusting the times in the diaries to be consistent with the GPS monitors where this could be done unambiguously. Because of difficulties with the GPS equipment, for example, significant loss of points or failure of the battery charger, and children forgetting to complete their diaries, not every child provided a complete set of data. Most of the analysis in this part of the project has been carried out on the 162 children at the two schools in Cheshunt who provided sufficient data to be analysed.

The final aspect of the data assembly was to establish the nature of the place where the GPS points were located. This was done in two ways: field observation and GIS. Field visits were held to Cheshunt. These identified a variety of kinds of street and public space environments. This was then related to survey data of children's movement. Places where children passed through or would 'hang out', were identified so that activity levels could be related to the different types of area. The Ordnance Survey MasterMap topology layer has been used in a GIS to classify all the land parcels into different types, such as buildings, natural environment, general

surface, path, road or track, roadside, structure and so on. The geo-location data and energy expenditure data have been related to the land use.

The sketch maps drawn by the children provide a rich source of information about their spatial representations. Two map drawing tasks were used as tests of the children's recall of spatial knowledge. The first task required the children to recall information about the route between their home and their school, the second required the children to recall information about the area around their school. Detail and accuracy provide two objective scores of how well a child's map represents the local environment. Detail scores can be obtained by counting up the number of identifiable landmarks, including streets and junctions, which have been recalled by the child. Obtaining a score for accuracy is more complicated and involves the use of bidimensional regression, a two-dimensional extension of standard regression, to compare the configuration of the sketch map elements with the same configuration elements in the real world. The regression scores for accuracy, and the detail scores, can be analysed in relation to other project datasets. For instance, all the children who took part in the sketch map exercise also completed the children's questionnaire, so it is possible to examine the sketch maps in relation to the information about travel, children's activities and levels of independence from the questionnaire. The most interesting link is between children's recall of spatial knowledge and the detailed data that has been recorded by the GPS units, especially for the journey to school.

The results from this work lend themselves to innovative visualization methods. The tracks that are extracted from the GPS monitors and the energy use which is coordinated with these movements imply a real time sequence which can be animated to illustrate different spatial regimes that children generate as they partake in various activities. A series of animated maps have been developed by inserting typical tracks into a non-proprietary mapping package (Google Maps) which is used to illustrate the speed at which children walk, their walking patterns and the energy expended as they walk. This is shown by colouring the track as a series of points, the colours of which reflect the energy used which is also associated with a space-time series. The speed at which a child moves is coded into the animation and this gives a sense of how energy uses, activity types, speed, and regularity of the movement patterns are integrated into the visualization. The basic methodology has now been developed. A more detailed classification of patterns will be developed and animated in the same way. Users will be able to access the data in this way and reach conclusions as to how movement patterns are related to different tasks and different energy expenditures. A sample of these tracks is shown at www.casa.ucl.ac.uk/capableproject/maps.

2.3 The findings

The findings can be considered under four inter-related themes of independent mobility, travel behaviour, physical activity and perception of the local environment. The most significant overall finding has been the effects of independent mobility on children's walking and physical activity levels. This, plus the complementary effects of increasing car use, probably explains a significant proportion of the decrease in children's volume of walking and physical activity in recent years.

About two-thirds of the children aged 8-11 were allowed out without an adult. The

mean age at which they were first allowed to go out alone was between 8 and 9, with boys allowed out alone about a year younger than girls, on average. However, the data also show that girls effectively achieve independence from adults at the same age as boys, or even younger, by doing things more often in groups. A very clear pattern emerges concerning the order in which different aspects of independence from adults are achieved by children. For virtually all children, crossing a main road without an adult happens at an earlier age than travelling to friends without an adult, which in turn comes before going for a walk without an adult, which is before going on a bus without an adult, and then cycling on a main road without an adult. A number of other forms of independence (going alone to a shopping centre, or to a cinema) are starting to be reached by some year 7 children, but only a minority.

