Electric bikes in Australia: safety gains and some new concerns

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ABSTRACT

In 2012, the Australian government adopted the European Union standard for pedelecs. This landmark policy decision opened Australia to the global market of internationally designed and manufactured electric bikes. Early indicators are that owners of electric bikes are riding more frequently and replacing vehicle trips, gaining many of the known benefits of cycling. Electric bikes addressed a range of issues that were identified as barriers to pedal bike cycling (e.g. hills, lack of fitness, lack of time, overweight). However, electric bikes are also presenting new, electric bike-specific safety concerns. In this study we build on the electric bike safety research with findings from an online survey of electric bike owners in Australia (n=522), their perceptions of safety and crash involvement accounting for previous cycling experience. Almost half the electric bike owners felt safer riding in traffic compared to riding a pedal bicycle (46.8%). There was significantly more agreement that it was safer to ride in traffic by people who were not previously regular cyclist (63.6%) compared to people who were regular cyclists prior to owning an electric bike (39.8%)($\chi^2(1)=20.796$, $p<0.001$). Power assistance had helped almost half the participants avoid a crash (42.5%). Participants felt more confident that they could complete a trip that they may not have the stamina to complete on a conventional bicycle. More than a quarter of participants (26.4%) had crashed and electric bike specific factors contributed to some crashes, specifically, throttle/handle grip power engagement, unexpected power surges that destabilised the rider and dis/mounting manoeuvres. Half the crashes did not involve a motor vehicle (55.3%). Of the crashes that did involve a vehicle, the collision profile was comparable to those experienced by pedal cyclists in Australia including crashes involving a vehicle occupant opening the car door in the path of the cyclist. Electric bikes have the potential to significantly to increase cycling participation in Australia. It is likely that the electric bike-specific safety concerns will be mitigated by greater rider support. This support could be offered at point-of-sale or post-purchase in bike handling skills training education.

Keywords: electric bikes, Australia, safety gains, safety concerns

1 INTRODUCTION

Increasingly electric bikes are providing a viable transport option to the private motor vehicle. The power assistance, often described as having a tailwind or a hand to push the rider, has addressed many of the traditional barriers to cycling including hilly terrain, perceptions of required fitness, need to shower/change clothes, increasing age and illness or injury (Johnson and Rose 2013).

Internationally, the uptake of electric bikes has been spectacular. In China over one decade, the electric bike ownership has leapt from zero to an estimated 150 million by 2015 (Cherry 2013). Electric bike ownership in Europe is growing. In the Netherlands, electric bike sales have increased from 22,000 in 2004 to 171, 000 in 2012 (van Cooten 2013) with an estimated 1 in 20 Dutch citizens owning an electric bike and accounting for up to 10 per cent of all cycle trips (Twisk, Boele et al. 2013). In Germany, in 2011 electric bikes were 8 per cent (310,000) of all bicycle sales and this is forecast to increase to 10-15 per cent (Gehlert, Kühn et al. 2012). In Switzerland, annual electric bike sales have increased from 1,792 in 2005 to 52,941 in 2012 as electric bikes are promoted by local Swiss governments as a greener transport option that offers more advantages than pedal cycling or walking.

Globally, regulations for electric bikes are inconsistent. Power output in Europe and Japan is limited to 250 watts with higher limits in Canada (500 W) and the United States (750 W). Maximum speed under power assistance also varies (China: 20 kph; Japan: 24kph; Europe: 25kph; US and Canada: 32 kph). While China has the lowest maximum speed permitted, it is suggested that due to a lack enforcement of the electric bikes' capacity that many are capable of much higher speeds (Weinert, Ogden et al. 2008, Rose 2012).

In terms of bicycle use in recent decades, the most relevant comparative country to Australia is the United States. In contrast to many Asian and European countries, regular pedal bicycle use in both Australia and the US has been marginal as private motor vehicles dominate personal transport choices (Pucher and Buehler 2008). In the US, electric bikes are increasing people's active transport options and are contributing to a shift from in motorised trips by all age groups (MacArthur, Dill et al. 2014).

