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# The reactivated bike: Self-reported cycling activity during the 2020 COVID-19 pandemic in Australia



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## ABSTRACT

In western societies, the 2020 COVID-19 pandemic restrictions created a boom in cycling activity and business. This article reports findings from an Australia-wide survey that invited responses from those who changed their cycling behaviour during the pandemic lockdowns. The survey premise was that the pandemic lockdowns in each state presented the conditions of a ‘natural experiment’ to test whether the reduction in automobile traffic affected how cyclists reported experiencing the cycling environment. The survey was in the field from 3 August to 16 September 2020 with purposive sampling. A total of 699 respondents participated, with 444 complete surveys. Key questions we seek to address include: Did cycling activity increase during the pandemic shut-downs? How did cyclists from under-represented groups experience the pandemic lockdowns? The findings are twofold. First, cycling activity increased among most respondents during pandemic lockdowns for exercise and wellbeing, but not for transport. Our survey reports that for respondents the pandemic lockdowns did not result in an uptake of active transport, despite the appearance of ‘pop-up’ cycle lanes. Second, the reduced traffic of the pandemic shutdown period created a particular opportunity for women to ride bikes. The key policy implication is that cities in Australia should be designed for more relaxed modalities of mobility if the goal is to increase rates of active travel and cycling activity.

## 1. Introduction

Cycling activity and business boomed during the 2020 COVID-19 pandemic restrictions (Boddy, 2020). For domestic transport, a frequently asked question during the COVID-19 pandemic is: “Will the pandemic bring a golden age of cycling?” (Beech, 2020). In Australia, like elsewhere, some attributed the boom to government advice that directed citizens to avoid public transport (Rabe, 2020). Many municipal authorities worked to incentivise cycling as a solution to the challenge of social distancing and minimising the risk of COVID-19 transmission (Musselwhite et al., 2020; Tirachini and Cats, 2020). This was the case in Sydney, Australia’s largest city, where the New South Wales transport minister, Andrew Constance (2020) outlined the state government response:

We are already seeing our public transport system at capacity during peak periods with the need to physical distance and we want to offer the community more options to make their journeys safer. We’ve been working closely with City of Sydney Council to identify key pub-

lic spaces that could be freed up for cycling paths and prioritising pedestrians and cyclists to ensure safety.

The pandemic disruption to transport behaviour was positioned by some media commentators, scholars and policymakers as an opportunity to invest in active transport, including cycling, walking and other forms of active travel or micro-mobility (Zhang and Cao, 2020; Mark, 2020; Thigpen, 2020). ‘Pop-up’ cycle lanes became a characteristic of cities in COVID-19 lockdowns to encourage active transport.

Yet, other scholars attributed the boom in cycling to securing wellbeing and health through physical activity, rather than solely for transport (De Vos 2020; Budd and Ison, 2020). For example, De Vos (2020) suggests that due to a reduction of out-of-home activities there might be an increase in recreational walking and cycling primarily for wellbeing and for maintaining physical activity levels. Similarly, Budd and Ison suggest:

The role of active travel gained newfound political and social prominence at the height of the crisis when walking and cycling (alone or with members of a single household) were promoted as a means of staying fit during the lockdown when all other options (including

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swimming pools, indoor gyms, leisure centres, and playgrounds) were closed. (Budd and Ison, 2020: 2)

Early indications are that increased cycling activity lead to positive health outcomes (Kraus and Koch, 2020; Nettleton, 2020).

Based on this background, this article reports findings from an Australia-wide survey that invited responses to better understand changes to cycling behaviour during pandemic lockdowns that began in each state in March 2020. In doing so, the manuscript contributes to existing research exploring the broader context of changes to mobility patterns and the disruption of the pandemic on commuter-based patterns of mobility (Borkowski et al., 2021). Our aim is to understand what might motivate some people to change their transport patterns and start cycling for transport, including reactivating their bicycles after a period of not riding. We asked the following research questions: Did the reduced automobile numbers on roads because of the travel restrictions of the 2020 COVID pandemic lockdowns facilitate the rapid uptake of cycling as active transport? Or did cycling rates change because of altered working routines, closure of gyms and concerns of wellbeing and mental health? Did the pandemic create opportunities for cyclists from under-represented groups to ride? Understanding how the disruption to everyday transport created by a pandemic mobilised cycling activity, or not, helps design policies which seek to promote cycling as a form of transport. The survey is part of a larger project underway investigating the constraints and barriers to riding a bicycle in a car-dominated society. Cycling in Australian society is paradoxical, with participation in leisure cycling increasing whilst rates of cycling for commuting purposes remain low and stagnant (Munro, 2019). We were particularly interested to garner insights from people who started cycling for the first time ever, or since childhood.

