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Planning for cycling in local government: Insights from national surveys in Australia and New Zealand

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Abstract: Despite a broad consensus that cycling can address a range of transportation issues, many countries have struggled to institute measures to increase cycling participation. Even for cities that have achieved marked progress, there remains a gap in making cycling a truly normative mode of transportation. The practical problem of translating research and converting policy vision into broad-based cycling participation has become an increasingly central focus of international cycling scholarship. To examine the challenges of practically planning for cycling, we focus on the role of local government and report on a survey of all urban and major regional local governments in Australia and New Zealand. By analyzing results across the two countries, we diagnose challenges faced by practitioners in implementing measures to support cycling. Key findings suggest there is support among local government officers and stakeholders for cycling to play an increased role in daily transportation, yet this support is much more mixed at the implementation stage of cycling plans, policies, and infrastructure projects. These findings indicate a pressing need to better equip local government practitioners with tools and knowledge to overcome barriers to providing for cycling, particularly in increasingly politicized and complex contexts.

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1 Introduction

Cycling is increasingly recognized as having an important role to play in urban transportation, addressing environmental, health, congestion, and equity issues common to cities and towns around the world (Buehler & Pucher, 2021). Cycling provides a low-cost solution for commuting and routine daily travel; extends the catchments of public transport; facilitates the local movement of goods; and provides a widely accessible and low impact form of exercise and recreation. Recent developments in electric and shared cycling further extend the range of what is possible on one, two or three wheels (Fishman & Cherry, 2016). The proliferation of micro-mobility (including e-scooters and e-skateboards) is diversi-

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fying the ways people travel on city paths, cycle tracks, and on city streets.

Achieving significant growth and sustaining high rates of urban cycling is a persistent planning challenge, though global exemplars cycling cities in countries such as the Netherlands and Demark demonstrate what is achievable (McLeod et al., 2020). Best practice planning frameworks derived from these examples recognize that providing integrated and high-quality cycling networks, infrastructure and facilities that meet the needs across the full door-to-door trip for a broad range of cyclists, is pivotal to increasing mode share (Pucher & Buehler, 2008). Improving cycling environments and increasing the number of cyclists is particularly challenging in cities with high car ownership and use, auto-centric cultures, and car-dependent urban form and structure (Aldred et al., 2019). The ongoing COVID-19 pandemic has dramatically highlighted the importance of providing space for cyclists in car-dependent cities, with many cities implementing pop-up and temporary cycling infrastructure to address issues in a disrupted transport system and providing safer space in streets due to the increased demand for cycling (Dunning & Nurse, 2020). However, to normalize cycling, fully coordinating measures across a range of institutional areas is necessary.

The effectiveness of institutional arrangements in delivering cycle-friendly environments varies according to levels of planning and political maturity, and understanding these political and institutional contexts is important in negotiating change (Canitez, 2019; McLeod et al., 2020; Nello-Deakin, 2020). The production and maintenance of supportive environments for cycling is the responsibility of multiple government and non-government stakeholders. Local Governments (LGs) play an integral role in the planning and delivery of cycling infrastructure and facilities worldwide (Bicalho et al., 2019; Hull, 2008; Rietveld & Daniel, 2004; Wang, 2020). The responsibilities of LGs related to cycling are varied and include: building and maintenance of local roads and cycling networks; regulating the provision of cycling access and facilities for cyclists in development assessment and land-use planning; facilitating partnerships between the various community, advocacy, industry and government stakeholders surrounding cycling; and providing education and travel behavior change programs (Edwards & Tsouros, 2006). LGs have an increasingly critical role in the implementation of new transportation schemes, from regulating shared bicycle and micro-mobility schemes, provision of supportive infrastructure and the adaptation of existing policies and regulation relating to managing street environments (McQueen et al., 2021). LGs often operationalize cycling measures through collaborating on and implementing regional-scale strategic plans; mediating between stakeholders and interests; managing grant programs; assessing neighborhood design and developments; providing parks and recreational facilities; and designing and managing streets (McClintock, 2002). A trend towards devolution to the local level has resulted in the assignment of transport planning responsibilities and powers to LGs in many countries (Canning et al., 2010; Lee & Rivasplata, 2001). However, LG powers are defined within a framework of state power or regional institutional interests. Cycle planning projects and issues in Australia and New Zealand are also increasingly characterized by a network of local or issue-based communities of practices such as advocacy and neighborhood-based interest groups (Vreugdenhil & Williams, 2013; Wild et al., 2018). Staff working within LGs must therefore mediate between immediate stakeholders within a complex institutional and political framework.

A supportive institutional environment for cycling requires the integration of transportation policy and institutions both vertically between tiers of government, and horizontally across different sectors of government and non-government actors (Hull, 2008; McClintock, 2002). Despite the recognition of the importance of integrated transport policy, the implementation of sustainable transportation policy (particularly that which challenges dominant car-oriented planning) is hampered by fragmented governance and multiple institutional barriers (Levinson & King, 2019, p. 163; Rietveld & Stough, 2005). LGs themselves have multiple functions and responsibilities and are typically divided into various work-

ing units, staffed by a diverse range of professionals. Cycling sits across many of these functions and professions, and how professions integrate measures to support cycling is critically important (Cole et al., 2010; McLeod et al., 2020). Discrete working units within LGs can view cycling through narrow perspectives. For instance, Rose (2015) found that civil engineers often have very limited training in methods to support cycling in transport systems. A greater understanding of the practices and culture at the LG level concerning planning for cycling—especially in car-dependent regions—can help inform strategic action towards the goal of increased cycling mode share and diversity of urban cycling types.

This research is focused on identifying common barriers and opportunities to facilitate cycling as a mode of transport experienced by planners, engineers and other officers responsible for active transportation at the local level in Australia and New Zealand. The urban context of both countries is car-dependent. The urban form and structure of Australian and New Zealand cities have been significantly shaped by auto-centric planning, policy and cultural trends. Cycling is a marginalized form of everyday urban transportation in Australia (Johnson & Bonham, 2015), when compared to other modes, particularly car use. This is evident in the share of trips by cycling in Australia comparing poorly with the exemplar cycling nations, such as Germany, Sweden, Denmark and the Netherlands (Pucher & Buehler, 2008). Australian census data places journeys to work by cycling across Australia as 1.5% (Olivier et al., 2020), indicating low overall participation in commuter cycling, even with variation across regions. Other data suggest that 10%-36% of Australians participate in cycling, when occasional and recreational cyclists are included (Olivier et al., 2020). In New Zealand, a similar picture is evident. In a benchmarking of six NZ cities, Shaw et al. (2016) found that rates of commuter cycling trips were between 0.4% and 3.6% of total trips and that trips by cycling had been declining since the 1970s.

