

Challenges to active transport in a car-dependent urban environment: a case study of Auckland, New Zealand

T. R. Faherty · J. E. Morrissey

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Abstract There is a wide body of literature which suggests that current urban transport practices are not sustainable in the long term. This study analyses the potential for planning strategies to overcome challenges limiting the wider uptake of the active transport modes of walking and cycling in the modern urban environment, evaluating the problems and potential solutions through a case study of Auckland, New Zealand. Auckland is a car-dependent city which has recently undergone significant restructuring of local governance structures. The recently released Auckland plan has explicit targets to increase active transport rates and to develop an urban form more conducive to walking and cycling. This paper presents an analysis of stakeholder interview data collected in Auckland in the aftermath of the restructure and Auckland Plan release. Analysis provides an evaluation of current approaches taken by the Auckland Council to increase rates of active transport and highlights a range of policy instruments which could be adopted to augment current approaches. Results indicate that comprehensive integration of

approaches to active transport by transport authorities has yet to be achieved, presenting a significant challenge for further promotion of walking and cycling within the city.

Keywords Sustainability · Planning strategies · Active transport · Policy instruments · Integrated approaches

Introduction

Cities are considered the optimum scale for integrating policy development and action on mitigating climate change. Land-use patterns and urbanisation in cities has significant impact on resident lifestyles and associated GHG emissions (Liao et al. 2013). In cities of advanced economies, car-based travel has continued to increase for the past 3–4 decades, with negative consequences for urban air quality, carbon emissions and more active forms of transport such as walking and cycling. This wider trend has been facilitated by planning practices supporting the continued separation of urban functions (Newman and Kenworthy 1996, Chapman 2007) and the ‘auto-orientated design’ of central urban areas (Bean et al. 2008). Resultant low-density, segregated-use suburbs are designed for driving rather than walking, leading people to drive more and walk less (Handy et al. 2006). In many instances, car use represents the easiest, and default option for urban travel. From an environmental perspective, such trends have significant negative impacts, not least the increase of greenhouse gas (GHG) emissions and contribution to global climate change. Technology development has not kept pace with the growth in car-based travel, and substantial shifts to more efficient vehicles and alternative fuels do not presently, or are not projected to, address the scale of the problem (Banister 2011).

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T. R. Faherty
Master of Planning Programme, Department of Geography,
University of Otago, Dunedin, New Zealand

T. R. Faherty
Auckland Transport, Auckland, New Zealand

J. E. Morrissey (✉)
Cleaner Production Promotion Unit, G.02A, Department of Civil
and Environmental Engineering, School of Engineering,
University College Cork, Cork, Ireland
e-mail: jemorrissey@ucc.ie

The term ‘active transport’ is defined by Burke and Brown (2007) as ‘travel between destinations by walking, cycling or other non-motorised modes’ (Burke and Brown 2007: p. 656). It is widely recognised that an increase in walking and cycling for short journeys in urban areas could substantially reduce traffic congestion, improve the quality of the urban environment, promote improved personal health and contribute to a reduction in carbon emissions (Pooley et al. 2011). The potential of walking and cycling as preferred modes for short-distance urban trips is highlighted by Jones (2012), Banister (2011) and Beckx et al. (2013).¹ The relationship between transit use and active lifestyles is also gaining increased attention (Lachapelle and Noland 2012). Walking and cycling can therefore make a considerable contribution to sustainable transport goals, building healthier and more sustainable communities (Tight et al. 2011), through enabling emissions reductions and public health improvements.

Policy interest in promoting active transport modes has increased in many countries (Beckx et al. 2013). However, in much of the industrialised world, cycling in particular, remains a marginal mode of transport, occasionally used for recreational purposes but rarely used for practical, everyday travel needs (Pucher and Buehler 2008). In contrast to some continental European cities such as Copenhagen and Amsterdam (Pucher and Buehler 2008) cycling is not seen as normal in large parts of the UK, in cities of the USA (Pooley et al. 2011) and in Australasian cities, such as Auckland.² Rates of cycling for everyday travel in the UK and in New Zealand have continued to decline as lifestyles have become more car dependent and cycling marginalised (Jones 2012). The promotion of active transport therefore represents a challenging policy issue in car-dependent cities, especially where safety, cultural and environmental factors all present barriers to the wider uptake of walking and cycling modes; and where getting in a car is perceived to be the quickest and easiest mode of travel for most people (Pooley et al. 2011).

This paper analyses the potential for planning strategies to overcome challenges limiting active transport uptake in modern, car-dependent urban environments, evaluating the problems and potential solutions through a case study of Auckland, New Zealand. The recent amalgamation of Auckland’s various councils into one ‘Super City Council’ allows for a fresh consideration of the key role which

active transport could play in an integrated metropolitan transport system. This is achieved through a review of international best-practice and through a series of key stakeholder interviews. “Methods” describes the qualitative research method applied for data collection, to interrogate the ideas and motives which have influenced the policy approaches outlined in the Auckland Plan regarding active transport, and the strategy direction for this in the context of future development of the city. A broad review of the literature is presented to provide the framework and theoretical background to the conducted analysis, providing an in-depth understanding of the current body of knowledge on active transport, as well as an overview of the gaps which continue to exist within this knowledge. The paper has three objectives:

1. To identify common challenges to active transport, through a review of literature
2. To highlight opportunities to improve uptake of active transport in Auckland, based on successfully applied strategies internationally
3. To discuss the role of governance structures in influencing active transport uptake as a travel mode

“Literature review” presents the results and implications of the analysis, providing a broad understanding of the perspectives of transport specialists and planners associated with Auckland Council, Auckland Transport and other key stakeholders in Auckland, including service providers supporting local authority bodies. “Results and discussion” provides a discussion of the implications of analysis, including an in-depth evaluation of the critical issues regarding active transport in Auckland. The paper contributes to knowledge through application of an extensive qualitative methodology to the analysis of a complex sociotechnical problem in a context of rapidly changing governance structures. By evaluating examples of successful active transport strategies applied internationally, collating insights into city-level decision-makers and reviewing current policy documents, a ‘toolbox’ of strategies suitable for promoting active transport in the dynamic governance context of Auckland is developed and forwarded. By extension, recommendations for the enactment of appropriate policies in other car-dependent cities with comparable urban forms are forthcoming.

Materials and methods

Study context

Auckland is New Zealand’s primate city with an urban area population of 1.33 million in 2009, 31 % of the country’s total population (Grimes and Young 2013). The city is

¹ Short-distance car trips require more fuel relative to long distance trips since they are more likely to be driven in urban areas and with cold engines. Reducing these trips could therefore lead to relatively significant environmental improvements (Beckx et al. 2013).

² In many European countries, at least a fourth of urban trips are made by walking or cycling, and some countries, including Denmark and The Netherlands, report a non-motorised travel rate of over 40 % (Pucher and Dijkstra 2003).



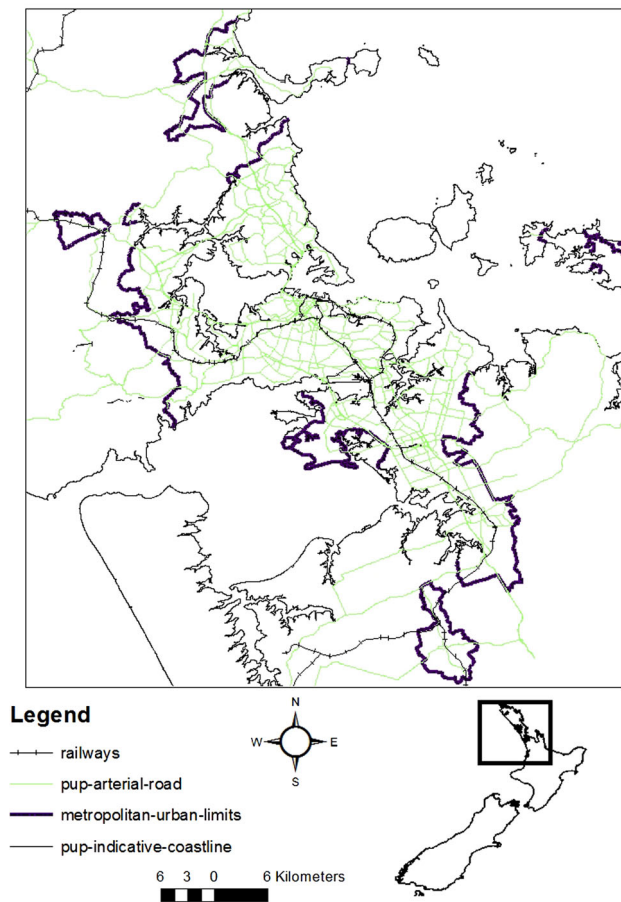


Fig. 1 Map of Auckland metropolitan area, showing proposed unitary plan (PUP) features: railways, arterial roads, metropolitan urban limits and the Auckland coastline