The paper is organised as follows. The next section provides an overview of research on the influence of the pandemic on active transport. Section 3 discusses the method, including the online survey, recruitment and statistical analyses. Section 4 presents the descriptive statistical analysis. The final section offers a discussion of the descriptive statistical analysis and draws policy conclusions

## 2. Domestic transport during a pandemic

Our review points to how the disruption of a pandemic results in not only a reduction in number of journeys, but changes in travel behaviour (De Vos, this issue). The disruption of COVID-19 brought into question 'normal' or 'taken-for-granted' modes of transport due to either widespread public fears from the virus, or governments' lockdown measures to mitigate the spread of the virus. Previous studies highlight that during the COVID-19 pandemic a preference emerged for either motorised or active transport rather than public transport (De Vos, this issue). The decline in public transport trips is often attributed to perceived risk, vulnerability and knowledge differentiated along the lines of gender and age. For example, Blendon et al. (2008) report from a United States national survey on community mitigation measures for pandemic influence, that 89% of respondents would avoid public transport. Furthermore, the analysis of smart card data from Seoul, South Korea, by Kim et al. (2017) points to decline in transit use following the MERS outbreak in 2015, particularly for those aged over 65 years. Likewise, Sadique et al. (2007) report on a risk perception survey of influenza and SARS to suggest that 75% of survey respondents would avoid public transport. Kwok et al. (2020) report on an online survey conducted in Hong Kong during the early stages of the COVID-19 pandemic that 40% would avoid public transport as preventive infection strategy. Similarly, Yıldırım and Güler (2020) report that public transportation avoidance in Turkey was the most widely practiced transport behaviour change.

During pandemic lockdowns, traffic congestion in many cities reduced because of the combination of official stay-at-home orders, alongside the fear of the virus. For example, Muley et al. (2020) report

that the number of journeys per weekday fell by up to 90% in severely affected cities. Whereas Molloy et al. (2020) report that number of journeys per weekday fell by 60 percent in Switzerland in March 2020. The reduced numbers of cars on the road created possibilities for municipal authorities to further promote active transport and specifically cycling, through the creation of pop-up 'corona cycle lanes'. Municipal authorities across Australia, like those in the United States of America, United Kingdom and Europe, implemented this strategy during the COVID-19 pandemic to make public space for cyclists, including Melbourne and Sydney.

Rolling out cycling infrastructure aims to not only boost public health, lowers carbon emissions, and protect public transport systems but to address safety concerns. In countries with low levels of cycling participation, Aldred et al (2017) report that the perceived risks of automobile-dominated traffic work against cycling as an active transport mode. Furthermore, the perceived risk of cycling in traffic are differentiated along the lines of gender (Prati, 2018; Shaw et al., 2020). Results from a qualitative study conducted by Scott (2020) suggest there is greater preference amongst cyclists to separate cycling activity from vehicle traffic. For Aldred et al (2017: 50) the policy implication of this previous research is a "focus on the infrastructural needs and preferences of under-represented groups, including older people, women, children and those cycling with children". Building on this previous research, an online questionnaire survey was designed to investigate changes in cycling behaviour before and during COVID-19, differentiated along the lines of gender and cycling history. The survey premise was that the pandemic lockdown and attendant reduction in automobile traffic presented the conditions of a 'natural experiment' to test whether the pandemic disruption increased cycling activity for transport.

## 3. Method

We first considered panel-based or other representative sampling techniques. However, this was not financially or technically feasible within the project timeline. Purposive sampling was used to collect responses across the City of Sydney's and Trek Bicycles Australia's email and social media channels. Trek Bicycles Australia assisted in reaching potential participants by distributing the survey via their consumer-focused email communications. The City of Sydney posted a link to the survey to the subscribers of the City of Sydney Cycling newsletter.

In total, there were 444 completed surveys and 699 partially completed surveys. Among those who fully completed the survey (N = 444) 342 (72%) identified as male, 98 (22%) as female and 5 (1%) identified as non-binary or preferred not to say. Almost two thirds of respondents resided in the state of New South Wales (28%) or Victoria (34%), with equal numbers from Queensland (12%) and Western Australian (12%), and 11% did not answer. Despite the purposive nature of the sampling for this survey, 17% of the respondents were 'new' to cycling or had started again during the pandemic. Eighty-three percent of the respondents always cycled before and during the pandemic. The survey data therefore provides limited insight into the cycling behaviour of 'new' cyclists.