1.1 Electric bikes – the Australian context

In Australia, the public policy framework for electric bikes has significantly restricted the uptake and interest in this emerging transport mode (Rose 2012). Until recently, Australia had the most restrictive regulations in the world with a 200 watts maximum power output limit. This restriction had a dramatic impact on the early uptake of electric bikes. With the global electric bike power output limits of 250 watts and higher, few quality electric bike models were manufactured to meet the 200 watts limit. Consequently, in Australia the options were a small range of locally produced models and cheap, imported, models. The imported models were frequently of inferior quality and design, provided a poor experience and no after sales which tainted some early adopters' experience and perception of the electric bikes. Retrofit

kits also provided an affordable option but usually required self-installation which was a significant disincentive (Johnson and Rose 2013).

In 2012, the Australian government adopted the European Union design standards for electric bikes, with a maximum speed of 25kph and an increased power output to 250 watts and this has dramatically expanded the electric bike market. Australians are now able to purchase a wide range of sophisticated, well designed models. Electric bike sales figures for Australia are not collected or published however electric bike retailers are reporting unprecedented and increasing demand and are not able to import electric bikes fast enough to meet demand (Dolomiti Electric Bicycles 2014).

Electric bicycles are legally defined as bicycles in Australia and riders are subject to the same road rules and permitted to ride their electric bike as if it were a pedal bicycle. In adopting the EU standard, the power assistance can only be engaged by pedalling also called pedal assist or pedelec (Australian Government 2012, Rose 2012). Prior to the policy change, electric bikes were frequently sold with a handle grip throttle that engaged the pedals without the rider needing to pedal. These models are still part of the existing electric bike fleet. Both handle grip throttle and pedal assist models are owned in Australia and were included in this study.

Early research of electric bike owners reports uptake by people a wide range of people regardless of their previous experience as a pedal cyclist. The electric bike is being integrated into daily travel, often replacing the car (Johnson and Rose 2013). While there are definitely gains in mode shift from the sedentary motor car to the more active, albeit assisted, cycling (Simons, Van Es et al. 2009, Gojanovic, Welker et al. 2011), there are also safety gains and some new safety concerns.

1.2 Electric bikes and safety

As the uptake of electric bike in Australia increases, potential safety issues also emerge. Safety concerns relate to cycling, including risk of a collisions with a motor vehicle are likely to be relevant for electric bike riders.

In countries without extensive separated infrastructure cyclists, including Australia and the US, travelling alongside motorised vehicles at speeds above 40km/h is the most cited cycling safety concern (Bauman, Rissel et al. 2008, Haworth 2012). Given the potential for harm in a crash with a motor vehicle and the increasing number of cyclist fatality and serious injury crashes in Australia, this concern is not surprising (Garrard, Greaves et al. 2010). However, it is also possible that the power assistance of an electric bike provides the rider with safety gains beyond that of a pedal bicycle. This potential for safety gains were explored in this study.

While the may be safety gains, electric bikes themselves have been reported to create new safety concerns. Electric bikes are typically heavier than pedal bicycles and the placement of the battery shifts the centre of balance. Twisk and colleagues (2013) reported that Dutch electric bike riders have fallen more frequently while mounting or dismounting compared to

pedal bicycle riders. Further, bike handling skills have been identified as a safety concern as unexpected higher speeds have been counterintuitive for some riders (Spolander 2007, Davidse, van Diujvenvoorde et al. 2013).

The focus of this paper is the safety benefits and new electric bike specific safety concerns. We investigated a cohort of electric bike owners to identify the safety benefits, attitudes towards safety when riding their electric bike, crash experiences and concerns through the lens of their previous cycling experience.

2. METHODS

An online survey was conducted with electric bike owners in Australia. Given the absence of data on electric bike sales or ownership in Australia a short survey was preferred to maximise the likelihood of response. Data collection was from November 2012 to March 2013. Study protocols were approved by the Monash University Human Research Ethics Committee.

2.1 Participants

Traditional household surveys rely on a sampling frame (list of the population) and draw a random sample. Due to the low ownership of electric bikes, sending out a population wide survey, even to a subsample, would require enormous resources for a potentially small return. Low market share of electric bike has been identified as a challenge to recruiting electric bike riders (Gehlert, Kühn et al. 2012). In this study, we used a convenience sample which is appropriate for an initial exploratory survey although it does limit the generalisablity of the results to a broader population.