Overall, parents appear to take a more cautious view of children's mobility than the children do, and typically see them as dependent until older. A number of factors stand out as important in developing competence amongst adolescents: the numbers of friends the children had, and how close they lived to them, influenced both the development of independence and levels of activity; this is also shown in the annotated maps. Children in higher income families showed up as generally more 'protected' (and cocooned for safety within cars) at this stage of their lives. However the factor which was most significant was that of family and household structure. Children of single parents were markedly more likely, at all the ages considered, to be the most independent, and usually the most involved in peer groups. This contrasts with what many single parents said in the interviews. They were frequently the most protective of all parents interviewed, and the contrast between what they said, and what their children apparently did, is indicative of the difficulties that single parents have in 'single-handedly' exercising control over children. Where single parents had local extended families to share parenting with them, the differences appear to be reduced.

Interesting differences were found between the children in the two areas of Lewisham and Hertfordshire. Even though the children in Lewisham use the car less than those in Hertfordshire, and so have more need to walk, as well as more opportunity because of the higher density, and have more extended family members living near by, fewer are allowed to go out without an adult. This is probably explained by the nature of the environment: relatively green with much open space in Hertfordshire, denser, perhaps with greater perceived risk to the child in terms of traffic and street crime, in Lewisham.

Turning more explicitly to travel behaviour, it was shown that the main reason children walk is to go to school, but they also walk to go to play, to after-school clubs and to go the shops, with boys tending to walk to clubs and girls to the shops. It was found that girls tend to walk more than boys, but that boys tend to walk unaccompanied by an adult more than girls. Of the non-school events, playing is the event that children, particularly girls, tend to walk to. Boys tend to walk to clubs much more than the girls. On the other hand, apart from school, when children walk with an adult it tends to be to the shops. Another dimension that has been considered is the intensity of walking, in terms of the number of activity calories consumed per minute. It was found that boys tend to walk slightly more vigorously than girls, and that children walk more vigorously when accompanied by an adult than when unaccompanied by an adult. The least vigorous walking was found to be girls going

shopping unaccompanied by an adult whilst the most vigorous was boys going to clubs, accompanied by an adult. On average, children consume about 15% more activity calories per minute when they are with an adult than when they are with their friends or alone. This is partly because children who are walking with an adult are often walking to or from school, whereas they tend to be going out to play when they are not with an adult and this tends to be a more discursive activity.

The results on the benefits of walking as a form of physical activity found in the project on children's car use have been confirmed by combining the data sets from the RT3s and diaries. Many of the differences between the age and gender cohorts of children have been shown to be statistical significant. It was found that children who spend more time in walking than they do in the car use more calories in every other type of activity. A significant factor determining children's quantity of physical activity in a day has been found to be the number of hours of daylight on week days, which is linked to the finding that children are much more active when out of the home than inside it. Also positively correlated with the volume of physical activity are the amount of time spent walking and BMI (body mass index) (i.e. fatter children use more calories shifting their body weight). Negatively correlated factors include the amount of time spent at home. Interestingly time spent shopping is negatively correlated on weekdays when children are often taken by car after school whereas for girls it is positively correlated at weekends when the girls may go shopping with their friends. Another factor that influences how active children are is whether or not they are accompanied by an adult. From the traces from GPS monitors it has been possible to calculate the extent to which the children deviate from a straight line when walking. It was found that the children walk much less straight when not accompanied by an adult than when with one, and that boys move around more than girls. Interestingly, the children tend to use more calories per minute and deviate less from a straight line when walking home from school than when walking to school, perhaps implying a greater enthusiasm to go home than to go to school.

In order to understand geodemographic and social differences in the children's patterns of spatial behaviour, the Mosaic UK area classification system developed by Experian Business Strategies has been used on the data for Cheshunt, Herts. The areas where children went by car or where they went on foot differ from one another in terms of neighbourhood characteristics. More specifically, the areas where children spent much time playing, walking around, being without adults, and being active are the neighbourhoods with typical comfortable suburban settings, good accessibility to local shops, or strong social support networks. On the other hand the children tend to be driven through more deprived areas.