located on a small isthmus section of land (Fig. 1) and is one of the most densely populated areas in New Zealand as well as one of the fastest growing (Pearson et al. 2013). The Auckland landscape is one of subdued rolling hills formed on weathered Mesozoic and Early Miocene sedimentary rocks, with many distinctive small volcanic cones rising abruptly from low hills in the central isthmus area, between the Hauraki Gulf on the east coast and Manukau Harbour in the west (Edbrooke et al. 2003). Before the first Europeans arrived, it is likely that Auckland was one of the most populated regions in New Zealand with large numbers of Maori living in the area, particularly around the shores of the Hauraki Gulf. European settlement began in 1840 and Auckland officially became a city in 1871 growing to become New Zealand's largest urban centre by the early 1900s (Edbrooke et al. 2003). Compared to the rest of New Zealand, Auckland's population has a higher proportion of young people and a smaller proportion of over-65s. It is marked by considerable ethnic diversity and its growth is significantly influenced by migration patterns. Auckland households tend to be larger than elsewhere in

New Zealand. Auckland also has a higher concentration of tertiary qualified and a smaller proportion of unqualified residents (Crothers et al. 2013).

Historically in the Auckland region, conventional transport policies have primarily supported road construction and have limited the funding of other modes of transport (Jakob et al. 2006). This historical policy bias has created modal share patterns dominated by road transport for both passenger and freight movement (Alam et al. 2013). Auckland as a city continues to rely heavily on private vehicles as the primary means of transport. Eighty-five per cent of trips in Auckland are currently made by private vehicles, indicating the inefficiency of the transport system and the emphasis which has traditionally been placed on roads and motorways for mobility (Auckland Council 2012). Auckland's roads are congested, but its passenger rail network is underutilised—in 2008/2009, Auckland had 7.65 million rail passenger journeys per year, compared with some similar-sized cities internationally that manage 30–50 million (Grimes and Young 2013). The historical reliance on private vehicles has resulted in the present largely one-dimensional character of the Auckland transport system, which is substantially challenged in catering to the needs of commuters. In particular, the historical lack of investment in alternative forms of transport has created difficulties for decision-makers as they seek to create a more integrated system (Auckland Council 2012). Pressure on Auckland's transport system has been compounded by a growing population together with sustainability concerns. The city's historical governance structures, characterised by a long history of parochialism and fragmentation, have exacerbated transport problems (Wetzstein 2013).

In 2007, a Royal Commission was convened to undertake the most significant review of local governance arrangements in Auckland since 1989 (Mouat and Dodson 2013). The Commission concluded that the establishment of a single, region-wide unitary authority would help to achieve strong and effective governance and overcome chronic problems of fragmentation and lack of coordination (RCAG 2007). In November 2010, seven territorial local authorities and one regional environmental authority merged into a consolidated single metropolitan authority, the Auckland Council (Mouat and Dodson 2013). Auckland was effectively 'supersized' into a unitary metropolitan authority to govern, plan, and manage the metropolitan city region (Mouat and Dodson 2013) (Fig. 2). Auckland's Spatial Plan, released in 2011, represents the centrepiece of the new Auckland Council. The amalgamation has been characterised by strong leadership situated in the office of the Council Mayor, a slimmer government, integrated transport, infrastructure and land-use planning, design-led urban renewal, environmental regulation and remediation

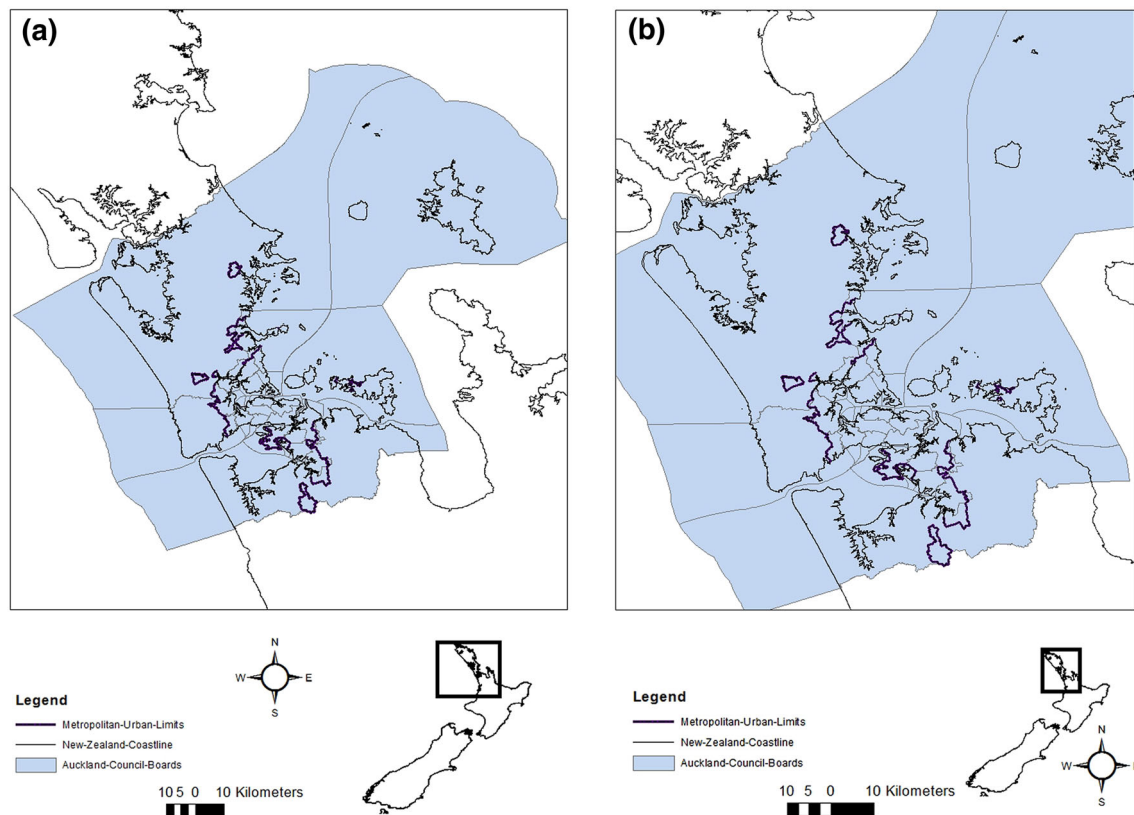


Fig. 2 Maps showing the remit of the Auckland council, including 21 local council board divisions

and globally oriented urban competitiveness (Mouat and Dodson 2013). It is supported by a powerful mayor, seven council-controlled organisations delivering key services, and infrastructure policy and provision and 21 local council boards (Le Heron 2013). In the new regime, responsibility for planning, including the spatial plan and land-use planning remains a core council responsibility while transport planning, including the development of the regional land transport plan, is now a function of Auckland Transport³ (McKinlay 2011).