Several recruitment strategies were used, including: posting the survey link on several websites (Monash University webpage and intranet, Amy Gillett Foundation webpage and social network page); promotion through social media by state bicycle advocacy groups and the main motoring advocacy group in Victoria (Royal Automobile Club of Victoria (RACV)). The study was also publicised through a the link in an online article (The Conversation viewed by over 18,500 people)(Johnson 2012) and; in a radio interview (Australian Broadcasting Corporation (ABC) Radio National).

2.2 Online survey

The survey was designed by the authors. Survey questions were developed following a review of the electric bike literature. The first webpage of the study provided a detailed explanation of the study and informed consent was implied on submission of the survey responses. The survey was delivered online using SurveyMonkey. There was an initial screening question about electric bike ownership to ensure only electric bike owners responded. The comprehensive survey was comprised of a wide range of questions including: details of the electric bike owned; purchase decision making; mode choice; electric bike trip purposes; ideal electric bike; crash experiences; previous pedal bike use; vehicle ownership and licence status,

and; demographics. Presented in this paper is an analysis of selected questions that focus on the crash experiences of participants, their electric bike purposes and demographics.

2.3 Classifications

Previous cycling experience is likely to have an impact on attitudes and bike handling skills and potentially crash involvement on electric bikes. To ensure that we were able to extricate the safety concerns related to electric bikes from the concerns of a new rider, we have conducted the analysis through the lens of previous cycling experience, comparing all responses between people who were frequent bike riders before purchasing an electric bike and those people who were infrequent riders, or did not ride a bike as an adult.

Cycling experience status: Comparisons were made between those people who were previously pedal bike riders compared people who were infrequent or non-riders. The classification was based on their frequency of pedal bicycle use prior to their electric bike purchase (*previous cyclists*: rode a pedal bicycle daily, weekly or monthly; *not previously cyclists:* rode a pedal bicycle a few times a year, did not ride).

Crash type: Participants self-reported electric bike crashes in an open text response. From these descriptions, electric bike crashes were analysed to determine the crash characteristics. We analysed the crashes to differentiate between the types of crashes that could have been experienced by any bike rider (i.e. pedal bicycle or electric bike) and those crashes that can only be experienced when riding an electric bike.

Data was analysed using descriptive statistics with Chi-square tests conducted on the comparisons, statistical significant was set at <0.05. All statistical analysis was conducted using SPSS Version 21 (IBM Corp 2012).

3 RESULTS

In total, 522 electric bike owners responded to the online survey. Two thirds of respondents had been pedal bicycle riders before purchasing an electric bike (66.3%). Demographic characteristics of the respondents were analysed by their previous pedal bicycle riding experience. A summary of the demographic characteristics of respondents, vehicle ownership and licence status are presented by respondents' pedal bike riding experience prior to their electric bike purchase in Table 1.

Two demographic characteristics were statistically significantly difference when compared by previous cycling experience: gender and age. The majority of respondents were male and more men than women reported being frequent pedal cyclists compared to female respondents (χ^2 (1)=12.710, p<0.001). Respondents' age ranged from 19 to 88 years ($\bar{x}$ 50 years) and three quarters of respondents (75.9%) were aged between 35-64 years.

Half the respondents were employed full time and almost 1 in 5 respondents were retired. Educational level was high with the majority having a tertiary or higher degree (70.3%) and almost half earned over $100,000, including respondents who earned over $150,000 (19.7%).

Table 1 Participant characteristics and vehicle ownership by pedal bike riding experience (n=522)