In terms of modelling children's walking patterns, Yi Gong will continue to analyse the data with a view to developing models of children's walking patterns which will take account of local geometric factors, socio-economic attributes, prior dispositions of children to types of travel and different activity regimes associated with movement. A simple agent based simulation model will be developed, based on the observed tracks that have been measured which will facilitate evaluation of the extent to which children have flexibility in their movement patterns in different environments when engaged in different tasks.

Analysis of the sketch maps suggests that there is a relationship between a child's

level of independence and the detail and accuracy of the maps that they produce. For instance, the results for sketch map accuracy show an advantage for children who travel more independently: on average, children who use the car for the journey to school are less accurate when recalling the locations of landmarks in the local area. Further analysis is planned that will include GPS data, available for a sub-set of the children, to provide a more detailed picture of the children's environmental experience.

3 BENEFITS TO SOCIETY, RESEARCH IMPACT AND FURTHER RESEARCH

The main potential beneficiaries of this research are the children whose lives are enhanced by the improved environments and ways of using them. These benefits are not transferred directly from the research programme to the children but through intermediaries such as local authorities and national policy makers. One example of this is that data from the questionnaires and interviews was fed back to LB Lewisham Road Safety Department to help inform policy decisions and monitoring exercises. This included data collected from the parental questionnaires on particular places in their local area which gave rise to concern and data on how children in Years 4-6 travelled to and from school, the time spent on journeys to and from school and how this related to other family information such as patterns of car ownership.

Much of the dissemination so far has been through conferences with audiences including policy-makers and those involved with implementation of schemes e.g. the Walk21 conferences, and the Living Streets Annual Walk to School Workshops. This has also facilitated active discussion with other researchers interested in this field, but from other disciplines, particularly health. Advice based upon the experience gained in developing the methodology used the CAPABLE project has been passed onto researchers at other institutions including Dr Ashley Cooper and Dr Angie Page of the Department of Exercise and Health Sciences at the University of Bristol, Dr Andy Jones of the School of Environmental Sciences, at the University of East Anglia, Dr Charlie Foster of the British Heart Foundation Health Promotion Research Group at the University of Oxford, Dr Amelia Lake of the Human Nutrition Research Centre at the University of Newcastle-upon-Tyne, and Dr Matthew Burke of the Urban Research Program at Griffith University in Brisbane Australia.

Examples of the effectiveness of the dissemination of outputs from the project was the appointment of Roger Mackett to be a Member of the Programme Development Group for the NICE (National Institute for Health and Clinical Excellence) public health programme guidance on Physical Activity and the Environment in July 2006, and an invitation to present evidence to the House of Commons Standing Committee on Health of the Canadian Parliament for its study on childhood obesity, by videoconference link, on 26 February 2007.

The work in CAPABLE has led to the involvement of Roger Mackett in a successful bid for funding led by Dr Randi Hjorthal of the Transport Economics Institute in Oslo to the Norwegian Research Council on 'Physical activity and car dependency in modern childhood: are we socializing our children to car use and poor health'.

4 DISSEMINATION

Considerable effort has been put into dissemination. A website (http://www.casa.ucl.ac.uk/capableproject/) was set up early in the project, with a wiki used both for communication between members of the team and as an archive of the data and research instruments. Presentations have been made at conferences and seminars to raise awareness of the work and stimulate discussion with researchers from other fields, particularly health and physical activity. The Appendix includes a list of outputs to date. In addition effort is being put into producing articles for academic journals. A paper entitled 'Setting children free: environments for children to use without an adult' has been submitted for a special issue of the journal *Built Environment*, and one entitled 'Gender differences in children's pathways to independent mobility' for a special issue of *Children's Geographies*. Roger Mackett and James Paskins are writing a paper on the factors that influence children's daily volume of physical activity for submission to the *British Medical Journal*, and Kay Kitazawa plans to submit a paper entitled 'Children's activity patterns – GPS surveys and geodemographic analysis of their spatial patterns' to the *Journal of Community and Applied Social Psychology*. Belinda Brown is writing a monograph on the development and social context of children's independent mobility for publication through Southern Universities Press in the summer of 2007.