The Auckland Plan is strongly underpinned by compact city ideals and directs the majority of intensification to take place in the core of Auckland as well as around existing centres in more peripheral areas (Mattingly and Morrissey 2014). The Auckland Plan also reveals new sensitivities towards Aucklanders' lifestyles, including supportive biophysical relationships (Le Heron 2013). Regarding transportation, there is a stated goal to provide a combined approach at all levels of government to improve the system by focussing upon more sustainable modes of transport through transport policy and targeted investment. As part of this, the Auckland Plan identifies active transport as an

essential means of increasing the proportion of non-car-based trips from 23 % of current trips to 45 % of trips in morning peak-hour traffic by 2040 (Auckland Council 2012). Active transport is therefore expected to play a major role in the future of the city's transport system which has to date demonstrated particularly low rates of walking and cycling. Active transport is also expected to play a vital role in reducing travel delays (Auckland Council 2012). The plan also subscribes to other ideals which are frequently advocated in the planning literature which would help to lower transportation costs, including encouraging mixed-use development, improving and extending public transport, and creating more walkable neighbourhoods (Mattingly and Morrissey 2014).

According to Mouat and Dodson (2013), the Auckland case shows an emerging logic of super amalgamation in which the rebordering and reconstitution of urban governance as a 'supersized' metropolitan authority is designed to deliver coordinated efficiency. Historically, governance in the city has been characterised by intergovernmental antagonism (perpetuating dysfunctional and often competitive relations between Auckland's local governments, and between local and central government), as well as wrestling over Auckland's assets and infrastructure (re)-development. This provided a key impetus for reform and

³ Auckland Transport is a Council-Controlled Organisation (CCO) of Auckland Council.

the shift to a strategic spatial planning paradigm characterised by efficient, coordinated, and integrated planning (Mouat et al. 2011). In the process, supersizing disrupts and reshuffles urban governance 'borders', both conceptual and practical, of the planning and community interface. The results of this process have yet to be fully evaluated, and meaningful appraisal may take time, particularly given that the fruits of the reformed structure may take up to a decade or more to become fully evident. In mid-2013, a survey of 350 Aucklanders showed that those surveyed are still unsure whether the governance reforms have benefitted the region or their local community (Crothers et al. 2013).

Stakeholder engagement

To date, research in transport geography and cognate disciplines has been dominated by quantitative methods, including statistical analysis and mathematical modelling (Røe 2000). Qualitative analysis methods provide a valuable, if under used, compliment to such approaches, ensuring that complex yet understandable social forms are not simply treated as logical categories in narrowly focused quantitative analysis (Røe 2000). Qualitative research methods were employed in this study to provide contextual (describing the nature of what exists), explanatory (determining the reasons for what exists) and evaluative (evaluating the effectiveness of what exist) insights into the active transport policy sphere in Auckland, after the descriptions of Ritchie and Lewis (2003). Qualitative-based enquiry allowed for a wider scope to be taken during the research process and enabled key informants to share their knowledge in a non-constrained manner during the interview process.

The applied approach was firmly based on precedent from the literature. Primary data were collated through a series of semi-structured interviews. Interviews of this type are content focussed rather than question focussed, allowing for preprepared questions, but usually constituted in an open-ended format in order to ensure that informants are not restricted in their answers (Hay 2000). Semi-structured interviews tend to unfold in a conversational manner, offering participants the opportunity to explore issues they view as significant. The interviewer does not strictly manage the interview but instead allows the interviewee, through the use of open-ended questions, to explore the subject in as much depth and from as many angles as they wish (Longhurst 2009). The use of preconceived frameworks or strictly organised questioning runs the risk of prematurely excluding rich data that may provide substantial illumination (Dierckx de Casterlé et al. 2012). For this reason, standardised and detailed interview schedules were not produced.

The deeper engagement associated with qualitative research means that smaller, more focused samples are

generally applied compared to quantitative research. In this study, 7 Key Informants were strategically selected for inclusion in data generation, based on their roles as prominent active transport policy stakeholders. The approach recognises that the content of each interview is unique, differing from the other interviews with regard to experiences, tone, personal and organisation involvement, etc. (Dierckx de Casterlé et al. 2012). Key Informants were not selected to provide an exhaustive or representative sample, but rather, for their capacity to provide insightful understanding of the active transport policy landscape in Auckland. A fuller discussion of the processes, strengths and weaknesses of qualitative research methods is available in Dierckx de Casterlé et al. (2012), Longhurst (2009), and Petty et al. (2012), amongst others. Key Informants from both Auckland Transport and Auckland Council were canvassed for interview for the study. They were purposefully selected, as is typical in qualitative research (Creswell 2009). The most applicable participants were selected through consultation with the relevant organisation. Key Informants from consultancies and a non-governmental organisation with roles relating to active transport planning, including Beca, Sinclair Knight Merz, and Cycle Action Auckland were also approached with requests for interview.

Potential interview candidates were contacted via both email and phone in order to arrange interview meetings. The interviews ranged from approximately 20–50 min in duration and were conducted either by phone, by Skype, or in person. An open-ended questioning technique was employed, with informants asked to provide information about their role in the organisation and the issues which they had observed during their work on active transport issues in Auckland. Interviews were conducted between the 19 December 2012 and the 27 February 2013. Table 1 provides a summary of the Key Informants interviewed during the data collection phase. Further details on the organisations of the Key Informants are provided in Appendix A (ESM).

All interviews were audio-recorded and transcribed to facilitate the qualitative analysis process. An interpretative approach was applied to data analysis by transcribing the interviews into written text, then condensing the data and coding it into themes, before final stages of reflection and synthesis of findings, following methods reported in Saldana (2013) and Berg and Lune (2012). In doing so, the key issues which emerged throughout the interview process were further articulated and interrogated from the large quantities of data generated. In addition to Key Informant interviews, a document analysis was undertaken to develop an understanding of the current legislative and policy framework surrounding active transport in Auckland. Documents included local government planning

Table 1 Summary of Key Informants interviewed in Auckland, Dec 2012–Feb 2013

Key informant	Profession	Organisation	Stakeholder role
Key Informant 1	Planning Professional	Beca (Engineering Consultancy)	Infrastructure needs appraisal
Key Informant 2	Transport Officer	Auckland Transport	Transport co-ordination and planning
Key Informant 3	Transport Officer	Auckland Transport	Transport co-ordination and planning
Key Informant 4	Consultant	Cycle Action Auckland	Not-for-Profit Lobby Group
Key Informant 5	Planner	Auckland Council	Governance
Key Informant 6	Manager	Auckland Transport	Transport co-ordination and planning
Key Informant 7	Engineer	Sinclair Knight Merz (Engineering/Project Management Consultancy)	Project management/Analysis

documents, with a focus on the Auckland Plan, as well as national, regional and local level documents of influence on active transport policies in Auckland were reviewed. Outputs from the qualitative analysis of interview transcripts provided a comprehensive characterisation of active transport as framed in policy debates, and a fuller understanding of the dynamic roles played by the respective stakeholders and their organisations.

Literature review

Barriers to active transport

In car-dependent cities, such as are evident in the parts of the UK and USA, or as exemplified by Auckland, walking and cycling are secondary modes of transport (Tight et al. 2011). The historical evolution of such cities, including the reduction in street connectivity and road safety, along with the increase in urban sprawl, has created conditions which are much less conducive to walking and cycling (Yeung et al. 2008). The environment for active transport and provision of facilities and infrastructure is often poor; levels of risk of injury are generally higher than for motorised modes; perceptions are often negative and the status of active transport modes is generally low. In addition, uptake of active transport could be substantially enhanced (Tight et al. 2011). In such environments, the car has certain inherent advantages over other modes in terms of speed, flexibility, safety and personal space (Carse et al. 2013). By contrast, journeys on foot or by bike often need to be planned more carefully than those by car (Pooley et al. 2011) and involve elements of vulnerability and exposure (Tight et al. 2011). While infrastructural issues such as a lack of proper pedestrian and cycling facilities can make active modes unsafe, inconvenient and unfeasible in some cities (Pucher and Dijkstra 2003), perceived barriers, or social and culturally derived barriers as distinguished by Thompson (2009), can be just as offputting. Real and perceived barriers therefore need to be considered in tandem in any analysis of active

transport. From a review of literature, a number of inter-related factors emerge which are critical to the development of active transport practices, addressing both infrastructural ‘real’ aspects and sociocultural ‘perceived’ aspects. For the purposes of this paper, these are categorised as:

- Urban design and planning issues
- Infrastructure provision and integration for active transport
- Behavioural and education aspects

Urban design and planning

Urban design has been identified as a key means through which to ‘script’ behaviour in the built environment. The compact city model can improve rates of active transport, for example, by reducing travel distances by foot or cycle, which are typically prohibitively long in sprawled cities (Edwards and Tsouros 2006). Design features such as pedestrian-only streets, pathways and cyclepaths to serve non-motorists, and car parks which permit easy access to building entrances for cyclists and pedestrians are measures through which better health and environmental outcomes can be achieved (Badland and Schofield 2005; Pucher and Dijkstra 2003). Urban design has proven to be an essential tool in improving rates of walking and cycling in countries such as Germany and The Netherlands. Where new residential neighbourhoods are constructed, for example, other uses accessible by foot or bike are generally included, including cultural centres, shopping and service establishments (Pucher and Dijkstra 2003). Road network design leading to increased connectivity and safety, pedestrian accessibility and mixed land use can contribute to the walkability of a neighbourhood and have a substantial impact on levels of physical activity and active transport uptake (Raine et al. 2012). At the neighbourhood scale, residents are attracted to walking in mixed land-use settings, which incorporate a range of social activities. People are less willing to walk in single use, industrial



areas, where destinations are distant and the views are monotonous (Azmi and Karim 2012).

To be most effective at promoting active transport habits, such design measures should be implemented as part of a larger integrated planning approach for the city. Banister (2011) argues that all available policy levers, including economic, planning and technological opportunities, need to be applied in mutually supporting ways, to this end. Through the combination of clear planning strategies, cities can be designed at the personal scale to allow high-quality accessibility and a high-quality environment, and to advantage non-car-based travel (Banister, 2011). Good transit service is typically associated with denser environments and a mix of activities and services, two features that are also supportive of walking trips (Lachapelle and Noland 2012). For new urban development, the incorporation of links to the existing urban structure and to secure public transport options therefore facilitate increased personal mobility and mitigate against the need for additional land requirements for more traffic (Broberg et al. 2013). A transit station in an environment with relatively high walkability may attract more pedestrians, while a suburban transit station can be accessed by drivers who park at the station, before walking to city centre destinations (Lachapelle and Noland 2012). While more compact urban form may be difficult to achieve in established towns and cities, the type and location of new developments is nevertheless critical in terms of the impact they may have on travel behaviour.

Infrastructure provision for active transport

Infrastructure is a key component of active transport planning, with cycle lanes, end-of-trip-facilities, bike share initiatives and traffic calming measures amongst the range of potential measures applied. However, urban planners may face challenges to what they can accomplish, given budgetary and practical constraints at the city level (Raine et al. 2012).⁴

- For pedestrians, Pucher and Dijkstra (2003) describe the following as critical infrastructure: wide, well-lit sidewalks on both sides of every street; pedestrian refuge islands for crossing wide streets; clearly marked zebra crosswalks; and pedestrian-activated crossing signals, both at intersections and midblock crosswalks.

⁴ As the benefits may take place over an extended period of time, it can be difficult to justify such initiatives in government policy and planning fields. Governments often choose a reactive model of decision making rather than adopting preventative measures to deal with such issues. As a result, there is often a difficult trade-off between attaining health and environmental benefits for communities, and achieving the targets of decision-makers in central and local government (WHO 2010).

- Modifying traffic patterns through calming measures, including speed humps, traffic circles, and pedestrian refuges, may provide a means of influencing physical activity levels (Badland and Schofield 2005). Dutch, Danish and German cities have traffic-calmed most streets in residential neighbourhoods, reducing the legal speed limit to 30 km/h and often prohibiting through traffic (Pucher and Buehler 2008).
- Copenhagen-style cycle lanes are an innovation in the provision of cycle infrastructure, providing cycling facilities which are separated from both parked cars and traffic. Snizek et al. (2013) demonstrate that Copenhagen lanes improve the experiences of cyclists and increase the likelihood that people will cycle on a particular cycle path, due to increased safety levels, but also because Copenhagen cycle lanes are considered the fastest way to get around the city.
- Extensive bike parking is available throughout most Dutch, Danish and German cities, provided by local government as well as public transport organisations. Moreover, private developers and building owners are required by local ordinances to provide specified minimum levels of bike parking both within and adjacent to their buildings (Pucher and Buehler 2008).

Despite the clear advantages of the described infrastructure measures, infrastructure provision is also limited in what it can achieve. While improvement in infrastructure for walking and cycling is important, such strategies alone are unlikely to be sufficient to effect major change (Pooley et al. 2011). Integrated approaches including attention on behavioural aspects are also critical.

Behavioural and education aspects

In view of limited technical advances and efficiency improvements, along with growing traffic volumes, behavioural changes towards more sustainable travel practices have attained a crucial importance (Prillwitz and Barr 2011). However, encouraging people to switch from their cars to other modes of transport has proven difficult (Carse et al. 2013). Targeted behavioural change policies generally aim at shifting people's approaches to active transport (Ogilvie et al. 2004) and are crucial to the success of active transport programmes. Examples of behaviour change programmes include national mass marketing campaigns which promote the fact that cycling may be safer than many think and that anyone can do it regardless of fitness levels (Bauman et al. 2008). However, measures aimed at behavioural change towards more sustainable practices face complex constraints and resistance. In addition, measures related to individual daily mobility and tourist travel face much lower levels of acceptance and

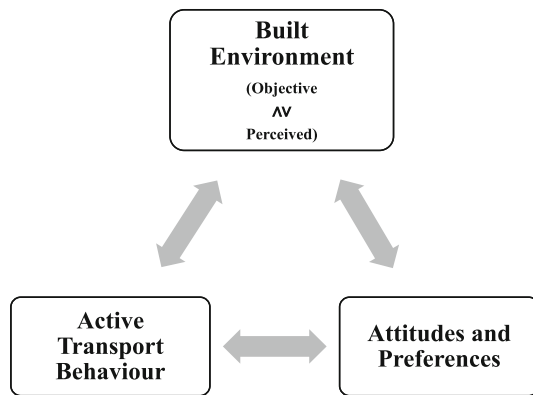


Fig. 3 Conceptual model of relationships between built environment, attitudes and preferences, and active transport behaviour, after (Handy et al. 2006)

implementation than other behaviour change initiatives, such as residential energy use for example (Prillwitz and Barr 2011). Figure 3 provides a conceptual model of relationships between the built environment, attitudes and preferences and active transport behaviour. Different causal mechanisms may apply in different situations at different times, depending on the combination of the individual's preferences and residential environment (Handy et al. 2006). The model in Fig. 3 points to an important distinction between the built environment as it can be objectively measured and the built environment as perceived by residents, demonstrating that mobility behaviour is influenced by both situational and personal factors (Prillwitz and Barr 2011).

The paper by Alfonzo (2005) offers another social-ecological model of active transport that presents a dynamic, causal model of the decision-making process. Alfonzo describes five levels of needs, organised hierarchically and presented as antecedents within the walking decision-making process. These are as follows:

- Feasibility
- Accessibility
- Safety
- Comfort
- Pleasurability

These outlined needs suggest that links to urban design and planning are critical for behavioural focused programmes. Feasibility, accessibility and safety are clearly linked to the provision of fundamental infrastructure to facilitate active transport, and Alfonzo's model suggests that these are critical prerequisites to advance an increased uptake of walking and cycling. However, once a basic level of infrastructure has been put in place, Handy's model (Fig. 3) suggests that education and awareness raising

efforts are critical to changing attitudes and preferences, and to shift perceived conceptions of the built environment. The evidence suggests that there is a need to combine infrastructure for active transport, with behavioural interventions, whereby policy focuses on ways of making walking and cycling both easier and more 'normal' so that it can be more conveniently fitted in with necessarily complex household routines (Pooley et al. 2011). Box 1 presents examples of community based information and awareness raising schemes which have addressed this critical sociocultural element of active transport initiatives.