	Count	Percent	Pedal bike riding experience				P value
			Frequent		Infrequent/non-rider		
			No.	Percent	No.	Percent	
Total	522	100.0	346	66.3	176	33.7	
Gender							
Male	376	71.1	264	76.3	108	61.4	0.00
Female	153	28.9	82	23.7	68	38.6	
Age							
18-24	7	1.4	7	2.1	0	0	
25-34	50	9.8	32	9.5	18	10.5	
35-44	117	22.9	75	22.2	42	24.4	0.02
45-54	133	26.1	92	27.2	41	23.8	
55-64	137	26.9	79	23.4	58	33.7	
≥ 65	66	12.9	53	15.7	13	7.6	
Employment							
Work full time	292	57.0	188	55.3	102	60.7	
Work part time	92	18.0	64	18.8	28	16.7	0.38
Retired	90	17.6	60	17.6	28	16.7	
Student	16	3.1	12	3.5	4	2.4	
Other	22	4.3	16	4.7	6	3.6	
Education							
≤ Partial secondary	4	0.8	1	0.3	3	3.0	
Secondary	50	9.7	33	9.8	16	15.8	
Technical school/TAFE	99	19.2	64	18.9	34	33.7	0.13
University degree	222	43.1	142	42.0	8	7.9	
Higher degree	140	27.2	98	29.0	40	39.6	
Income							
< $20,000	30	6.0	23	7.0	7	4.1	
$20,000-$39,999	46	9.2	33	10.1	12	7.1	
$40,000-$74,999	104	20.8	70	21.4	33	19.4	0.54
$75,000-$99,999	84	16.8	52	15.9	31	18.2	
≥ $100,000	237	47.3	149	45.6	87	51.2	
Relationship status							
Single	114	22.4	71	21.3	41	23.7	0.30
Married/relationship	396	77.6	262	78.7	132	76.3	
Driver's licence							
Yes	491	94.8	323	94.7	165	94.8	0.57
No	27	5.2	18	5.3	9	5.2	
Own/access to a car							
Yes	478	91.9	309	90.4	166	94.9	0.51
No	42	8.1	33	9.6	9	5.1	

3.1 Electric bike use and perceptions

Regardless of previous pedal cycling experience, the majority of respondents rode their electric bike weekly (88.2%) including daily riders (48.7%). The difference between the groups by previous cycling experience was just significant (χ^2 (5)=11.518, p0.042). Differences between the groups by gender were not significant.

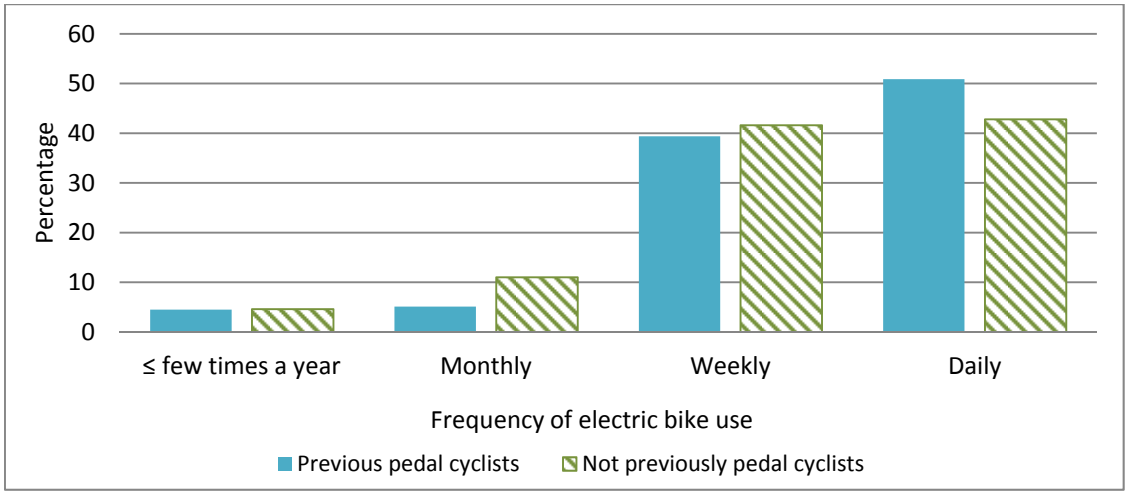

Figure 2. Frequency of electric bike use by status as pedal cyclist prior to electric bike purchase

Almost half of all respondents agreed (agreed/strongly agreed) that they felt safer riding in traffic on an electric bike compared to a pedal bicycle (46.8%). There was a statistically significant difference by riding experience in feelings of safety when riding in traffic. Respondents who did not have pedal cycling experience prior to purchasing their electric bike were significantly more likely to report feeling safer than respondents with cycling experience (χ^2 (4)=23.669, p<0.000). Among the people who were not previously pedal cyclists, both males and females agreed that they felt safer and this was not significantly different.