5 CONCLUSIONS

This has been an ambitious project which has developed a methodology to integrate three research instruments: GPS monitors, activity monitors and diaries, and use them to investigate how children move about and use in the local environment. It has also brought in other techniques and disciplines, including psychology and sociology, to help explain the complexity of children's use of the local environment. It has made a number of important findings, many of which revolve around the theme of independent mobility by children. The project has attracted worldwide attention from researchers, particularly in the health field. Extensive dissemination to audiences of researchers, policy-makers and those involved implementation has been carried out. Now the findings are being written up for publication in peer-review journals. The research will continue, both through further research projects and through further analysis of the data by some of the researchers for submission as PhD theses.

ACKNOWLEDGEMENTS

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APPENDIX – LIST OF OUTPUTS TO DATE

Batty, M. (2006) Information Technology, in Ian Douglas, Richard Huggett, and Chris Perkins (Editors) **Companion Encyclopedia of Geography: From Local to Global**, Routledge, London, pp. 245-264.

Brown B and Paskins J (2005) A child's eye view of the local environment, Presentation at the Conference on Emerging Issues in the Geographies of Children and Youth, held at Brunel University, 23-24 June 2005.

Gong Y (2007) Monitoring children's walking behaviour in the local environment using GPS and energy expenditure monitors, CASA Seminar, UCL, February 2007.

Gong Y (2007) Baby-sitting using satellites and motion monitors – monitoring children walking in the built environment, Poster entered in the UCL Graduate School Poster Competition, March 2007.

Gong Y, Mackett R L, Marshall S and Paskins J (2006) Neighbourhood design, children accessibility and physical activity – evidence from Cheshunt, UK, Presentation at the International Workshop Geo-spatial Information and Decision Support for Urban Planning, School of Urban Design, Wuhan University, China, 30-31 October 2006.

Mackett R L (2004) Promoting active play and tackling obesity, Presentation at the Play Matters Annual Conference on 'Play Matters for Families', National Association of Toy and Leisure Libraries, Earls Court, London, 6 October 2004.

Mackett R L (2004) Getting children out of the car, Seminar at the Institute for Transport Studies, University of Leeds, 18 November 2004.

Mackett R L (2005) Winning the health argument: The facts at your fingertips, Presentation at the Living Streets Annual Walk to School Workshop 2005, Birmingham, 24 February 2005.

Mackett R L (2005) The role of transport in children's daily physical activity, Seminar at the Institute of Child Health, London, 8 March 2005.

Mackett R L (2005) Children and physical activity: effects of the environment and transport, Presentation at the conference on 'Creating an active England, a healthier nation and tackling obesity', organised by the North Central London Strategic Health Authority and Islington Primary Care Trust, held at Regent's College, London, 4 May 2005.

Mackett R L (2005) Reducing car use to school: implications and prospects, Presentation at the Westminster Briefing on 'School Travel Planning: How can local authorities provide a realistic alternative to car usage?', organised by The House Magazine, held at Broadway House, London SW1, on 21 June 2005.

Mackett R L (2005) Getting children active: the contribution of active transportation, Presentation at the 9es JASP (9th Annual Public Health Days) Conference, Québec

City, Canada, 14-17 November 2005.

Mackett R L (2005) Children's physical activity and the local environment, Presentation to Kino-Québec, Québec City, Canada, 18 November 2005.

Mackett R L (2006) How walking to school can help children to be more healthy, Presentation at the Auckland Regional Transport Authority ARTA Sustainable School Travel Symposium, Auckland, 2 February 2006.