Education and training also play a wider role in developing active transport practices. Dutch, Danish and German children receive extensive training in safe and effective cycling techniques as part of their regular school curriculum, including both classroom instruction and 'on the road' lessons, first on a cycling training track solely for children and then on regular cycling facilities throughout the city (Pucher et al. 2010). Another key element in cyclist safety is training motorists to be aware of cyclists on the roadway and to avoid endangering them. In the Netherlands, Denmark and Germany motorists are legally responsible for collisions with children and elderly cyclists, even if they behave contrary to traffic regulations. The priority legal status of non-motorists puts motorists on the defensive and forces them to drive with special attention to the safety of cyclists and pedestrians (Pucher and Buehler 2008).

Delivering increased rates of active transport

Cycling rates in countries such as the Netherlands, Germany and Denmark are often perceived as exemplary of what can be achieved by targeted policy responses to foster active transport (Pucher and Buehler 2008).⁵ Table 2 provides an overview of policy interventions to be applied to encourage great rates of uptake of active transport modes.

However, the urban context wherein the policies described in Table 2 are enacted are also of critical importance. Strict land-use policies foster relatively compact, mixed-use developments that generate more bikeable, shorter trips, for instance (Pucher and Buehler 2008). In the Netherlands, strategic national spatial planning has been effective in retaining high shares of cycling and walking in the large-and medium-sized cities (Schwanen et al. 2004). Regulation can also play a key role. for example mandating that car parks are to be located behind or beside buildings, to allow for ease of access by non-motorists (Pucher and

⁵ Changes in transport and planning policy in the mid-1970s and beyond generated the current success story in these countries (Tight et al. 2011).

Box 1 Behaviour change and awareness raising measures—Smart-Trips and Model Communities

Portland’s SmartTrips Initiatives

Portland’s SmartTrips initiative aimed to ensure that everyone within Portland knew of the alternative transport options available to them, with the overall goal of promoting sustainable transport choices within the city. From the initial pilot study which began in 2003, the idea was to individually market alternative transport options to different neighbourhoods throughout the city. The development of cycling and walking maps were a key component of the programs, allowing for people to recognise the ease with which they could use active transport options without having to use their private vehicle. Beginning with a pilot study of 600 people, the SmartTrips initiative has since expanded in scope to cover areas with a total population of 20,000 people per annum (PCIC 2012)

The number of individual vehicle trips reduced from between 9 and 13 % in all areas where the programs were initiated. Each of these areas also witnessed a significant rise in active transport use

According to Gotschi (2011), the overall cost was estimated to be around \$57 million to develop the increased cycle network, and \$7.2 million to administer the ongoing SmartTrips program by 2012 (\$10 per person in each study area)—these were cost-effective when balancing the costs against the benefits including estimated cumulative bike miles, health benefits, and fuel and emissions savings

New Zealand’s Model Communities

In 2010, Hastings and New Plymouth, New Zealand, were jointly awarded a \$7 million grant to become New Zealand’s first walking and cycling ‘Model Communities’ (Bargh and Kelly 2011). The funding was split between the two Councils and was put towards improving the viability of walking and cycling as popular transport options in Hastings and New Plymouth, and to incorporate walking and cycling into the Council’s transport plans (NZTA 2011). Model Communities can be defined as ‘urban environments where walking or cycling is offered to the community as the easiest transport choice. Model communities are also about delivering safe environments that suit novice users commuting to school or to work’ (NZTA 2011: p. 1). The programme aimed to use learnings to share knowledge with other communities (NZTA 2011)

Dijkstra 2003). There is increasing evidence that enforcing a shared space ideology on urban roads can help to improve the rate of walking and cycling (Hamilton-Baillie 2008).⁶

Results and discussion

Challenges to active transport in Auckland

Several Key Informants were asked to comment on the general issues affecting the uptake and development of active transport as viable transport modes within Auckland.

⁶ When drivers, cyclists and pedestrians are integrated together, they become more aware of each other and users across all modes tend to be safer (Hamilton-Baillie 2008).

Table 2 Policy interventions to foster uptake of active transport modes, after (Pucher and Buehler 2008; PCIC 2012; Bargh and Kelly 2011)

Behavioural or infrastructural focus	Policy measure	Instruments
Infrastructural	Cycling infrastructure	Fully integrated paths, lanes and dedicated bicycle streets Co-ordinated directional signs for cyclists
Infrastructural	Infrastructure modifications and priority traffic signals	Advance green lights for cyclists at intersections Advanced cyclist waiting positions Cyclist short cuts to make right-hand turns before intersections
Infrastructural	Traffic calming	Traffic calming of residential neighbourhoods and physical deterrents for cars
Infrastructural	Bike parking	Geographical spread of facilities throughout the city Lighting and security of bike parking facilities
Infrastructural	Co-ordination with public transport	Bike parking at metro, suburban and regional train stations Bike rentals at train stations Dedicated bike carriages, with holding equipment
Behavioural	Traffic Education and Training	Comprehensive cycle training for school children Training of motorists to respect cyclists and pedestrians
	Traffic Laws	Special legal protection for children and elderly cyclists Motorists assumed by law to be responsible for crashes with cyclists Strict enforcement of cyclist rights by policy and courts
	Awareness raising	SmartTrips initiatives; Model Communities

The themes which emerged from analysis of interview transcripts may be divided into local-scale issues relating to community safety and behavioural change, city-wide issues

relating to urban form, and national-level issues relating to government policy and support. Road safety was an important consideration for behavioural constraints, as it is difficult to change commuter transport habits to include more walking and cycling when people feel that it is unsafe to do so on Auckland's roads. Key Informant 7 felt that safety concerns would prove to be even more paramount when more people chose to walk or cycle:

'Probably around Auckland, it's more of a safety thing. Obviously the more active transport gets used, the more safety problems because you're introducing a lot more points of conflict, particularly with motor vehicles and things like buses and trucks and that sort of thing' (Key Informant 7).

The importance of the urban form of the city was recognised by Key Informants as a determinant of current transport behaviour and in shaping future choices. Key Informants 1, 4 and 7 each emphasised the impact which urban form had on active transport rates. This is currently an area of high interest in Auckland, given the sprawling nature of the city and the historical development of the urban form which has resulted in the present levels of dependence on private vehicles. Key Informants 1, 4 and 7 believed that policy makers needed a better understanding of the way in which urban form continued to reduce the liveability of Auckland through inadequate transport connections.

'The reality is there is a better way to deliver better urban form for Auckland, it's not about huge Greenfield development, because all that does is isolate people and make expensive transport connections, which is not what people want...they want a liveable city which has easy access by means of... housing choice, you know, affordable housing and good public transport and cycling links' (Key Informant 4).

Despite gains made by local authority amalgamation in Auckland, the need for further policy alignment and an integration of approaches across various level of government was highlighted as a key challenge to the promotion of active transport within the city. The NZ Government have backed greenfield development as a key instrument to assist with housing affordability in urban areas across the country. However, the Auckland Council viewed extensive greenfield development as an additional pressure on the transport system which they are trying to implement, including measures to promote active transport.

Role of the Auckland plan

During the interview process, Key Informants were asked to comment on both the effectiveness of the new Auckland

Council structure and how they felt that the Auckland Plan had worked as a guiding document in their profession. Six out of the seven Key Informants were pleased on the whole with the council restructuring and found that it had been beneficial to the provision of all modes of transport in Auckland. The inclusion of Auckland Transport and Local Boards to the Auckland Council was highlighted as being particularly significant. It was generally acknowledged that there continued to be challenges; however, these were also being dealt with over time as functions and relationships became better established within the new structures. Five of seven of the Key Informants found the Auckland Plan to be useful as a guiding document for more sustainable transport planning, largely due to the directions that it set for both a long-term vision for transport and for improving objectives relating to walking and cycling. Key Informant 7 felt that the targets were realistic and that active transport would at least be provided a more substantial focus in Auckland than is currently the case. Given the recent implementation of the Auckland Plan, this document also held a high level of priority for the Key Informants. Further, as the city's key direction-setting document, each Key Informant had applied it in their professional practice. Key Informants 4 and 5 were not in support of the Auckland Plan, however, and this resistance was chiefly related to their belief that active transport had not received adequate attention throughout the document. Key Informant 5 elaborated on this by suggesting that active transport should be split into two separate targets for both walking and cycling, as they felt that the aims should be quite different for each.