The survey instrument drafted through June and July 2020 and consisted of 30 questions in four-parts: 1. basic household demographic questions; 2. details of pre-, during and post-pandemic shutdown cycling activity (if relevant), 3. any commercial or technical (maintenance, etc) activity; and 4. experiential questions about cycling activity and the cycling environment. The design of the cycling activity questions was influenced by the standardised biennial National Cycling Participation Survey (NCPS), which included questions about the frequency (days per week) of different kinds of cycling activity (Munro, 2019). Unlike the NCPS we also included questions about distance travelled per week and hours spent cycling per week. Part 3 of

the survey instrument was designed to capture maintenance and commercial/purchasing activity and included questions about maintenance, bike shop services, and information seeking behaviour. The following is an example of a restricted choice question and the three responses:

Q15. Since Covid 19 restrictions have been relaxed in May 2020, compared to my cycling activity at the height of the restrictions:

- I'm finding that my cycling has increased
- I'm finding that my cycling has decreased
- Think it stayed about the same

Ethics approval was received in July 2020. The survey was in the field from 3 August to 16 September 2020.

The timing of the drafting of the survey instrument and its use in the field are important because of the shifting pandemic 'lockdowns' experienced in different Australian cities. The Australian response was initially uniform across the States and Territories, with only relatively minor differences in the timing of shutdowns of schools and public space (for a detailed account of the early period in Australia, see Beck and Hensher, 2020). However, in July 2020 the state of Victoria then reported a COVID-19 outbreak and implemented the most constrained 5 months pandemic lockdown and social distancing requirements of any State or Territory in Australia. When the survey was in the field Victoria was entering this second wave of COVID-19 spread and an increase in restrictions, while other states were reporting fewer cases and a loosening of restrictions. Some Victorian respondents indicated they had not yet entered post-lockdown conditions, but all could respond to the questions about their cycling behaviours during the pandemic lockdown. As this was the primary concern, our findings are presented with the States and Territories grouped together.

Descriptive analysis was conducted on the survey data in SPSS and focused primarily on where there were differences between reported cycling activity before, during, and after the pandemic shutdown period. We rely on descriptive analysis due to both the complexity and small size of the sample. It is difficult to extrapolate to population scale findings when we do not know how representative the sample is. A cohort of respondents was identified that increased their cycling activity and another much smaller cohort was identified that decreased their cycling activity. The research team then carried out a series of cross-tabulations with other responses to identify any patterns in responses regarding these cohorts. Due to the purposive, non-random sampling the authors do not have a basis for establishing the representativeness of these cohorts with regard to broader categories of the population and the findings should be interpreted with this limitation in mind.

#### 4. Results

The results section is organised into two sub-sections, the first addressing cycling activity during the COVID-19 restrictions and the second outlining the gendered cycling activity. The key finding is that 63% of respondents say they increased cycling during COVID-19 restrictions. Recreational cycling increased significantly, while there has been a significant decrease in commuter riding. Thirty-five percent of those who always cycled and 55% of new and resuming cyclists say their cycling has increased further since COVID-19 restrictions were relaxed in May 2020. Of the 15% of respondents that indicated reduced cycling activity this was reducing work hours, or working from home, and COVID-19 restrictions on travel distance and group riding. Women were more likely to rate improved cycling skills and confidence as important factors to post-COVID cycling. Public transport restrictions and new bicycle lanes were not considered important factors in increased cycling activity. Although we captured some data

regarding the distance and frequency of journeys and reasons for specific journeys (work, shopping, exploring suburb, etc), we focus on the key findings regarding stated motivations in the context of increased or decreased cycling activity.

##### 4.1. Cycling activity under Covid-19 restrictions

Overall, 63% of respondents declared their cycling increased at the height of pandemic restrictions. As Fig. 1 describes, 28% of respondents who took up cycling during the pandemic sustained or increased their cycling as lockdown restrictions were relaxed and 55% reported cycling activity had increased further. In comparison, 51% of respondents who always cycled report that their cycling activity remained unchanged from the restriction heights. Taken together, following the easing of national lockdown restrictions, about 85% of respondents either increased or maintained their national lockdown level cycling.