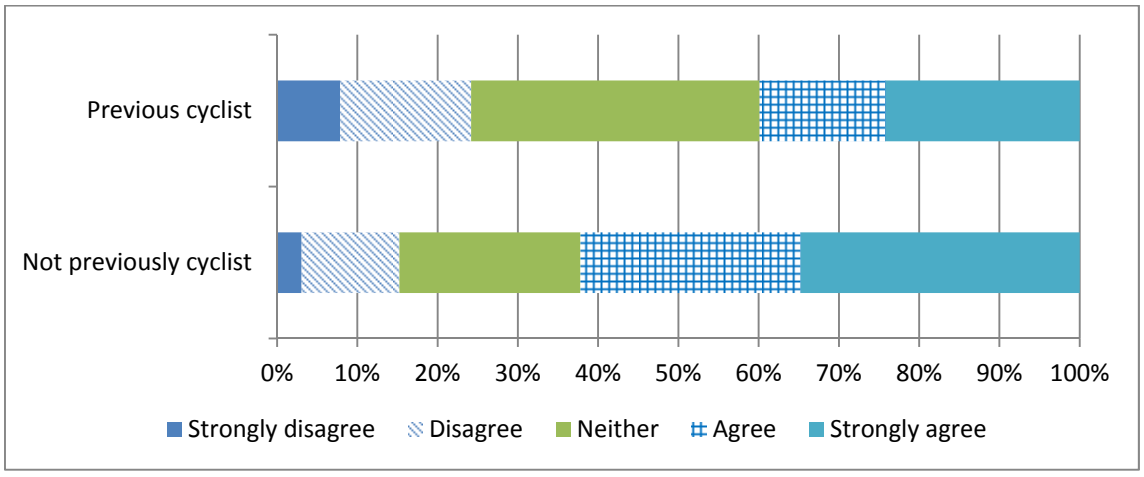

Figure 3. Feel safer riding in traffic on an electric bike compared to a pedal bike

There were also significant differences in travel speeds on the electric bike compared to a pedal bicycle. ***Top speed:*** respondents who were not previously pedal cyclists were more likely to report that their top speed on their electric bike was higher than on a pedal bike (59.0%) compared to previous pedal cyclists (45.5%)(χ^2(6)=29.814, p<0.000). ***Average speed:*** the majority of respondents reported a higher average speed on their electric bike than a pedal bicycle regardless of previous cycling experience (previous cyclist: 74.9%; not previous cyclist: 79.5%). The difference was significant by cycling experience as a higher proportion of previous cyclists reported that their average speed was not higher on an electric bike (previous cyclist: 17.1%; not previous cyclist: 11.8%) (χ^2(6)=20.569, p0.002).

3.2 Electric bike safety gains

The electric bike helped almost half the respondents to avoid a crash (42.5%). This was significantly different by cycling experience with respondents who were not previously pedal cyclists (52.0%) more likely to agree than previous pedal cyclists (37.7%) (χ^2(1)=8.249, p0.004).

Additional speed was the main reason the electric bike helped riders to avoid a crash (81.6%). The most reported benefits of speed were: helped rider move away from a dangerous situation (39.4%); helped rider keep pace with motorised traffic (31.8%), and; made starting/ stopping easier (10.2%). Other safety gains included: greater stability and control (7.0%) and less fatigue/more alert (5.9%). Other noted safety gains included: better components (e.g. brakes), better bike geometry (e.g. easier to mount/dismount a step through frame, more upright position) and permanent bike light. There was no significant difference by previous cycling experience.

3.3 Electric bike crashes

More than a quarter of participants (26.4%) had experienced a crash on their electric bike. Slightly more respondents who were not previously cyclists had experienced a crash (30.6%) compared to previous cyclists (25.3%) however, this was not statistically significant.

Of the people who had experienced a crash on their electric bike (n=138), half (50.0%) the crash types could have occurred on any bike type. Three quarters of the crashes did not involve a motor vehicle (75.4%). Of the electric bike crashes that did involve a motor vehicle, the crash characteristics were typical of those experienced by pedal bicycle rides in Australia including 8 crashes where a vehicle occupant opened the door in front of the electric bike rider (known as 'dooring').

For one in five crashes, the road/path surface was a contributing crash factor. Descriptions of crashes included loss of traction or balance on a wet or icy road or path or poor road surface (e.g. potholes or large cracks). While these may be classified as crashes that could have occurred to a ride of any bike type, some respondents noted that they were travelling too fast for the conditions. The electric bike itself contributed to almost a quarter of crashes. Of these crashes, the main contributing factors were: rider error (e.g. throttle/handle grip power

engagement, unexpected power surges that destabilised the rider and dis/mounting manoeuvres); fall due to heavy bike or lost balance, and; mechanical failure, typically related to self-assembly. Table 2 is a summary of electric bike rider crashes.