'There's only one target in [the Auckland Plan] really relating to cycling and walking and it's not even its own target, the Morning Peak target. So, I think that's kind of disappointing that there's not a specific one for cycling and walking...You could split it into one target for walking and one target for cycling, you know, quite different things really' (Key Informant 5).

Key Informant 5 also suggested that Auckland Transport have their own separate targets for walking and cycling, and that this should also be reflected in the Auckland Plan so that their objectives aligned.

Opportunities to improve current rates of active transport

Given the concerns which Key Informants 1, 4 and 7 expressed regarding the state of Auckland's current urban form, suggestions for a greater focus on urban form to promote better use of active transport were forthcoming. Interestingly, these were the non-governance-focused



stakeholders. Urban intensification and prioritisation of public transport have been identified in the Auckland Plan as two of the most vital measures to reduce congestion within Auckland. Both elements are also likely to have positive implications for active transport throughout the city. In particular, Key Informant 1 believed that urban intensification was a key factor in improving active transport in Auckland. The manner in which this was to be addressed was identified as critical to the prospective success of intensification efforts. Key Informant 1 emphasised the need to increase housing density through constructing compact residential units, rather than very high densities through development of apartment blocks:

‘A critical factor in the success of it is increasing the density of the suburbs of Auckland. So, not so much 20 story apartment blocks, I don’t think they’re particularly good for active transport, but those 3 story houses on the edges of suburbs where there’s enough density of people that it’s good to be connected and there’s attractions that people can be connected to and it’s easier to walk to the shops than to drive to the shops and that kind of thing, so there’s actually enough density to get facilities in proximity to where people are living. I think that’s the key to success for it’ (Key Informant 1).

The integration of transport infrastructure and services was also highlighted by Key Informants. Key Informant 6 emphasised the need for greater connections between different modes of transport, especially between walking and cycling, and public transport. This is related to issues of urban form, but more specifically concerns the design of urban environments which provide a range of different transport modes, easily accessible to commuters. The electrification of the rail network was provided as an example of a measure improving connectivity and facilitating integration between different transport modes:

‘So, the growth that we’re getting from cycling and walking is fantastic, and making sure that it’s seen as a connection to public transport as well, and that’s one of the growth areas that we’ve got in Auckland with the electrification of the rail network and through our integrated ticketing, it provides much more ease for potential users and customers across the transport network to connect and not see it as something which is disconnected’ (Key Informant 6).

The Key Informants generally considered monitoring to be one of the most important factors when assessing commuter behavioural change. Key Informant 6 indicated that new methods which the Council has implemented to gauge the percentage changes of cyclists throughout Auckland are an important tool to assess and further develop policy.

Through enhanced monitoring throughout the main cycle routes, the Council has been able to determine that cycling numbers have continued to increase in recent times. Recorded increases ranged from 1 to 30 % increases in cyclist numbers for 2012 compared to the same month in the previous year. As a result, Key Informant 6 was enthusiastic about future prospects:

‘We’d also pulled out a series of 24-hour continuous cycle counters on a high-utilised or a high-focused route, and that’s really given us a great picture of how cycling has increased over the past year. So previously, we just based our growth of cycling on a one-off yearly count, which is done every March, and that sort of shows a growth between 2-7 % per year. But now we have these continuous 24-hour counts, and we’re able to really get some good profiles of 24-hour counts, and peak hour counts. And we’ve got those based on 10 cycle routes through the region, so we are seeing growth on a month-on-month basis compared to the previous year, ranging from 1 % to 30 % growth per month, which is fantastic!’ (Key Informant 6).

Key Informant 5 indicated that the current monitoring regime could be expanded to improve the data collected on the amount of people walking for transport on popular pedestrian routes. While it may be very difficult to ascertain the number of people walking regularly as a form of commuter transport, Key Informant 5 suggested that ‘you can’t have a target without any way to monitor it’. Monitoring data for cycling were of increasing validity with increasing numbers of automated counters being set out on popular cycling routes. However, if the Council was to introduce separate targets for walking and cycling, Key Informant 5 believed such a change would be better facilitated by different sets of monitoring data for each mode. While innovative concepts and designs relating to active transport were not generally highlighted as a major priority for authorities to focus upon, the Key Informants did indicate that there were some innovations which could be further explored for possible implementation throughout Auckland. Key Informant 4 recommended applying lessons from the Model Communities initiative (Box 1). In particular, the investment by the Hastings District Council into walking and cycling has contributed to ‘interesting, new, creative and successful’ innovations for these communities (Key Informant 4). The implementation of such strategies for Auckland communities presented significant potential to increase walking and cycling and the cost-effective nature of these developments served to increase their attractiveness:

‘First of all, applying the lessons of model communities as quickly as possible. It’s clever use of

infrastructure....they're finding ways to do maintenance better, faster, longer-lasting, they're finding ways to mark cycle lanes better, they've found good ways to educate the local population and engage them. So, I actually think that if we delivered the learning's from the Model Communities in the next 3 years, boy would we be getting bang for our buck' (Key Informant 4).

Key Informant 4 also considered smartphone applications to be an important opportunity to use modern technologies to improve the active transport network in Auckland. Cycle Action were 'looking at using phone apps to make far better means of communication between roading authorities and the cycling community' (Key Informant 4). Innovation of this type was described as already occurring

Table 3 SWOT analysis of the implementation of the learnings from the Model Communities in Auckland

Model Communities	
<i>Strengths</i>	<i>Weaknesses</i>
Model Communities appear to represent very cost-effective strategies as they largely target changing travel behaviours rather than enforcing widespread infrastructural changes. They also offer realistic opportunities to enhance the existing active transport networks in different locations and consider the interactions between the different transport modes (Bargh and Kelly 2011)	The main weakness of the Model Communities approach is that they do not explain why people choose to travel the way they do (Bargh and Kelly 2011). Further analysis may be needed to help answer this in order to combine these behavioural elements into the implementation of the model
<i>Opportunities</i>	<i>Threats</i>
Specific communities throughout Auckland could be targeted to introduce the learnings of the Model Communities. Behavioural change is clearly a significant issue for Auckland's roads, which continue to be dominated by private vehicles. As indicated by Key Informant 4, Model Communities offer a cost-effective option for transport planning, so there is minimal risk in implementing these lessons if they do not turn out to be successful. They would also fit well with the Auckland Council's policies surrounding integrated transport as they take into account multi-modal transport strategies	The main threat for expanding the learnings of Model Communities into Auckland would be the different climatic conditions and urban environments which make Hastings and New Plymouth difficult to compare to Auckland. Hastings, in particular, was chosen partly for its warm, dry climate, relatively small population and flat topography which made it an ideal location to encourage more walking and cycling. This is largely in contrast to Auckland which features very little of these elements other than a relatively warm climate. This could make similar behavioural changes difficult to achieve in relation to walking and cycling

in some parts of the public transport system, which could also help to assist pedestrians or cyclists to combine active modes with buses, trains or ferries during their commuting journey (Key Informant 4). Further, one informant suggested that Auckland Transport 'are looking at how we can improve the information and promotion of walking and cycling, and some of those options involve looking at how we can make information available on smartphones, but that's early days for us' (Key Informant 2).

Policy makers were aware of international successes in the active transport space, and these were referred to as a key source of information and potential direction for present and future initiatives. Copenhagen-style bicycle lanes provide an example, and these were discussed as a possible option for parts of Auckland by Key Informants 3, 4 and 5. While there were mixed opinions about their validity, Key Informant 3 discussed their trial implementation:

'Yes, and there is a project on Albany Highway, they're trying not to use the word Copenhagen lane, they've tried to call this a separated cycle facility. But it is similar to a Copenhagen lane, so it's basically a separated cycle path, and at the intersections you have to either stay on the path or go onto a shared path and cross with the pedestrians, or you can go back onto the road and continue along the road, it's exactly what I described before of overcoming this issue in New Zealand, that as a cyclist you don't have right of way over side roads' (Key Informant 3).