Changes in cycling behaviour occurred in the context of the COVID-19 pandemic amongst those participants who cycled for exercise. An increase in cycling activity was reported by 13% of respondents who cycled for leisure, exercise or recreation 5–7 days a week, and by 4% of those who cycled for leisure, exercise or recreations 3–5 days a week. The data show that respondents generally reported that key factors in increasing their cycling were enjoying riding for fitness (82% say extremely important) and riding as a social activity (39%) (see Fig. 2). Having fewer cars on the road was considered extremely important for 37% and wanting some time alone was considered extremely important by 33%. By contrast, public transport restrictions and new bike lanes were reported as not important for 86% and 64% of respondents, respectively (see Fig. 3).

Interestingly, 15% declared a decrease in cycling activity at the height of COVID-19 restrictions. Decline in cycling activity was not attributed to new riders crowding the paths, infection risk and lack of secure parking, with 68%, 71% and 77% respondents declaring these variables as 'not at all important', respectively. That said, 38% reported that pedestrian crowding was somewhat important to reduce cycling activity at the height of COVID-19 restrictions (See Fig. 4).

By far the most important reason given was 'other' (Fig. 6). Listed, the most important 'other' reasons given were reducing work hours, or working from home, and COVID-19 restrictions on travel distance and group riding.

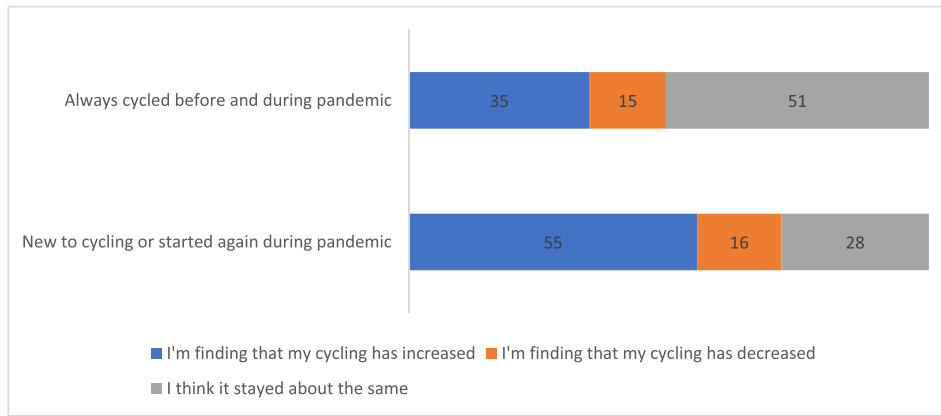
##### 4.2. Gendered cycling participation

Gender is key to cycling participation in Australia. Our findings indicate that cycling in Australia is gendered. The survey gender distribution is like those reported in Australian cycling participation studies (Munro, 2019). Fig. 5 shows the percent distribution of respondents by cycling history by gender.

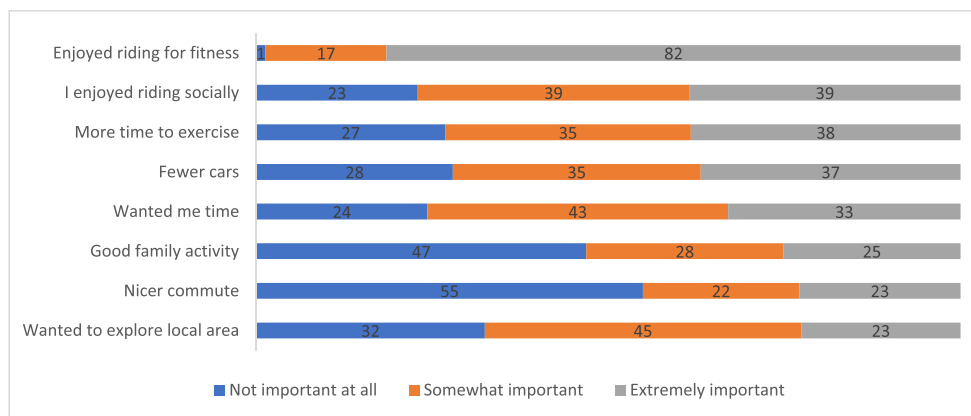
Of note, females were overrepresented among those who declared they were new to cycling or started again (33%) compared to the total proportion of females in the sample (22%) (see Fig. 6). Additionally, Fig. 6 shows that females are overrepresented among those who reported decreased cycling activity (29%) following the relaxing of national pandemic restrictions compared to females who sustained (19%) or increased (23%) their cycling.