LGs in Australia and New Zealand play significant roles in the planning and delivery of cycling networks and infrastructure, often with funding provided by higher levels of government (Leung et al., 2019; Pucher, Garrard, & Greaves, 2011). In Australia, whereas State and territory governments are largely responsible for the major transport networks (such as railways, highways, and higher-order arterial roads), LGs address district and local transport planning and infrastructure provision, often in collaboration with state governments. In New Zealand, transportation is largely governed by regional and local councils, within the bounds set by central (i.e., national) ministries and agencies. Local governments in Australia and New Zealand are primarily funded through rates and a range of fees and charges and revenue raising from these sources are often limited by rate caps. Higher levels of governments in both countries also provide funding and the stipulation for expenditure of revenue for transportation infrastructure, leaving local governments' ability to fund transport infrastructure prone to external factors. So far, there has been little attention paid to the capacity of local governments to facilitate cycling in countries with high car-dependency and limited funding sources for providing transportation infrastructure. The comparison of Australia and New Zealand indicates how planning for cycling may differ and align at the local government level and potentially support more effective planning for cycling at the local government level that could yield benefits at a regional and trans-national scale.

2 Research approach

This research assesses the current state of practice in planning for cycling at the LG level according to LG employees across Australia and New Zealand. An online survey questionnaire was developed based on the themes outlined in an earlier review paper (McLeod et al., 2020) and existing survey instruments, such as the Australian National Cycling Participation Survey (Austroads, 2019). The survey contained questions regarding LG officers' attitudes towards cycling and the current conditions for cyclists in their jurisdiction. It also captured what LG staff perceived as barriers to achieving higher rates of participation

in cycling, and barriers to delivering better cycling infrastructure and facilities. Most questions adopted five-point Likert scales as a structure for collecting results within a consistent frame.

2.1 Sample and recruitment

The online survey was distributed to email addresses of all 242 urban and major regional LG in Australia, as categorized in the 2015 Local Government National Report by the Federal Government Department of Infrastructure and Regional Development (DIRD, 2017), in September 2020. A request to all 34 LG in New Zealand (including District, Unitary, City, and Regional Councils) was also emailed in October 2020—including rural LGs—as no categorization list equivalent to the 2017 Australian DIRD report was readily available. The email request was sent to the public-facing general contact email of each LG, with a request that it be forward to any staff within the LG with a role relevant to cycling. Responses from multiple staff within the same LG were encouraged to capture potential differences in perspectives between professionals working in different roles. Cross-tabulation analysis of four groups of professionals (Traffic engineers, transport planners, land-use planners, and others), was undertaken to identify differences between communities of practice. While the COVID-19 pandemic was worsening globally in September and October of 2020, only the Australian state of Victoria was significantly impacted by a severe lockdown during the recruitment period. Other Australian and New Zealand regions were experiencing limited to no community transmission of the virus, and there was no significant restriction on the operations of LGs during this period. Our email recruitment method was also compatible with LG staff who may have been working from home.

Self-selection bias common to voluntary cold-contact questionnaire surveys was anticipated, reflecting a respondent cohort more interested in cycling since those less interested would be less likely to respond. With this in mind, questions were included about personal beliefs and involvement in cycling by specifically asking respondents to assess their perception of cycling (see Section 3.1). Policy-focused questions (including questions concerning perceptions of the roles of cycling, cycle planning practices, and the development of cycling plans) were then included to ascertain practical difficulties encountered by respondents in their everyday planning for cycling.

2.2 Analysis

Results for the ordinal Likert questions from the two countries were compared through summary indicator statistics to identify potential differences between the two countries. Univariate descriptive analysis was performed on Likert scale responses for the Australian and New Zealand responses. These analyses were intended to indicate potential differences between the two countries—though variation in the samples (see 2.1 above), the limited total sample size (only 44 valid responses from NZ), and lack of control for sample factors (such as demographic or professional role characteristics) limits the confidence in individual statistics. We include these indicators to identify potential points of variance for further investigation in future research.

A Mann Whitney U Test was applied to the two independent samples to compare the central tendency between them. All values, including mean, U values and P values were calculated based on representing Likert responses numerically ("Strongly Disagree" = 1, etc.). Asymptotic Significance (2 sided) p values were calculated to assess the potential significance of the difference between the samples of Australian and New Zealand LG staff, with p values of less than 0.05 used to indicate a significant difference.

Open-ended comments were also collected and coded using Nvivo. The coding was conducted and cross-checked independently by two researchers using a set of codes drawn from a framework outlining

a maturity model of planning for cycling, which can be used to rate the effectiveness of various practices on a continuum (McLeod, Babb and Barlow 2020). The coding analysis was cross-checked by two researchers and codes with a weak level of agreement were removed from analysis (see section 3.4). The full set of de-identified results, and all of the summary statistics (including Mann Whitney U test and associated p-values for all questions presented in the figures), is published at Babb, McLeod and Noone (2021).

3 Results

A total of 202 valid (substantially complete) responses were received (Table 1), from 162 identified local governments. Multiple identifiable responses were received from 15 Australian LGs (41 responses), and 6 LGs in New Zealand (15 responses).

Table 1. Basic characteristics of the response set

Survey Country	Sampled LGs	Total Responses	Total Valid* Responses	Identified** LGs which Responded	Identifiable Response Rate	Unidentifiable Valid Responses
Australia	238	184	158	128	53.8%	30
New Zealand	78	47	44	34	43.6%	10
Total	316	231	202	162	51.3%	40

*Valid responses were those assessed as being substantially complete.
**Respondents were provided the option of identifying their LG.

Among Australian states and territories, thirty-four identifiable results were received from 71 sampled LGs in New South Wales (45%); 31 from 55 (56%) in Victoria; 15 from 31 in Queensland (48%); 24 from 37 in Western Australia (65%); 16 from 30 in South Australia (53%); 5 from 10 in Tasmania (50%); and 3 from 4 in the Northern Territory (75%). Identifiable results from 34 of the total 78 LGs in New Zealand were received. The response rate of 44% in New Zealand was lower than the 51% response rate for Australia, though rural LGs in New Zealand were not excluded.

Respondents were asked to identify their role within their LG against broad professional groupings. Among the total results set, 66 respondents (32%) identified as transport/traffic planners, 44 (21%) as engineering staff, 28 (14%) as planners (land use/strategy/statutory planners), 22 (10%) as recreation/parks staff, 19 (9%) as road safety staff, and 12 (6%) as sustainability staff. When asked about the proportion of their role that relates to cycling, only 6 (3%) reported their role was exclusive to cycling; 39 (19%) reported their role was significantly (around half) related to cycling; 66 (33%) often (weekly) deal with cycling; 57 (28%) do occasionally/monthly; 29 (14%) rarely/yearly, and; 5 (2%) reported having never personally dealt with cycling in their role.

Respondents reported personally cycling much more frequently than the Australian public surveyed by Austroads (2019)[1], though past years of the survey have reported greater participation in cycling closer to the results among our survey sample (Table 2).