Mackett R L (2006) Children's interaction with the local environment, Presentation to the New Zealand Recreation Association, Otago and Southland Area, Dunedin, New Zealand, 7 February 2006.

Mackett R L (2006) Making the journey to school healthier, Presentation to VicHealth, The Victorian Health Promotion Foundation, Melbourne, Australia, 12 February 2006.

Mackett R L (2006) Children and the environment – research into how they interact, Presentation at the 3rd Annual Walk to School Workshop, organised by Living Streets, held at the Glaziers Hall, London, 23-24 February 2006.

Mackett R L (2006) Evaluation of active transport to school programs, Presentation at the International Congress on Physical Activity and Public Health, held at the Grand Hyett At Buckhead Hotel in Atlanta Georgia, USA, 17-20 April 2006.

Mackett R L (2007) Understanding Children's travel behaviour in the local environment: the implications for physical activity and health, Transport Research Foundation Lecture, UCL, 13 March 2007.

Mackett R L, Brown B, Gong Y, Kitazawa K, and Paskins J (2006) Measuring the outcomes from transport interventions for children, Paper presented at the Creating Lively Neighbourhoods: Children and Active Transport Symposium, Melbourne, Australia, 28 October 2006.

Mackett R L, Brown B and Paskins J (2005) Set the children free: exploring children's independent movement, Presentation at the Conference on New Directions in Children's Geographies, University of Northampton, 7-8 September 2005.

Mackett R L, Gong Y, Kitazawa K, and Paskins J (2006) Where do children walk and what do they do when they get there? Paper presented at the WALK21 Conference, Melbourne, Australia, 23-26 October 2006.

Mackett R L, Gong Y, Kitazawa K, and Paskins J (2007) Children's local travel behaviour - how the environment influences, controls and facilitates it, Paper written for presentation at the World Conference on Transport Research, Berkeley, California, June 2007.

Mackett R L and Kitazawa K (2006) CAPABLE - Children's Activities, Perceptions and Behaviour in the Local Environment, Presentation at Department for Transport November 2006.

Mackett R L and Paskins J (2005) Children and the local environment: breaking down the barriers, Presentation at the Conference on Emerging Issues in the Geographies of Children and Youth, held at Brunel University, 23-24 June 2005.

Mackett R L and Paskins J (2005) The role of transport in children's daily physical activity, Presentation at the Walk21 Satellite Symposium on Transport-Related Physical Activity and Health, held at the Federal Office of Sport, Magglingen, Switzerland, 18-20 September 2005.

Mackett R L and Paskins J (2006) Children and the environment – the influence of attitudes, perceptions and social networks on behaviour and activity patterns, Presentation at the first International Symposium on Environment, Behaviour and Society, Department of Architecture, University of Sydney, 9-11 February 2006.

Mackett R L and Paskins J (2007) Children's physical activity: the contribution of playing and walking, Paper submitted to **Children and Society**.

Mackett R L, Paskins J and Brown B (2005) Overcoming the barriers to walking for children, Paper presented at the Walk21 Conference, held in Zurich Switzerland, 22-23 September 2005.

Mackett R L, Paskins J and Kitazawa K (2006) CAPABLE project: tracking children from home to school and back, CASA Seminar, UCL, 1 November 2006.

Paskins J (2005) Understanding the barriers to children's active transport, Presentation at the Walk21 Satellite Symposium on Transport-Related Physical Activity and Health, held at the Federal Office of Sport, Magglingen, Switzerland, 18-20 September 2005.

Paskins J (2005) Investigating the effects of a car culture on a child's spatial skills, Paper presented at the Walk21 Conference, held in Zurich Switzerland, 22-23 September 2006.

Marshall S, Kitazawa K, Paskins J and Gong Y (2006) Mapping children's places and activities: analysis of the local area around a primary school, Paper presented at the International Conference on Planning and Designing Healthy Public Outdoor Spaces for Young People in the 21st Century, Bristol, July 2006.