The low number of females represented in the sample works against the application of inferential statistics. That said, the distribution confirms, first, that cycling is a highly gendered masculine activity on car-dominated Australian roads that often works against many women participating. Second, women, rather than men, were more likely to take up cycling during the pandemic with the decline in car numbers. Third, more women reduced their cycling once pandemic restrictions relaxed, cars returned in larger numbers and other leisure and recreation options became available.

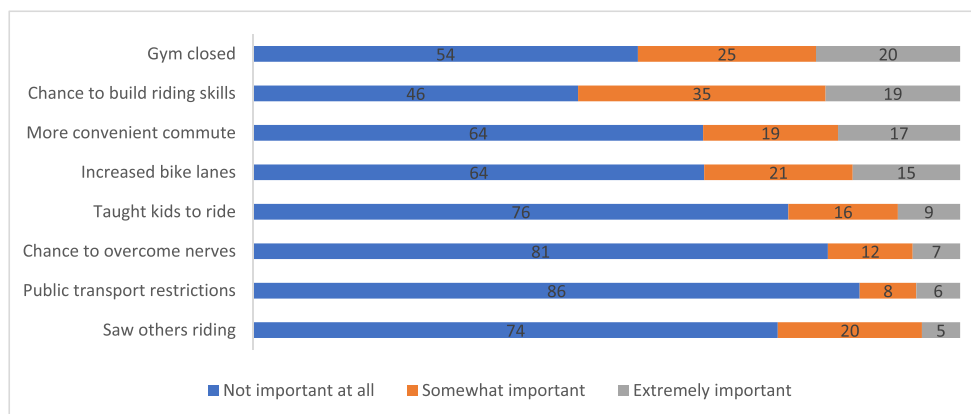
How cycling history intersects with gender is important to understand how the pandemic lockdown created an opportunity to ride



**Fig. 1.** Cycling activity after restrictions relaxed by history of cycling (%). < How would you describe your cycling history? > < Since Covid 19 restrictions have been relaxed in May 2020, compared to my cycling activity at the height of the restrictions >.



**Fig. 2.** Reasons for increased cycling (most important) (%). < If your cycling increased at the height of the Covid 19 restrictions please indicate the importance of each of these reasons (select as many as appropriate) >.