[1] We are not aware of an equivalent source for New Zealand

Table 2. Personal cycling participation reported by respondents

Last rode a bicycle	Responses	Percent	Austroads (2019) National Survey		Our Sample
Today	38	18.8%	Last week	13.8%	55.4%
In the last 7 days	74	36.6%			
In the last two weeks	14	6.9%	Last Month	21.4%	16.8%
In the last three weeks	6	3.0%			
In the last four weeks	14	6.9%	Last Year	35.0%	9.4%
More than a month ago	19	9.4%			
More than a year ago	36	17.8%	More than a year ago or never (imputed)	29.8%	17.8%
No Response	1	0.5%			
Total	202	100.0%	Total	100.0%	100.0%

3.1 Perceived roles and importance of cycling

Survey respondents were asked to evaluate various statements regarding the potential role cycling can play in urban transportation systems. These responses are important because local policy actors and networks interpret and implement policies (Macmillen & Stead, 2014) and hold capacity for policy learning (Sheldrik et al., 2017). All respondents concurred that cycling was a healthy form of recreation (Figure 1). Respondents also broadly agreed that cycling can serve as a form of everyday transport (87%), mitigate traffic congestion (95%), and help to manage parking problems (95%), with engineers less likely to strongly agree than other professional groups. These responses indicate a strong recognition of the potential of cycling to achieve a range of policy objectives. Consistent with literature that has identified safety concerns as being the largest single barrier to higher rates of cycling (Forsyth & Krizek, 2010; Wang, 2020, p. 7–8), 26% of respondents answering this question (52 responses) did not believe that cycling within their LG area is "reasonably safe." Only half of the respondents (50% —99 responses) agreed that cycling in their LG is "reasonably safe," and of that, only 13 (7%) strongly agreed.

Overwhelmingly, participants agreed that e-bikes make "cycling more practical for daily travel" (148 of 176 responses—84%), with 97 of 167 (58%) reporting the same for cargo bikes. Slightly less than half (47%—74 of 158) agreed that shared bike schemes make cycling more practical for daily travel. Results from the Mann-Whitney test indicate differences between Australian and New Zealand respondents (see Figure 1), with respondents from New Zealand less likely to agree that cycling can reduce traffic congestion ($p=0.003$), manage parking problems ($p=0.004$) or that cargo bikes ($p=0.03$) and shared bike schemes ($p=0.003$) can be a practical mode of daily travel.

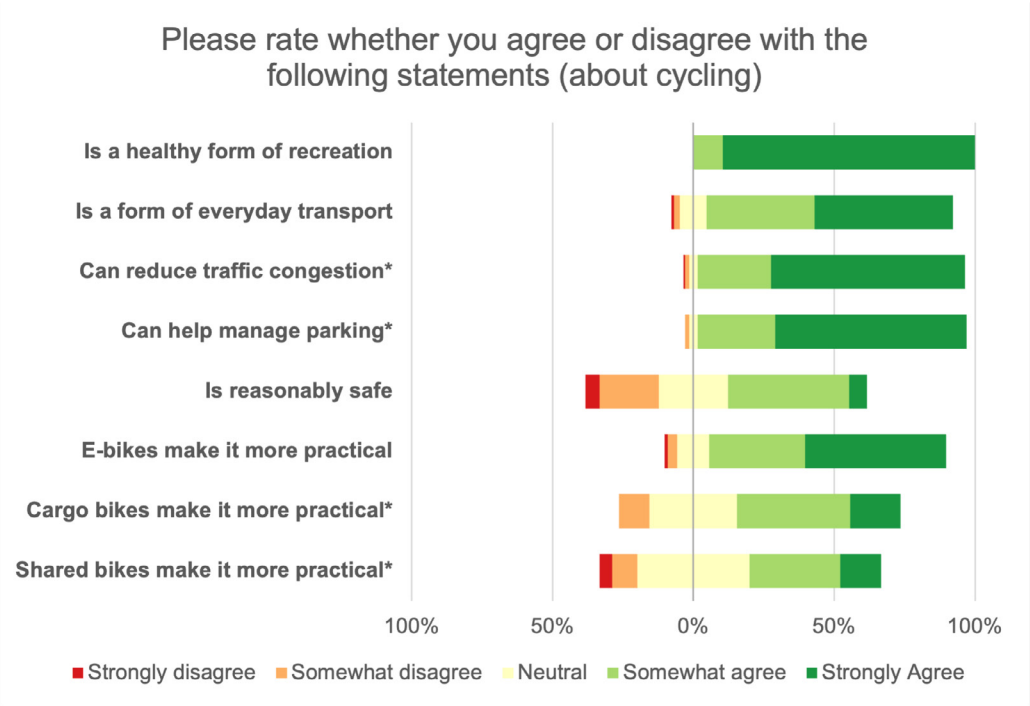

Figure 1. Perceived importance of cycling uses
*Denotes results that were significantly different between countries with a p-value less than 0.05. A corresponding summary statistics table and the full data are available in the data file published with this paper.

To provide insight into the broader institutional structures shaping planning for cycling at the local level, participants were then asked to indicate how important they consider cycling as a mode of transport to be—both from their perspective, and their perception of how various LG stakeholders perceive the importance of cycling (Figure 2). Almost all (92% 184 of 200) respondents considered cycling to be important. In contrast, respondents considered that ratepayers varied in their level of support (Figure 2). Many (42%) respondents thought that business ratepayers consider cycling to be unimportant, with a further 40% rating business ratepayer perceptions as being neutral. Resident ratepayers were more normally distributed. Respondents perceived sustainability and planning staff to be more strongly supportive that engineering and administration staff. Slightly more than half of the respondents (56%) perceived that elected councilors were at least somewhat supportive of cycling. Results between the two countries were similar.

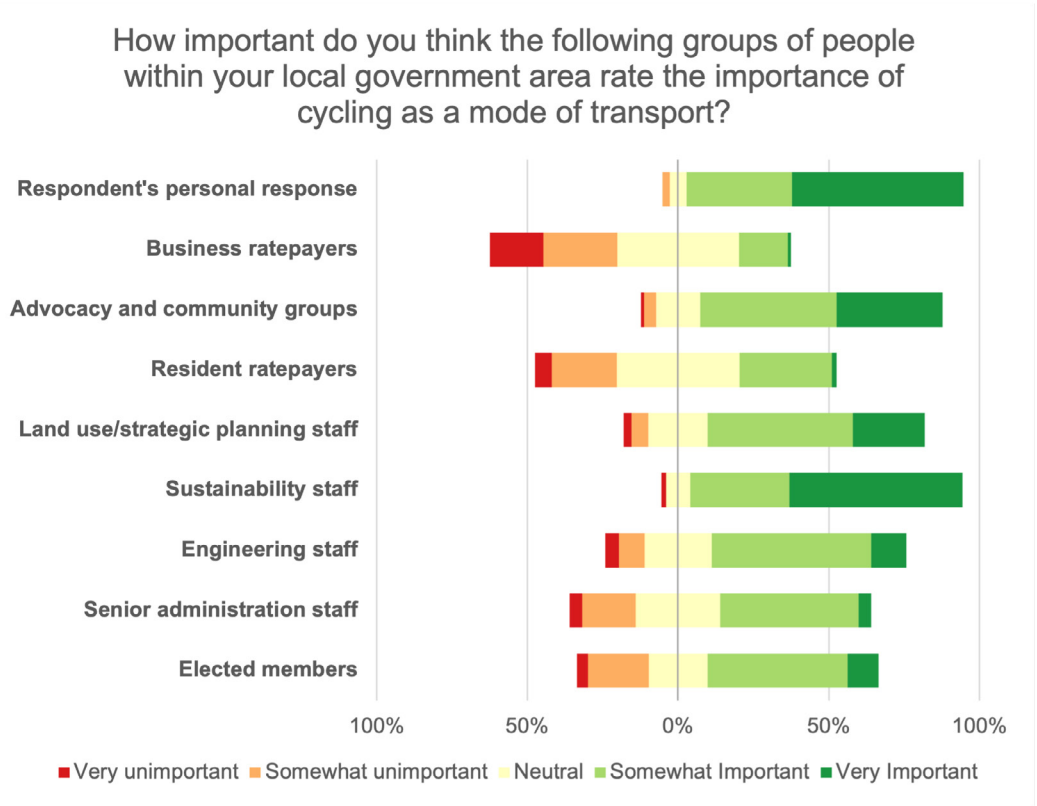

Figure 2. Perceived importance of cycling by stakeholder category
No results were significantly different between countries at a threshold of $p<0.05$. A corresponding summary statistics table and the full data are available in the data file published with this paper.