Key Informant 3 indicated that the development of infrastructure of this type would be useful in encouraging less confident cyclists onto the road by providing a separated cycle facility for them to use. In communities with high numbers of school children, such as the Albany Highway area referred to, Key Informant 3 believed that the provision of Copenhagen lanes could be useful to help overcome issues concerning perceptions of cycle safety. However, Key Informant 4 questioned their compatibility with Auckland roads as a result of the wide carriageways which Copenhagen lanes require:

'Look, it can happen, it can be done, but it does depend on a wide carriageway. I mean I'd dearly love off-road cycle lanes to accompany on road cycle lanes, and every on road cycle lane would be a Copenhagen lane in an ideal world. Cycle Action takes some real pride in focussing on being pragmatic, that simply cannot be achieved in a lot of corridors in Auckland because there's just not the road width and there's not the money. But, where it can be achieved, we'd be the first ones to put our hands up and ask for it' (Key Informant 4).

Table 4 SWOT analysis of the potential implementation of the Copenhagen-style cycle lane in Auckland

Copenhagen-style cycle lanes	
<i>Strengths</i>	<i>Weaknesses</i>
<p>A major strength of the Copenhagen-style cycle lane is that it reduces the dangers presented to cyclists from roads with both traffic and parked cars, which cyclists can often feel vulnerable from when riding between the two. This approach could significantly enhance people’s perceptions of cycling, especially when it comes to less confident cyclists. The other major advantage of Copenhagen-style lanes is the speed with which people are able to travel, given that they can provide greater priority to cyclists over other road users</p>	<p>Copenhagen lanes are difficult to implement due to their requirement for a wide carriageway. This is because there usually needs to be space for a footpath, a Copenhagen lane, roadside parking and motor vehicles. Unless traffic lanes are reduced or roadside parking taken away, this creates a difficult set of circumstances for authorities to introduce these lanes. It is also likely that they would be expensive to implement, something which would probably discourage many authorities given that most have limited budgets for strategies involving active modes of transport</p>
<i>Opportunities</i>	<i>Threats</i>
<p>Shared space cannot be regarded as a cheap or easy option to implement. However, as highlighted by Key Informant 5, shared space has been largely successful once implemented in certain parts of Auckland. Thus, while Copenhagen-style cycle lanes are expensive to implement, further trials could be introduced in different locations throughout the city, similar to shared space, in order to gauge an understanding of their future potential. Once the public become aware of their benefits, this may assist in the potential implementation process</p>	<p>As with the weaknesses of Copenhagen lanes, the main difficulty with implementing this option in Auckland is the requirement for a wide carriageway. Because most Auckland streets are not particularly wide, to introduce them would require extensive redevelopment of roads at a considerable price. As their greatest potential would be along main roads in inner city locations, this also presents a challenge as these locations are particularly short on road space. If greater levels of congestion were to result following the implementation of Copenhagen-style cycle lanes, there may be potential for a public backlash against them</p>

While there was enthusiasm for this infrastructure amongst Key Informants, some felt that there was limited scope for large scale development of infrastructure such as Copenhagen lanes in Auckland, considering current budgets and road infrastructure available for active transport.

‘In the long-term plan and in the Regional Land Transport Programme, cycling and walking is given \$10 million. It was increased from 5 to 10 in the last round which was around the middle of last year...and there’s not a lot you can actually do for that because most projects cost a couple of million just by

Table 5 SWOT analysis of the potential for smart-phone technology and application to assist cyclists in Auckland

Smart-phone technology and applications	
<i>Strengths</i>	<i>Weaknesses</i>
<p>The use of smart-phone technology offers a very innovative, forward-thinking strategy to promote active transport. It is very useful in that it can help to better inform authorities of the need to change elements of cycle facilities in particular locations, along with providing useful information to cyclists about their own journeys. There is also a very minimal risk associated with these applications as there would a limited cost associated with implementing them. Also, if the application appears not to have been successful, then changes could easily be made to improve them</p>	<p>There are very few weaknesses which are considered to be major issues with implementing smart-phone applications. One issue, however, was presented by the San Francisco County Transportation Authority in their work with the so-called SmartTracks application, whereby the GPS used in the smartphone applications struggled at times to connect properly with satellites to receive high-quality coordinates for route choice, especially at the start of trips and around tall buildings, an issue for cyclists in the CBD (Charlton et al. 2009)</p>
<i>Opportunities</i>	<i>Threats</i>
<p>If Auckland Transport is able to promote the application well, and make it simple for all people to use, then there could be significant opportunities to utilise this information. With a substantial amount of development occurring to the transport network throughout Auckland, a smart-phone application could assist in providing information on the locations which require the most attention and in providing feedback on the facilities available for cycling</p>	<p>The main threat would probably relate to the amount of public buy-in that a smart-phone application would receive. It would probably appeal to younger generations, but may fall short of attracting use from a wider demographic of age groups. This could skew the data which is received by local authorities and affect the type of decisions which they make around cycle facilities</p>

themselves. You either do a whole lot of little ones, or you do one or two big ones, but that’s not meeting the demand’ (Key Informant 5).

However, Key Informant 5 considered that there may be room for a limited number of Copenhagen lanes to be developed, once the Albany Highway development is further trialled. The expressed view was that it would take public buy-in, which could be attained in a similar way to the implementation of shared spaces throughout the city.

‘I think you have to see it working and then people will use it and everyone will say “Oh, it’s great”, and then they’ll become more common like the shared spaces’ (Key Informant 5).

Table 6 SWOT analysis of the potential for SmartTrips to promote active transport in Auckland

SmartTrips type information service	
<i>Strengths</i>	<i>Weaknesses</i>
As Gotschi (2011) indicated, the SmartTrips initiative was ultimately cost-effective given the benefits which were achieved in each area the programme was implemented in Portland. Individualised marketing is the other major positive aspect of this programme, as each person will have different priorities when it comes to their transport requirements	The SmartTrips programme was resource-intensive to initiate. There are therefore significant costs associated with implementing strategies of this type, which generally target relatively small groups at a time—even if the long-term benefits significantly outweigh the overall costs. The use of these types of programmes may also be difficult to justify for financial support in the political realm as the benefits are less obvious in a physical sense than physical infrastructure would be in the short-term
<i>Opportunities</i>	<i>Threats</i>
A significant feature of the SmartTrips programme was that it was not heavily influenced by poor weather conditions in Portland, which is relevant to Auckland as it can receive a high quantity of rainfall on an annual basis. Further, by using target-specific marketing, this can cater to the wide range of cultures, age groups and transport requirements for different communities throughout Auckland, rather than a one size fits all approach to active transport marketing	One difficulty with comparing Auckland to Portland is that most everyday trips in Portland were considered to be within 3 miles. This made it easy to implement the strategies throughout Portland to improve rates of active transport. Aucklanders are likely to have to travel further than this on a regular basis due to the sprawled nature of the city, especially when it comes to workplace commutes, adding difficulty to promoting active modes of transport when compared to Portland

SWOT analysis of potential measures

From the review of international literature and insights forthcoming from Key Informants, a number of strategies with potential for application in Auckland to promote the viability of active transport are forthcoming. These are framed in a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis to analyse their potential implementation (Tables 3, 4, 5, 6). The topics focused on for this analysis include model communities, smartphone applications, Copenhagen-style cycle lanes and SmartTrips. The aim of the section is to provide a list of progressive policy measures and instruments with potential for implementation in Auckland in the short to medium term. Longer-term strategies such as concentration on urban form and integration of land-use and transport planning are not deemed suitable for SWOT analysis due to their complexity and due to the requirement for

substantial vertical and horizontal policy integration which these would entail. These are discussed further in the implications section.