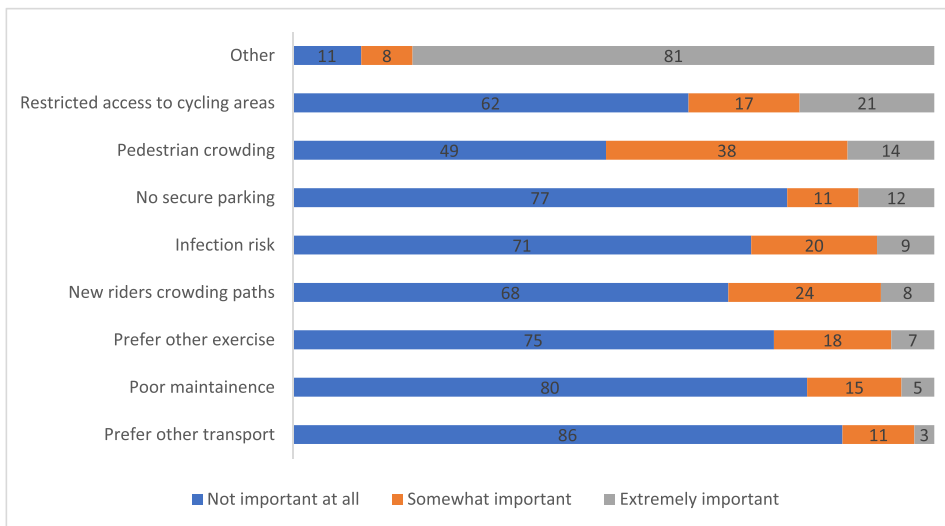


**Fig. 3.** Reasons for increased cycling (Least Important) (%).

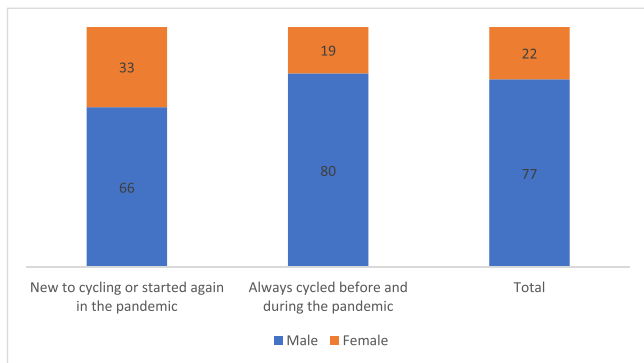
by building skills and confidence. Fig. 7 illustrates that the reasons given for ongoing cycling following the easing of the national lockdown restrictions by the 17% of respondents who were new to cycling, or had started again during the pandemic, were very different from those participants that cycled before the pandemic. For example, 52% of respondents who were new to cycling, or had started again, reported they were more likely to rate improved

cycling skills as ‘extremely or very important’ compared to 27% for those who had always cycled.

Similarly, 59% of respondents who were new to cycling, or had started again reported that improved confidence was ‘extremely or very important’ compared to those who had always cycled (25%) (Fig. 8). Reflecting gender differences, 42% of female respondents reported improved cycling skills generated by the national lockdown



**Fig. 4.** Reasons for decreased cycling (%) at the height of Covid-19 restrictions. < If your cycling decreased at the height of the Covid 19 restrictions please indicate the importance of each of these reasons (tick as many as appropriate) >.



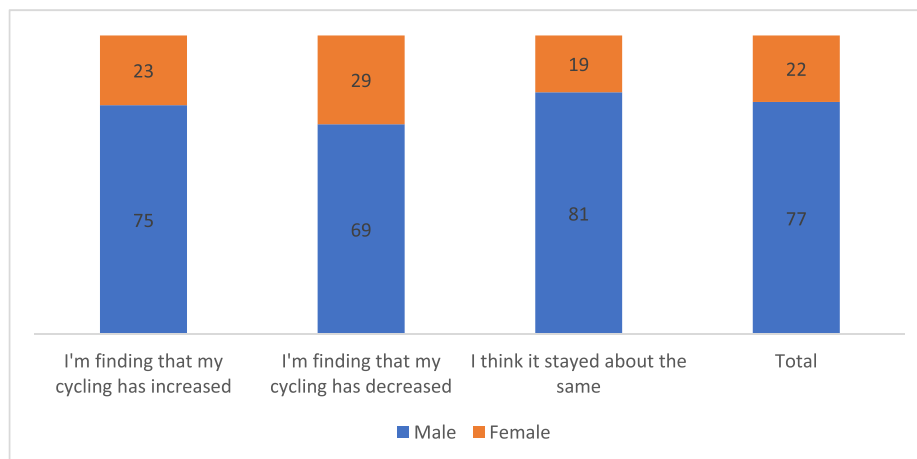
**Fig. 5.** Cycling History by Gender (%). < How would you describe your cycling history >.

were ‘very or extremely important’ compared to only 29% of male respondents. Similarly, 49% of female respondents reported improved confidence as result of the national lockdown was a ‘very or extremely important’ compared to only 28% of male respondents (Fig. 9).

### 5. Discussion and conclusion

The notion of a ‘cycling renaissance’ emerged in western society media during national lockdowns and reports of increased bike sales. The premise of the ‘cycling renaissance’ narrative is that a pandemic creates disruption to everyday travel behaviours, creating possibilities to challenge ‘normal’ transport modes due to increased government restrictions and infections fears. The study presented results of an online questionnaire survey that was conducted to better understand the boom in cycling sales and participation activity in Australia reported in the media due to the COVID 19 pandemic. The national survey focused specifically on cycling activity during the national lockdown.

Except for a small proportion of respondents who could no longer commute or because of group restrictions, overall cycling activity increased for most respondents during the national lockdown. Even so, our data suggests that in a car-dominated society, the pandemic disruption did not result in a switch to cycling as a mode of transport for shopping, visiting friends or commuting. Most respondents were not cycling for transport before or during the pandemic. Indeed, after the national lockdown the percentage of respondents cycling to work



**Fig. 6.** Cycling Activity After Restrictions Relaxed by Gender (%). < Since Covid 19 restrictions have been relaxed in May 2020, compared to my cycling activity at the height of the restrictions: >.