Respondents were also asked to report their perceptions of how supportive stakeholder groups are in providing for cycling (Figure 3). There were mixed results as to whether developers of commercial and residential facilities supported providing for cycling, with just over a quarter of respondents agreeing with the statements that commercial or housing developers "are generally supportive toward providing for cycling." On the other hand, over half of respondents felt that public sector transport agencies, including State/Regional Road Agencies (58%, 99 of 171 responses) and Public Transport Agencies (57%, 95 of 165 responses) are "generally supportive toward providing for cycling." Results between Australia and New Zealand were similar.

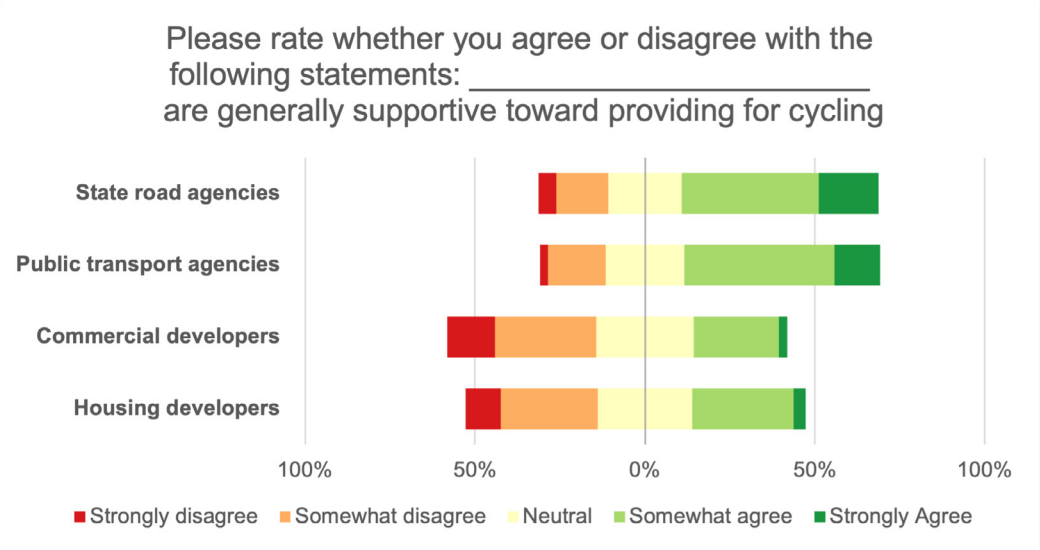

Figure 3. Perceived level of support for cycling infrastructure
No results were significantly different between countries at a threshold of $p<0.05$. A corresponding summary statistics table and the full data are available in the data file published with this paper.

3.2 Perceived barriers to participation in cycling

Respondents were asked to evaluate the relative severity of barriers to higher rates of participation in cycling through an adapted Likert scale ("not a barrier," "slight barrier," "moderate barrier," and "major barrier"). Consistent with the previous findings, issues relating to safety were considered the most severe barrier to people's participation in cycling (Figure 4). Almost all (98%) respondents felt that "Perceived Crash Risk" was a barrier, with 75 respondents (44%) classifying it as being a major barrier. Poor on-road infrastructure was also highly ranked as a barrier (77% considered it a major or moderate barrier). "Dangerous Drivers" was also perceived as being a deterrent to people cycling, with 25% (43 responses) feeling it was a major barrier and only 6% responding that it was not a barrier. Helmet laws ranked the least significant barrier within the list in our question, with 54% of responses classifying it as "not a barrier." Again, results between Australia and New Zealand were generally similar.

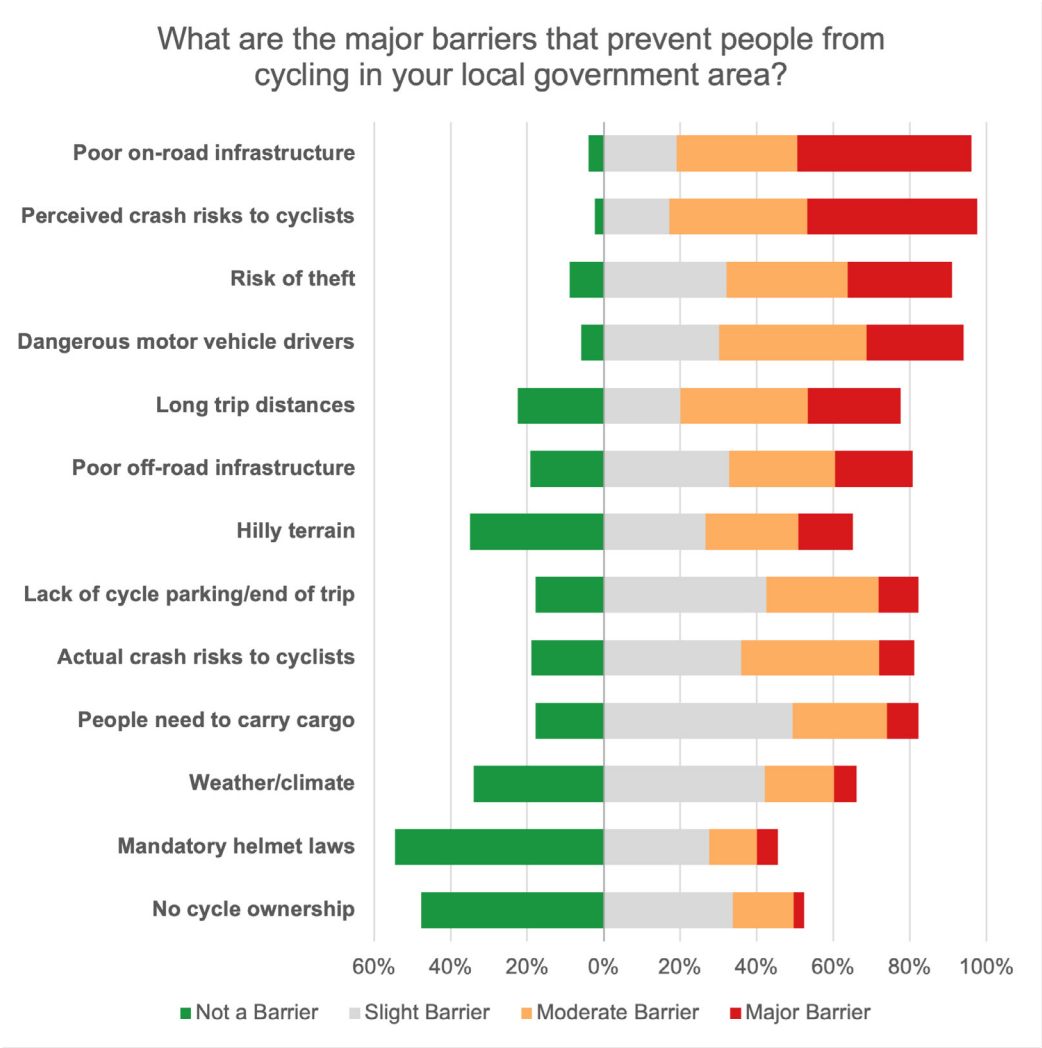

Figure 4. Major barriers preventing people cycling
No results were significantly different between countries at a threshold of $p<0.05$. A corresponding summary statistics table and the full data are available in the data file published with this paper.