Implications

Yigitcanlar and Teriman (2014) highlight that adopting holistic planning and development processes can generate potential for enhanced sustainability of cities. While in the early stages of implementation, the policies and objectives related to transport planning and urban development in the Auckland Plan appear to have begun the process of promoting active transport across Auckland city. In particular, policies aimed at urban intensification look to be effective, and the Auckland Plan will assist in establishing ‘greater accessibility through expanded public transport services and greater opportunities to walk and cycle’ (Auckland Council 2012). Improving accessibility to jobs, schools, services and other facilities is particularly relevant in the context of a projected doubling of population over the next 30 years and predicted challenges with meeting of housing need for the relevant authorities. Policies and objectives targeted for urban intensification will provide the macro-context for a greater number of Aucklanders to use active transport modes either for part or for all of their daily commutes. Against this, targeting short-term fixes in urban development in order to improve housing affordability will not solve the plethora of other issues which Auckland is facing with a rapidly rising population base, particularly those relating to transport. Liveability is a headline indicator of success outlined in the Auckland Plan.⁷ Transport costs and accessibility are key components of this, as is affordable housing. However, for the long-term objectives outlined in the Auckland Plan, it is critical that these elements are considered in tandem, and that housing affordability, for example, is not considered in primacy to the detriment of sustainable mobility and accessibility goals. As outlined by Key Informant 4, people want a livable city which has easy access by means of housing choice, affordable housing and good public transport and cycling links.

Effective choices across transportation modes will be an important factor in gauging whether liveability is really improving in Auckland. However, prioritised transport options need to be both realistic and affordable for all Aucklanders. The Auckland Plan and a considered implementation of this are key to ensuring that active transport represents an increasingly important travel mode for increasing numbers of Aucklanders. In this regard, it is important that policy development and implementation

⁷ The intention of the Auckland Plan is to make Auckland the most liveable city in the world (Auckland Council 2012).

ensures that cycling, in particular, is not just focussed on cycling enthusiasts, but rather represents a cheap and realistic option for people from a range of socio-economic backgrounds. Projects such as the Southern Initiative from the Auckland Plan may assist in ensuring that access to everyday destinations via walking and cycling becomes a reality for many more Auckland families over the next 30 years, thereby reducing the proportion of income that Aucklanders must spend on motorised transport. The primary research revealed that there is an argument for the development of separate walking and cycling targets by the Auckland Council. The Auckland Plan provides a big picture view of the Auckland transport system, as a 30-year direction-setting document. It is important that the Auckland Council use this plan and the Auckland Unitary Plan to modernise the way in which transport planning is carried out to fully integrate active transport modes. While walking and cycling come under the same active transport heading, the requirements for change associated with each transport mode are often very different. Auckland Transport already separates the two targets, so it is imperative that the Council documents also do this in order to ensure that the directions align across the relevant authorities. This may also allow for more specific targets to be established in the Auckland Plan relating to active transport in future, other than just the Morning Peak target as it presently stands. Further, the separation of targets provides greater emphasis on monitoring the rates of both walking and cycling, as an authority cannot have a target without any data to monitor it. Therefore, more data collection needs to be utilised in order to consider the number of people walking throughout Auckland, rather than just a monitoring of cyclist numbers. This would also ensure that directions can be adapted and updated over time as targets change in relation to monitoring data.

Technology may also play an important role in the years to come. Smartphones have become commonplace in modern society and could present a unique opportunity for local authorities to use this technology in order to improve rates of active transport. Getting involved with such a scheme would be an innovative way for local authorities to offer forward-thinking in their quest to reduce the influence of the car on the modern urban landscape. The GPS capability of smartphones enables their users to view maps of the routes they have taken on their walking or cycling routes along with their distances and speeds, generating rich travel data at the individual commuter scale, which could provide invaluable information to municipal decision-makers and researchers. There is emerging evidence of such schemes working successfully internationally. In addition, behavioural change programmes emerge from this study as a critical aspect of developing the viability and critical mass of active transport modes. In coordination

with infrastructural changes to active transport networks, target-specific marketing methods such as those applied in the SmartTrips initiative could go a long way to changing prevalent attitudes and cultural norms surrounding ubiquitous private car use. By ensuring that everyone is aware of all of their alternatives, significant shifts could be made in regard to individual's transport choices, at relatively low costs.

While the amalgamation of the Auckland Council has ensured that many of the historical governance problems in Auckland have been successfully addressed, challenges remain to achieve further alignment and integration of approaches across local and national government structures. From a governance perspective, primary research has revealed that there may be some disconnection between the Auckland Council and Auckland Transport as teething problems continue under the realigned local authority structures in Auckland. It is therefore important that improvements are made to the formal relationship structures established in local and central government, to ensure that common visions for critical active transport strategies are developed and adequate communication and coordination is fostered to achieve these. While the formation of the Auckland Council was to enable a unified approach to governance at the city level, central government needs to endorse the Council and to support it where required if this is to happen. It is clear that the alignment between Auckland Council and the New Zealand Government needs to be addressed to ensure that political differences do not hinder the future growth and development of Auckland and that policies at difference scales are mutually reinforcing rather than working in opposition. This is especially acute in the case of greenfield development policies. It was interesting to note that the non-governance-focused Key Informants (Key Informants 1, 4 and 7) highlighted the importance of policy integration and big picture understanding of issues such as the role of urban form, more generally for a sustainable city, and specifically in determining rates of active transport. By contrast, governance-focused Key Informants (Key Informants 2, 3, 5 and 6) concentrated on process, including the integration of services and measurement issues. This is perhaps indicative of a more global issue with environmental governance in cities. While the policy measures described in the SWOT analysis can be readily implemented within current governance structures, more radical change in governance practices (in addition to structures) may be required to tackle fundamental problems such as urban form legacy issues. While the new Auckland Council has successfully achieved integration *across* local authority bodies, there is no evidence that integration is being targeted *within* local authority structures. For effective governance in the face of challenges outlined in the introduction, there is a need for holistic understanding of



city-region systems and how these can be better configured to meet current and emerging environmental challenges across local authority departments. The challenge of climate change is paramount at the global scale, and for individual local authorities the question remains, how can service provision be better integrated to meet such challenges effectively. In the case of the Auckland Plan, for example, the links between emissions reductions targets, car-based travel and the uptake of active transport are not made explicit, targets for addressing these issues are not linked up and the quantification of emissions reductions projections from widespread active transport uptake targets are not clearly defined. This omission has important implications for practitioners involved in implementing aspects of the plan. A lack of joined-up-thinking at the strategic level will therefore perpetuate siloed responses at tactical and project levels, ensuring that problems such as urban form remain as everyone's problem yet no-one's problem.

Conclusion

This paper has been motivated by the failure of both local and national authorities to provide a transport system which caters for and encourages high rates of active transport in Auckland, and the opportunities provided by the recent amalgamation of the Auckland Council to assist in resolving this issue. The paper has contributed new analysis through an extensive qualitative methodology applied to a complex sociotechnical problem in a context of rapidly changing governance structures, with a focus on the opportunities available to improve Auckland's active transport system under the amalgamated Auckland Council. The paper has demonstrated that initiatives to address active transport in car-dependent cities are likely to encounter a myriad of obstacles and challenges, including urban form and structure legacy issues, such as dispersed and isolated urban functions and auto-oriented highway design, sociocultural reluctance to change and budgetary constraints limiting the roll out of new infrastructure. Governance structures need to be appropriately aligned to meet such challenges. In Auckland, the Auckland Council has achieved integration *across* local authority bodies, and this has ensured that active transport is now a policy priority across the Auckland Council area. However, further integration is now required *within* local authority structures, to better approach the multi-faceted objectives of a low impact, liveable and mobile city. Further research is required to provide a more comprehensive picture of the way in which active transport can become a more prominent feature in integrated planning approaches for the transport system. The link between public transport and

active transport especially is inseparable, and it is imperative that authorities in car-dependent cities ensure that any future transport projects incorporate both forms of transport so that the transport system is sustainable, efficient and caters to the transport needs of all city dwellers. Despite the clear challenges evident, successes to date in Auckland and in other cities internationally suggest that with appropriate governance structures and with sufficient political will, active transport can represent an important part of municipal efforts to develop more sustainable and liveable cities.

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