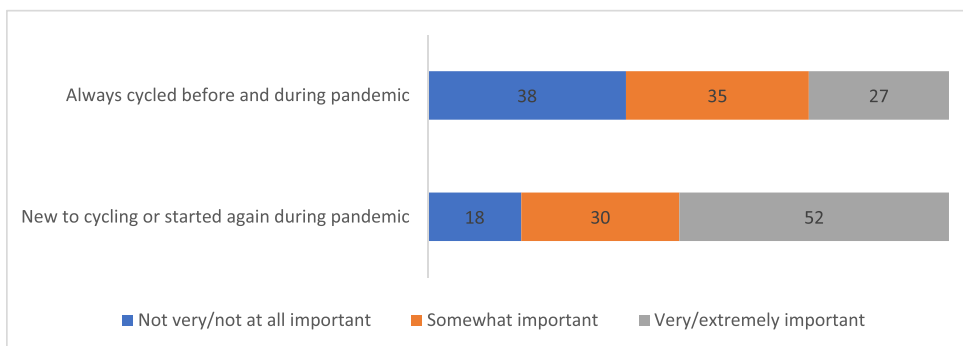


Fig. 7. Importance of Improved Cycling Skills by History of Cycling (%).

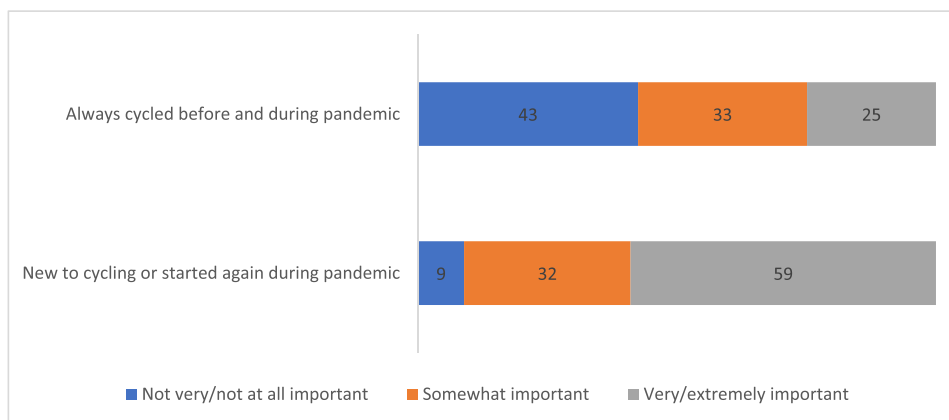


Fig. 8. Importance of Improved Confidence by History of Cycling (%).

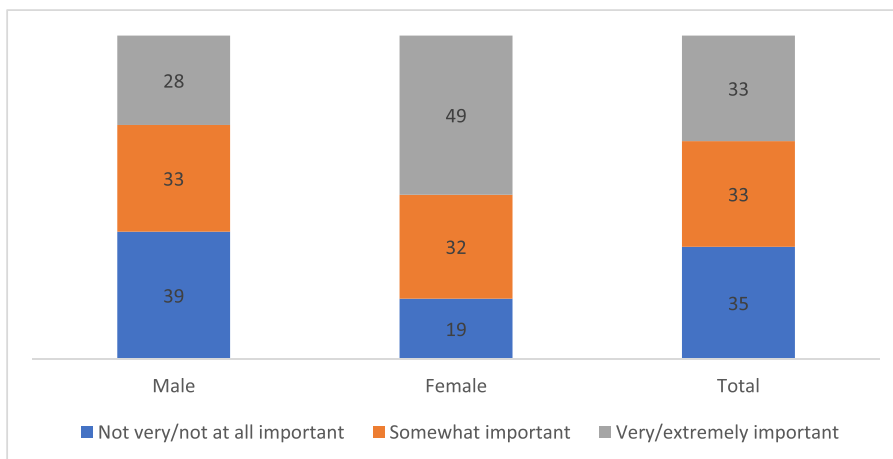


Fig. 9. Importance of Improved Confidence by Gender (%).

reduced rather than increased, given more participants were working from home. Instead, confirming the work of De Vos (2020), the study observations indicate that primary purpose for most respondents increased cycling trips were taken primarily to explore neighbourhoods, for physical exercise and for mental health. Furthermore, leisure and wellbeing cycling trips become more frequent for some respondents during the national lockdown. Reduced motorised traffic was attributed as important by most respondents in increasing cycling activity during the national lockdown. Since most respondents were cycling as a leisure activity, little importance was attributed to the provision of ‘pop-up’ bicycle infrastructure and gave little importance on

the perceived infections risks from public transport. This finding suggests that promoting active transport through the provision of cycling lanes alone is not sufficient to change transport behaviours in car-dominated societies.