The issue of safety was further explored by asking LG employees' about cycling infrastructure and the enforcement of traffic laws (Figure 5). 151 of 175 participants (86%) felt there was a 'safety in numbers' effect (see Elvik & Goel, 2019). Transport planners were more likely to consider perceived risks to be a barrier, whilst less likely to consider distance a barrier to cycling than other professional groups. Respondents overwhelmingly agreed that cycling should be made easier than driving (85%, 149 of 175 responses). Perceptions of mandatory helmet laws were split. 49% (84 of 173 responses) agreed with mandatory helmet laws, while 23% were neutral and 28% disagreed. Australian respondents were more likely to disagree with mandatory helmet laws than New Zealand respondents (Figure 5, $p=0.025$).

Almost half disagreed (78 of 171 responses—46%) that current enforcement of traffic laws ensures cyclist safety, with a further 35% being neutral. Respondents from New Zealand showed a significantly lower level of agreement (56%—22 of 39 disagreed, at $p=0.036$) than Australian respondents. A majority of all respondents (113 of 172, 66%) also perceived the infrastructure they design and construct meets the needs of a wide range of users, with this result being consistent across the two countries.

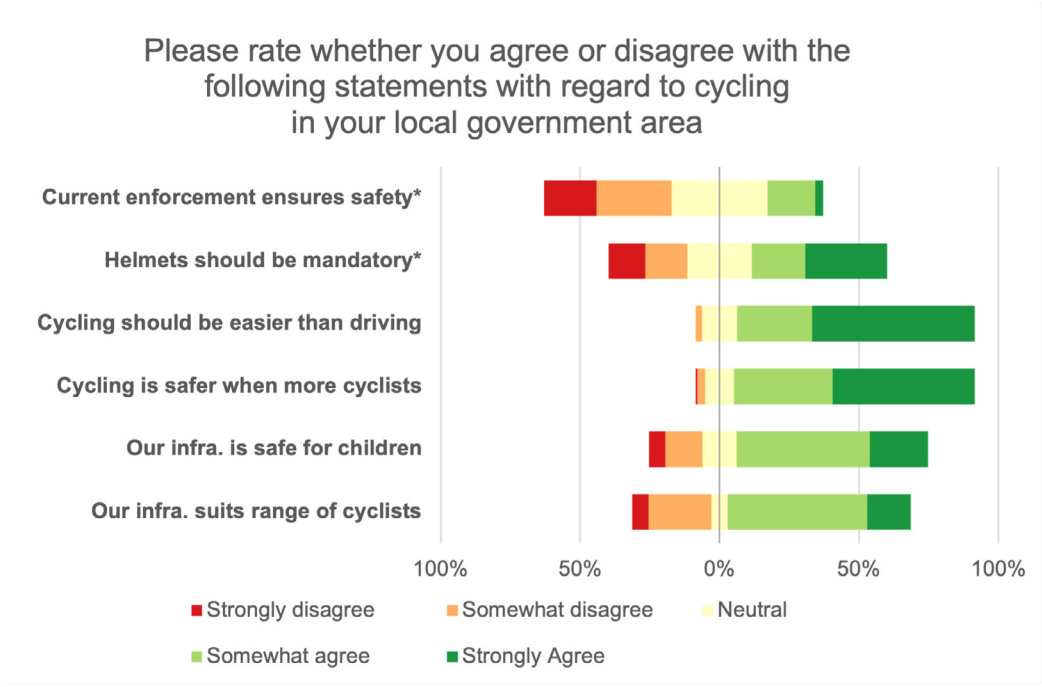

Figure 5. Health and safety in planning for cycling
*Denotes results that were significantly different between countries with a p-value less than 0.05. A corresponding summary statistics table and the full data are available in the data file published with this paper.

3.3 Perceived barriers to local government infrastructure improvement

Participants were asked questions about the barriers that LG employees may face in doing effective planning for cycling, using the same Likert scale used to rate individual participation in cycling (Figure 6). A lack of funding was identified as the greatest barrier to LGs improving cycling facilities. Over 90% of respondents reported that the limited availability of funding from higher levels (state/regional/national) of government (165 of 176 responses—94%) and internal LG budgets (167 of 177 responses, 94%) constrained their abilities to provide facilities, and most (155 of 173 responses, 90%) also noted that LGs had other priorities. Limited street space was also regarded as a significant barrier in delivering cycling routes and infrastructure (89%), an attitude held by a higher proportion of traffic engineers and transport planners than other professions. State/regional government transport agencies, those agencies' design standards, and the burden of maintenance costs were reported as being less severe concerns, though they were all still considered to be a barrier to some degree by more than half of all respondents to the question. Again, the perceived significance of factors was generally similar between the two countries.