Table 2 Electric bike crash characteristics by pedal bike riding experience (n=138)

	Count	Percent	Pedal bike riding experience			
			Frequent		Infrequent/non-rider	
			No.	Percent	No.	Percent
Total	138	100.0	87	63.0	51	37.0
Crash, did not involve a motor vehicle, could have happened on a pedal bike	35	25.4	20	23.0	15	29.4
Collision with a motor vehicle, could have happened on a pedal bike	34	24.6	27	31.0	7	13.7
Surface, could have been because of higher speed on ebike	31	22.5	20	23.0	11	21.6
User error, ebike	16	11.6	10	11.5	6	11.8
Fell because of heavy bike/lost balance	10	7.2	5	5.7	5	9.8
Mechanical ebike fail	7	5.1	4	4.6	3	5.9
Pedestrian related	4	2.9	1	1.1	3	5.9
Alcohol related	1	0.7	0	0.0	1	2.0

Participants were asked about their crash experience in an open ended question and most did not specify if they were or were not injured.

4 DISCUSSION

This study provides insights into the safety gains and some new concerns related to electric bike use in Australia. While the convenience sampling limits the generalisablity of the results to all current, or potential, electric bike owners, the findings offer interesting initial results.

Australia rates poorly in international comparisons of rates of regular cycling (Pucher and Buehler 2008). For many people in Australia, concerns about safety are the most significant barrier to cycling (Bauman, Rissel et al. 2008, Garrard, Greaves et al. 2010). The profile of the majority of Australian cyclists, adult males, often riding for sport/fitness is likely to be an artefact of the need to ride on the road alongside moving vehicular traffic. For females, concerns about safety and a greater likelihood of being risk adverse compared to males are identified barriers to cycling for females in Australia (Garrard 2003).

Given the existing cycling cohort in Australia, it was not surprising that the majority of electric bike riders in this study were adult males. What was unexpected was the proportion of people

who were not previously pedal cyclists, including half the females. Despite not riding a pedal bicycle, the majority of respondents rode their electric bike weekly. Perhaps this finding is not so surprising given that riding an electric bike is fun (Sperlich, Zinner et al. 2012) and the enjoyment of riding an e-bike is also likely to contribute to more frequent use compared to other modes of active transport (Langford, Cherry et al. 2013).

Electric bikes are speed limited at 25km/h. While the rider may travel faster, this requires them to pedal without additional assistance. It is also likely that some cyclists may reach considerably higher speeds when travelling downhill. Despite this speed restriction, many respondents in this study reported travel speeds that were higher on their electric bike than on a pedal bicycle. Notably, this was more frequently reported by those people who were not previously pedal cyclists. Therefore this may be a perceived increase in travel speed rather than an actual increase.

4.1 Electric bike safety gains

The dramatic shift in cycling participation and trip frequency facilitated by the electric bike suggests that the power assistance is addressing some of the barriers to cycling. Electric bikes may have a significant role to play in increasing cycling participation in Australia. Participants reported feeling safer when riding in traffic on their electric bike compared to a pedal bicycle. This finding concurs with experiences in China where females reported feeling safer crossing intersections on an electric bike compared to a pedal bike (Weinert, Ma et al. 2007). Importantly, this was significantly different between those people who had previously cycled compared to those who were not cyclists prior to purchasing their electric bike. This suggests the electric bike addressed most, if not all, the concerns and barriers these people had to cycling a pedal bicycle.

In addition to the perceptions of safety, participants' experiences also validated their sense of safety. Participants reported that the additional assistance helped them to avoid a dangerous situation and keep pace with the motorised traffic. This second benefit is an interesting observation on the respondents' perception of their relationship to the motorised traffic. In Australia there is a tension between drivers and cyclists on the road, drivers could be described as having what Basford et al described as an 'impatient caution' (2002: 16) about sharing the road with cyclists. It may be that travelling at a higher average speed on an electric bike, riders feel they are able to avoid safety critical situations including slowing down vehicular traffic. From a Safe System perspective, the pillar of safer speed, may be somewhat addressed by the power assistance of electric bikes which contribute to a reduced speed differential between the rider and the vehicular traffic.