Our results suggest caution around the optimism surrounding building cycling infrastructure during the COVID-19 pandemic conveyed by Budd and Ison (2020). Instead, observations from a car-dominated society like Australia, where most people own a car and cycle for leisure, suggests that alongside providing cycling infrastructure, the shift away from the private car to active transport modes of transport require reducing motorised traffic and emphasising wellbe-

ing benefits attributed to slower-paced cycling, including connectedness and relaxation. The policy implications are not so much for cycling or cycling infrastructure but opportunities to affirm more relaxed modalities of mobility.

The key policy imperative we argue can be derived from our research is that to improve participation rates of active transport and cycling, cities need to be designed for slower modalities of mobility. Slower modalities of mobility would, in effect, reproduce the traffic conditions of the global pandemic. This is broadly supportive of the position advocated by [Tranter and Tolley \(2020\)](#) who emphasise the importance of active transport modes in their preferred vision of a 'slow city'. They argue that the "central tenet of promoting cycling is restraining faster – and more dangerous – traffic" and suggest a hierarchy of provision of cycle link facilities for planners, which begins with reduction or volume and speed of motorised traffic and ends with provision of separated cycle lanes (284–285). Furthermore, they make the critical point that Australian cities have been designed as 'fast cities' and much of the cycling infrastructure is designated to accommodate the "fearless and fast" so-called MAMILs (Middle Aged Men In Lycra) (284). Our interpretation of the data is that this group is represented in our survey by the respondents that reduced their overall cycling activity during the most restrictive conditions.

How gender intersects with cycling history was found to be important in shaping cycling activity during the national COVID-19 pandemic lockdown. Our observation confirmed that cycling participation is gendered in Australia, with higher rates of participation amongst men. Female respondents comprised a larger proportion of those cycling for the first time or reactivating their bike during the national lockdown. Furthermore, female respondents reported how the reduction in motorised traffic during the national lockdown offered possibilities to increase cycling skills and confidence. Equally, a larger proportion of female respondents reported stopping cycling once the national lockdown restrictions eased. Our findings of increased cycling participation among female cyclists during lockdown conditions supports the argument developed by [Crane et al. \(2016\)](#) that appropriate cycling infrastructure is required to "provide the environment for cycling to be discovered and perceptions to be challenged". In addition, we add that, the policy challenge in the Australian context involves not only building infrastructure, but challenging dominant gendered understanding of cycling as sport, configured by Lycra-clad bodies, road bikes and notions of speed, competition and sporting masculinity.

A key limitation of this study was the survey instrument design itself. This includes, first, the information available to the researchers in designing the instrument and unknown dimensions regarding the timing of lockdowns in various jurisdictions. Victoria re-entered a lockdown period while the survey was in the field, which meant part of the survey about a relaxation of COVID-19 restrictions was not relevant. Second, the survey is arguably not as effective as a standardised measure of cycling activity (i.e. National Cycling Participation Survey) as it also seeks further information about the purpose of cycling journeys and behaviours related to cycling activity, such as maintenance and commercial activity. Another key limitation is the purposive sampling used as the findings should only be considered indicative of the given state of cycling activity in Australia rather than representative.

Opportunities for future research include investigating the experiences and specific local conditions of those cyclists that reduced their cycling activity once COVID-19 restrictions were relaxed. Our findings indicate that improving skills and confidence experienced during the lockdown period were important among those respondents who were new to cycling, particularly among demographic cohorts that we know are underrepresented in cycling participation rates. Having a better sense of what contributes to this experience could be useful to feed into policy discussions about active transport. Are those new or newly returned to cycling choosing cycling because other forms of recreation were not available or for transport-related reasons due to the lack of vehicle traffic on the roads? If for transport related reasons, besides

a global pandemic, what are the conditions by which we could encourage those new to cycling to begin or continue cycling?

### CRedit authorship contribution statement

**Glen Fuller:** Conceptualization, Investigation, Writing - original draft, Writing - review & editing. **Kieran McGuinness:** Formal analysis, Investigation, Writing - original draft. **Gordon Waitt:** Conceptualization, Investigation, Writing - review & editing. **Ian Buchanan:** Conceptualization, Methodology. **Tess Lea:** Conceptualization.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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