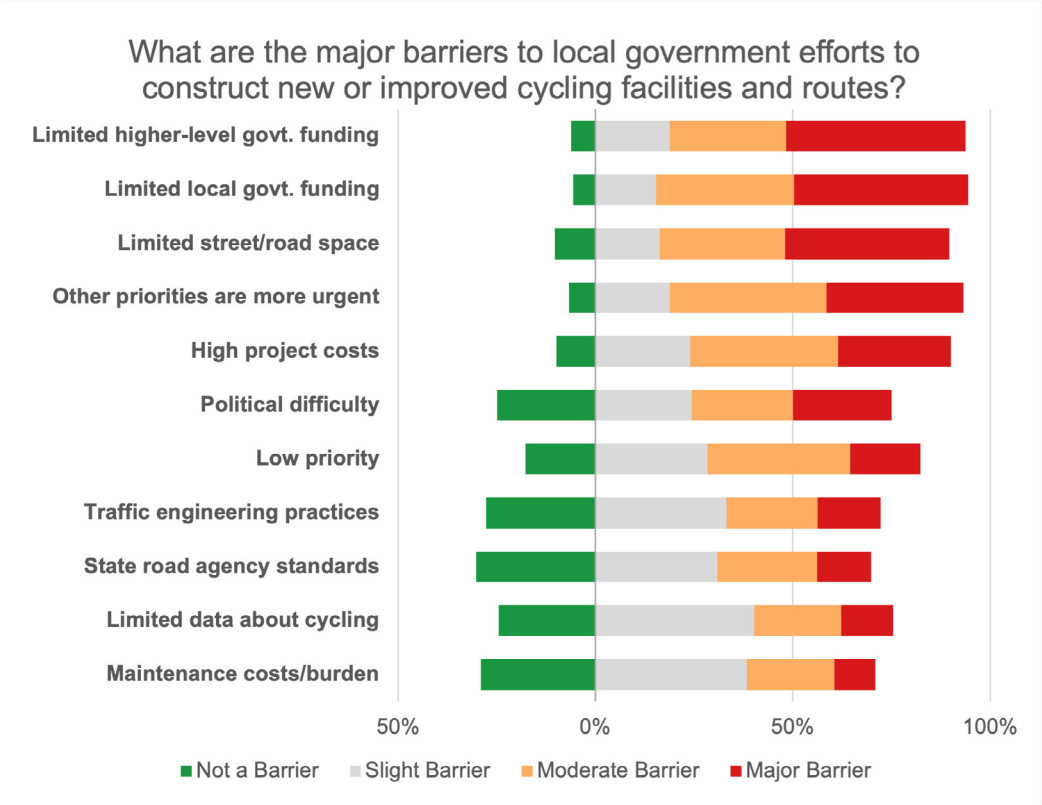

Figure 6. Major barriers preventing LG efforts to construct new and improved cycling facilities and routes
No results were significantly different between countries at a threshold of $p<0.05$. A corresponding summary statistics table and the full data are available in the data file published with this paper.

While respondents reported agreement with the popularity and value of cycling projects, it appears that LG employees find them to be difficult to deliver (Figure 7). A majority of participants (65%—117 of 179 responses) agreed with the statement that cycling route projects were good value for money. Slightly more (70%—126 of 180) agreed that they are popular with the public. On the other hand, 54% (96 of 177) of participants disagreed that cycling route projects were generally quick to deliver, and half of the respondents (50%—90 of 179) also disagreed with that cycling route projects are generally easy to deliver. Respondents in New Zealand (21 of 41—51%) were significantly ($p= 0.015$) less likely than Australian respondents (96 of 138—70%) to agree that cycling route projects are good value for money. Similarly, those in New Zealand (5 of 41—12% agree) were significantly ($p=0.041$) less likely to agree that "bicycle route projects are generally easy to deliver" compared to Australian respondents (43 of 138—31% agree)—though the overall rate of agreement in both countries was very low. This practical implementation challenge—an apparent paradox between the reported popularity of bike projects and their difficulty to construct—appears to highlight a managerial challenge for which improved project governance and delivery capability may be needed.

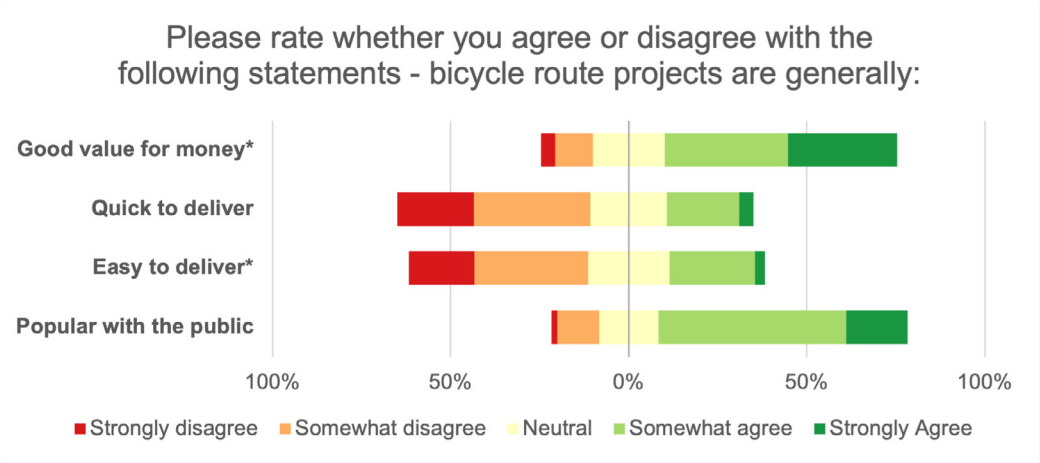

Figure 7. Perceptions of cycling route projects
*Denotes results that were significantly different between countries with a p-value less than 0.05. A corresponding summary statistics table and the full data are available in the data file published with this paper.

Lastly, respondents were asked to report whether cycling is considered in routine land-use planning practices, from development assessment to strategic planning. Participants mostly agreed that cycling was supported in higher level planning (i.e., master planning, high level planning strategy and precinct design planning), although there was a noticeable higher level of disagreement that cycling was supported in road planning, individual development and precinct plans by land-use planners (Figure 8). This could indicate a failure to operationalize the provision of cycling infrastructure at the micro-level of new streets and buildings. Results were generally similar between Australia and New Zealand.

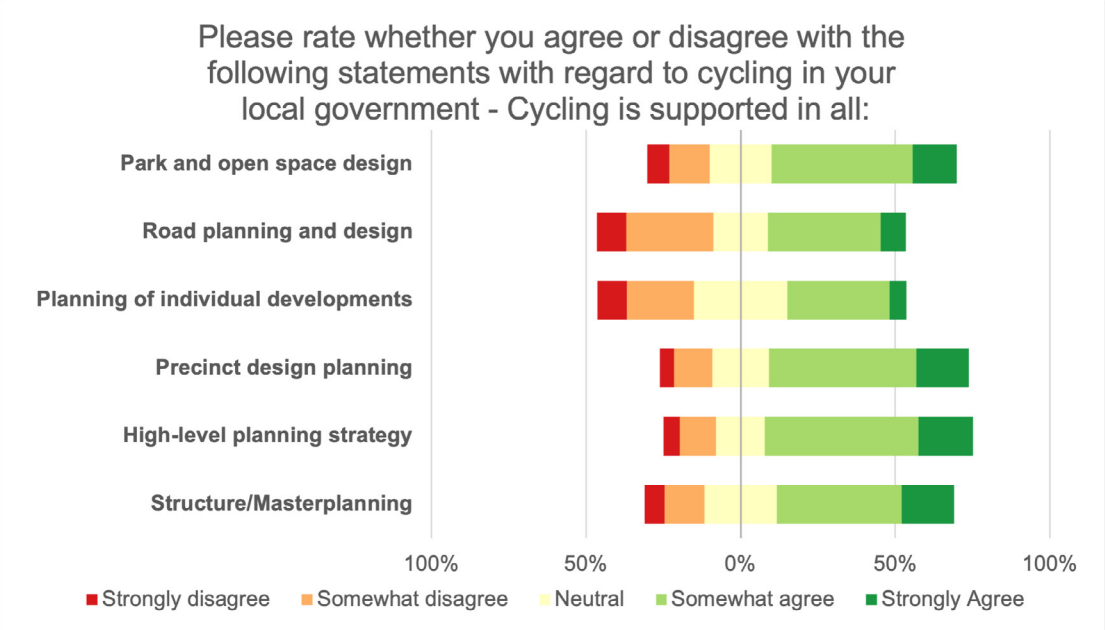

Figure 8. Perceived support in urban design and planning processes
No results were significantly different between countries at a threshold of $p<0.05$. A corresponding summary statistics table and the full data are available in the data file published with this paper.