For some participants safety gains were made due to the bicycle itself with an increased feeling of stability and control. Some participants noted that on the electric bike they were less 'wobbly' referring to the unstable movement of a pedal bicycle from a stationary position. It is likely that being able to accelerate from a standing stop gave confidence to some riders, particularly when riding alongside vehicular traffic. A few participants also noted that they felt

less fatigued on the electric bike and subsequently were more alert on their electric bike. This too is likely to contribute to greater confidence.

4.2 Electric bike crashes

The majority of respondents in our survey had not experienced a crash on their electric bike. In the main, electric bike crashes in this study were typical of the crash types that could be experienced by the rider of a pedal bicycle. In this study, of the 'cycle' crash types, the most frequently cited was the cyclist being stuck by an unexpectedly opened car door. This crash type is not particular to electric bikes as the number of cyclists who experience this type of crash has been increasing (Johnson, Newstead et al. 2013). Similarly, several respondents noted they had been involved in crashes with vehicles after the driver had turned in front of them without adequate signalling. Other respondents had crashed without the involvement of a motor vehicle and again the crash circumstances were similar to those reported for pedal cyclists (Watson and Cameron 2006). In relation to these types of crashes, electric bike riders can be grouped together with all other cyclists. Continued actions to improve safety for cyclists in Australia including investment cycling infrastructure and behaviour change campaigns that target safer driver and safer cyclist behaviours are likely to have a direct impact on the safety of electric bike riders.

However, in a quarter of electric bike crashes, the electric bike itself contributed to the crash. It is in the analysis of these crash events that new safety concerns, specific to the electric bike were identified. Almost half of the electric bike specific crashes were due to user error, mainly related to unexpected power surges as the rider, while either astride or walking/pushing the electric bike, has inadvertently twisted the handle grip throttle. The adoption of the EU design standard will eliminate this crash type in future, however it is likely to persist for some riders of electric bikes purchased prior to the legislation change. While there are clear safety benefits to be gained by restricting the power engagement to pedalling, some participants did note that the ability to engage the power using the throttle enabled them to quickly accelerate to avoid danger. Also, the advantage of being able to use the throttle to move off from a stationary position was considered a benefit that would be lost with pedal-only power engagement. Current pedal assist models with a handle grip throttle that provide assistance up to 6km/h and provided initial acceleration may be a solution for riders who prefer some assistance.

One unintended consequence of the previous Australian regulation, the 200 watts power output limit, was that one in five crashes due to a mechanical failure and often the crash was related to self-assembly. Self-assembly crashes involved bikes that were retrofitted with electric bike kits and electric bikes purchased online that required some assembly. It is anticipated that the increasing availability of higher quality models in store will reduce the frequency of this crash type.

In this study, the road/path surface was also a contributing factor in almost a quarter of crashes. While it is reasonable that some of these crashes may have been experienced by the

same rider on any bike type, it is possible that these crashes are electric bike specific. Frequently participants noted that the speed they were travelling on the impaired surface (e.g. wet, icy, potholes, cracked) may have contributed to their crash. The relationship between the road/path surface and travel speed of electric bike riders could not be established from the data collected in this study. There may be some concerns that a person with limited bike handling skills who is empowered by an electric bike to travel at higher speeds may encounter situations beyond their skill level. The role of increased travel speed is an important area for future research and would provide valuable insights into the correlation between higher travel speeds, bike handling skills and crash factors such as road/path surface.

5 CONCLUSIONS

Electric bikes provide a viable cycling option for many Australians who did not ride a pedal bicycle. Given the significant proportion of people who were previously non-cyclists who are now regularly cycling, we suggest that electric bikes will provide an important link in the increased participation of cycling in Australia. Electric bikes have provided some safety gains in terms of being able to move away from a potentially dangerous encounter and being able to keep pace with motorised traffic was considered important to many respondents in this study. However, electric bike do create additional safety concerns in terms of bike handling skills by inexperienced cyclists. It may be that cycling skills training either as point of sale or as part of additional training (e.g. AustCycle) could mitigate some of the crashes.

6 ACKNOWLEDGEMENTS

This research was supported under the Australian Research Council's Linkage Projects funding scheme (Project LP100200197) and conducted in conjunction with VicRoads, the Victorian Department of Transport, the Transport Accident Commission, the Royal Automobile Club of Victoria and the Federal Chamber of Automotive Industries. The views expressed herein are those of the authors and are not necessarily those of the Australian Research Council or any of the organisations associated with the project.

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