3.4 Responses to open-ended questions

Participants were also invited to contribute open-ended comments, which were coded using an earlier developed maturity model for planning for cycling (McLeod, et al, 2020). Fifty-five respondents from Australia and twenty from New Zealand provided open-ended comments. Consistent with Likert results (see Figure 6), the most significant barriers to providing adequate infrastructure and delivering safe cycling environments identified in the responses were related to the lack of funding and resources for cycling infrastructure and facilities, and competition for road space. Limited support from state and national governments was the most frequently noted comment regarding funding, with some respondents also noting the small size of LGs and subsequent limited land tax income available for cycling infrastructure. Consequently, state, regional and national governing organizations were also framed as important partners and enablers for the planning and delivery of cycling infrastructure, especially in their capacity as funding bodies. Some respondents referred to the work their LGs were doing in prioritizing infrastructure planning and spending to crucial locations such as schools, public spaces, and local centers, as a way of working within existing funding constraints.

Whereas comments regarding lack of funding were primarily concerned with the extent of state and national government support, the barriers to planning and providing for cycling at the LG level due to competition for road space related to a broader set of political and institutional themes. Car-centric road design and high traffic speeds were raised as critical factors in deterring cyclists. Respondents generally considered the segregation of cycling paths as 'best practice' in infrastructure planning. However, respondents noted it was difficult to deliver segregated cycling infrastructure in Australia and New Zealand for the same reasons including constrained road space, limited funding, low level of community support and the lack of demand for cycling to justify the expenditure. As one transport engineer from Australia noted:

"It would be ideal to provide more segregated cycling and walking infrastructure. However, it is difficult to justify the expense particularly when state government funding is targeted towards improving cycling infrastructure only."

The limited potential for shared infrastructure to deliver an ideal urban cycling environment was noted by one road/community safety officer from New Zealand:

"The exponential growth in footpaths becoming "shared paths" as a solution to poor cycling infrastructure are becoming problematic especially for the mobility, vision and hearing impaired walkers and those with mental health issues using footpaths. These vulnerable members of society already take much fewer trips outdoors than able bodied people and are now being marginalized further."

Competition for road space for on-street parking was noted as a significant barrier to implementing cycling infrastructure. Several respondents focused on the political difficulty in removing on-street parking to facilitate cycle lanes. Parking was a prevalent theme in the responses from both countries, with respondents noting that general support for cycling friendly initiatives can dissolve rapidly when the impacts on parking provision become a reality. As one transport engineer from New Zealand noted:

"The loss of any parking (and car space generally) to create better cycling and pedestrian opportunities is supported in principle by our community until it affects them and then is strongly opposed."

One strategic planner from Australia noted that property developers were most likely to be supportive of cycling only when it reduced their need to provide vehicle parking. These responses point to the sensitivities and economic trade-off implicit with planning and decision-making regarding cycling in urban development.

Despite state governments in Australia being reported as having an important role in delivering cycling infrastructure, procedures and rules generated at the state government level were considered bar-

riers to the implementation of cycling friendly infrastructure and initiatives. As one manager of urban design stated:

"State-led transport infrastructure projects need to maximize cycling assets… State agencies that control land along transport corridors need to support cycling infrastructure rather than taking 2-3 years to approve new paths."

The role of standards and guidelines in delivering cycling infrastructure was also identified by a transport planner as a constraint to LGs achieving best practice in planning for cycling.

"State policies and guidelines are holding us back from providing the fundamental design facilities and aspects which enable safe cycling streets—many of which are in use throughout other states and territories of Australia, and throughout the world."

Five LG officers in Australia also referred to the lack of appropriate design standards and guidelines as a barrier to progressing cycling as transportation. According to the commentators, consultants were risk averse and tended to use minimum standards as guidelines, rather than developing innovative responses to advance cycling-focused objectives. A strategic planner in an Australia explained how professional groups acted according to different logics:

"There is a general disconnect between planning and engineering staff on the issue of supporting bicycle travel, and quality bicycle infrastructure. Traffic engineering staff often operate on a demand and supply model, but demand cannot arise when most feel too vulnerable to cycle. Hence there is an observation that nobody cycles so why should infrastructure be provided."

Other respondents chose to provide ideas about how cycling can be advanced in Australia and New Zealand. The importance of community consultation, education programs, and constructive partnerships with other government organizations were common themes in these comments. One transport planner and road safety officer from New Zealand noted:

"It is a constant process of education and behavior change and infrastructure improvements. If we can provide separated cycling facilities, we can encourage the interested but concerned cyclist, this will bump the numbers of cyclists up on the network which will make it safer for all, as drivers adjust to allowing for cyclist movements and common practice will evolve the change in mode which improves our health and the environment."

Another strategic planner from Australia noted the importance of engaging with other road users:

"The development of cycling strategies and projects also needs to involve consultation with drivers. Understanding the drivers' needs (for example particularly around schools) can help to resolve potential cyclist/driver conflicts and therefore reduce the potential for accidents and fatalities."

Overall, the comments offered support and clarity to the findings indicated by the questionnaire.

4 Discussion

This research contributes to a growing body of work focused on LG practitioner perspectives in cycle planning (e.g., Bicalho et al., 2019; Wang, 2020; Zhao et al., 2018) by identifying common attitudes and perceived barriers to facilitating participation in cycling according to LG staff in Australian and New Zealand. Both countries share geographical proximity and a range of characteristics that indicate a high degree of car dependency and marginalization of cycling, including high car use and ownership, low mode share of cycling, low-density urban cities and regional centers, extensive road infrastructure, and street space allocation that privileges movement by motorized vehicles.

4.1 Capability and perception of cycling

While there is variation among some individual results, the survey findings across both countries are generally consistent, confirming assumptions that LGs in these countries share similar barriers to the planning and delivery of cycle-friendly environments. Although some differences were noted, indicating areas where the maturity of LGs in Australia and New Zealand may vary, these results form a convincing case for diagnosing common specific challenges in planning for cycling in car-dependent urban cities.

This research indicates there is limited dedicated resourcing for cycling at the LG level. Very few respondents were involved in cycle projects or planning as a major part of their day-to-day role—suggesting that planning for cycling is not normalized as a role across LGs, and is practiced within a variety of organizational functions. Furthermore, the survey results and analysis of open-ended questions indicated limited material resources and funding for the provision of cycling planning, infrastructure and facilities, with respondents noting overarching funding models from higher levels of government as a key issue of concern. However, the respondents collectively indicated strong support for enhancing cycling as a mode of transportation through their views and reported behavior. Respondents tended to believe that other staff in their LG, the general public, and state and regional agencies overall shared a level of general support for cycling.

Results indicate that LG staff may be more progressive towards cycling than might be assumed, given the low levels of participation in cycling in both Australia and New Zealand. For instance, the tendency for respondents to support a model of cycling that meets a diverse range of transport needs and types of cyclists is promising, given concerns raised in the literature regarding the way stereotypes of vehicular cycling (in which bicycles are considered as quasi-vehicles negotiating in mixed motorized traffic) lock in exclusionary and ineffective planning for cycling (Aldred, 2012; see also Schultheiss et al., 2018). However, respondents did not believe that the same support for this conceptualization of cycling in the transport mix was completely shared by political representatives, senior administration and other key stakeholders in development and infrastructure projects and planning. The consistency in how LG officers perceived the general lack of support from the private sector in cycling infrastructure in both countries suggests the existence of a broader mobility culture (Klinger et al., 2013), where the interests of various institutional actors are aligned to create barriers to the delivery of cycling-friendly policies and infrastructure. Comments noting that the practices of transport engineers hindered progress towards achieving higher rates of cycling also suggested that divisions within various communities of practice at the LG level existed, and that there is a need for improved internal coordination with LGs.

4.2 Stakeholder engagement to deliver cycling infrastructure

When considered against open-ended responses, it appears that the "in-principle" support for cycling indicated in our data (Figure 2) is often eroded if cycling is perceived to pose negative impacts. The loss of parking bays was identified as a primary reason for why the community may oppose any bike infrastructure, with aggrieved ratepayers and electors appealing to their elected members, who then in-turn hinder a cycling project's development. However, as Yen et al. (2020) revealed in a study of restaurateurs' views in Brisbane, Queensland, there is a disconnect between the high value restaurateurs place on parking, and the high potential for customers who arrived by foot, public transport and bike to contribute to restaurant trade. Given recent advances in empirical studies about the relative economic benefits of cycle lanes over on-street car parking (e.g., Arancibia et al., 2019), further evidence to demonstrate these benefits across jurisdictions could mitigate these stakeholder concerns. These findings support the argument put forth by Nello-Deakin (2020)—that the interface between political and institutional cycling

research and applied practice holds immense potential for addressing the critical problems of planning for cycling. This deserves greater joint attention between academic researchers and practitioners. The results of this research highlight the need for effective stakeholder engagement practices to translate generalized support for cycling into tangible support for the delivery of projects. As the results in Figure 7 outline, respondents indicated that cycling infrastructure projects which appear to be publicly popular are difficult to deliver, potentially due to the opposition of minority stakeholders (Figure 2, Figure 3, see also Wild et al., 2018). Results for both countries appear to reflect a stage of only moderate maturity of translating support for cycling into successfully delivered projects—even with the apparent institutional support provided by higher levels of government (Figure 3).

Generally, how LG officers perceived barriers to achieving cycling within their communities reflected common findings in the cycling literature (McLeod et al., 2020). These barriers primarily relate to the perceived and real risks to safety posed by traffic, lack of infrastructure, and long distances between destinations. Comparable surveying of these questions with a broad public would further assist in addressing these concerns to encourage prospective "interested but concerned" people to participate in cycling. Our respondents indicated mixed perceptions towards other factors that may play a role in suppressing demand for cycling (such as mandatory helmet laws and the impact of weather on cycling) reflecting the contentious nature of these topics in academic, professional, and public debates.

4.3 Integrated institutions for cycling

The survey results indicate the significant advancements in planning for cycling which could be improved by the conscious integration of institutional areas responsible for both of higher-level policy and the delivery of cycling projects. Support for cycling in highly car dependent environments may be leveraged through mechanisms that encourage horizontal integration, such as better integration with land-use planning practices and integration across cycling planning and traditional engineering (see Figure 8). At the strategic level, the findings suggest cycling is well supported through policy. Yet the view of most respondents that cycling projects are not easy or quick to deliver, are hampered by political interference, and not resourced adequately suggest a policy and funding implementation gap as the critical area for attention in LGs.

The findings point to a need for investment in LG professionals' capabilities in planning for cycling, to enable practitioners to draw upon a range of approaches such as advocacy, education and outreach to ameliorate unsupportive political environments and internal divisions (Aldred, 2012; Koglin, 2015; Pucher, Buehler, & Seinen, 2011). Education and messaging are important to foster public support for actions to make cycling safer—rather than to encourage cycling in existing unsafe environments. This research also points to the need for champions who can challenge existing political roadblocks and leverage general support for cycling in a way to neutralize objections to proposals to make cycling safer.

4.4 Limitations and challenges to cycling policy research

There are key limitations to this research. Responses from LG staff may reflect particular biases in their evaluation of cycling environments, to the extent that they reflect normative views from within their communities of practice and not the user experience of cycling in LGs. Although the self-reported behaviors of respondents suggest that many are active cyclists and knowledgeable of local cycling environments, the survey would benefit by extending a similar line of questioning to the general public to offer comparisons between professional and community perceptions of cycling. The research is also aggregated across national contexts and may not perfectly reflect finer grain difference between LGs across different states and regions, and within urban regions. Further research will reveal differences between

LGs based on their location within inter and intra-regional differences and differences based on size and demographic base of LGs.

There were several challenges in conducting this research, which indicates the need for improved availability of data, especially to support comparative international studies. No consistent cross-jurisdictional survey framework for assessing cycling policy preferences or routine cycling participation was identified in the literature. There is also no common characterization of LGs (i.e., types of urban and regional context similar to the Australian DIRD report) between countries. Further, a more consistent publication of contact details for LGs could enable wider sampling. For instance, having consistently defined or openly published email contact details for elected members would enable this research to be readily expanded to examine perceptions among councilors. Lastly, the lack of consistent reporting for generalized cycling participation, particularly down to individual LG level, makes comparing LG staff perceptions to actual participation challenging, particularly for cycling for purposes other than journeys to work as measured in national censuses (Olivier et al. ,2020).

5 Conclusion

This paper reports on the findings of a survey of LG employees in Australia and New Zealand, which provides unique insight into the perceptions of planners, engineers and other professionals involved in planning for cycling. Our results affirm the views put forth by Nello-Deakin (2020), McLeod et al. (2020), and others that international cycling research must turn directly towards addressing specific political and institutional implementation challenges.

This research has narrowed the diagnosis of the specific barriers which prevent LG professionals from more effectively planning for cycling in our two survey countries. It appears that the most acute challenge is translating generalized support for cycling—among practically all groups of stakeholders (see Figure 2) and higher-levels of government (Figure 3)—to successfully deliver cycling infrastructure projects (Figure 7).

LG professionals require support in engaging with the minority of stakeholders, such as local businesses and residents, to build consensus for the delivery of cycling facilities. The cycling research and practice communities could provide this support in several ways: by making research about specific wider benefits of cycling more openly available; by participating in action research to deliver cycling projects; by both applying and then replicating studies about cycling benefits (e.g., Arancibia et al,. 2019; Krizek et al., 2007; Litman, 2020) in case study contexts to bolster the evidence base; by more frequently undertaking and publishing standardized policy preference surveys; and by disseminating case studies and best practice guidance on how cycling infrastructure was successfully delivered (e.g., Carpenter & Zaccaro 2018). We suggest that applied project management for cycling infrastructure should constitute a new sub-field of cycling research.

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Data availability

Babb, C., McLeod, S., and Noone, C. (2021). *Surveys of local government employees in Australia and New Zealand—Planning for cycling/bicycling within local governments* [data set]. Mendeley Data. https://doi.org/10.17632/scbbbv2b8d.1.

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