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Safety in numbers? Investigating Australian driver behaviour, knowledge and attitudes towards cyclists

Marilyn Johnson[a,b,c,*], Jennie Oxley[c], Stuart Newstead[c], Judith Charlton[c]

[a] Institute of Transport Studies, Department of Civil Engineering, Monash University, Clayton, Australia
[b] Amy Gillett Foundation, St Kilda, Melbourne, Australia
[c] Monash University Accident Research Centre, Monash Injury Research Institute, Clayton, Australia

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ABSTRACT

A key tenet of the safety in numbers theory is that as the number of people cycling increases, more drivers will also be cyclists and therefore will give greater consideration to cyclists when driving. We tested this theory in relation to self-reported behaviour, attitudes and knowledge in relation to cycling. An online survey was conducted of Australian drivers ($n = 1984$) who were also cyclists (cyclist-drivers) and drivers who did not cycle (drivers). Cyclist-drivers were 1.5 times more likely than drivers to report safe driving behaviours related to sharing the roads with cyclists (95% CI: 1.1–1.9, $p < 0.01$). Cyclist-drivers had better knowledge of the road rules related to cycling infrastructure than drivers; however knowledge of road rules related to bike lanes was low for both groups. Drivers were more likely than cyclist-drivers to have negative attitudes (e.g. cyclists are unpredictable and repeatedly overtaking cyclists is frustrating). Findings from this study highlight the need for increased education and awareness in relation to safe driving behaviour, road rules and attitudes towards cyclists. Specific recommendations are made for approaches to improve safety for cyclists.

1. Introduction

Cycling participation is increasing in Australia. From 2001 to 2010, adult cycling participation increased by 45 per cent (Department of Communications Information Technology and the Arts, 2011) and in 2011, 4 million Australians (18% of population) had ridden a bike in the previous week, while over a third of Australians (39.6% of population or 8.5 million people) had ridden a bike in the previous year (Australian Bicycle Council and Austroads, 2011). With increased participation, a 'safety in numbers effect' might be expected (Jacobsen, 2003; Elvik, 2009), however, in 2013, 48 cyclists were killed in Australia, an increase of 37 percent from the annual average for the previous decade (an annual average of 35 killed each year) (Bureau of Infrastructure Transport and Regional Economics, 2013). Further, there has been a substantial increase in the rate of age-standardised cyclist serious injury crashes (per 100,000 population: up 47% from 2000/01 to 2006/07) (Henley and Harrison, 2009).

One of the tenets of the safety in numbers theory is that when people are cyclists, when they drive they are more likely to give greater consideration to other cyclists when sharing the road (Jacobsen, 2003). Previous research has identified safer driving behaviour amongst road users who use multiple modes. For example, there is a lower likelihood of a crash between a car driver and a motorcycle if the driver also rides a motorcycle, what Crundall and colleagues called 'dual drivers', or had family or friends who rode motorcycles, and people who do not ride a motorcycle or know someone who does (Brooks and Guppy, 1990; Magazzù et al., 2006; Crundall et al., 2008). Greater understanding of cycling infrastructure has also been identified in drivers who are also bicycle riders compared to drivers who do not ride a bike (Monsere et al., 2013).

We tested this tenet by comparing the self-reported behaviour, attitudes and knowledge of people who were drivers and cycled (driver-cyclists) with people who were drivers but did not cycle (drivers).

1.1. Behaviour

Previous research by the authors identified that a common cyclist-driver interaction related to collisions and near-collisions is

* Corresponding author at: Institute of Transport Studies, Department of Civil Engineering, Monash University, Wellington Road, Clayton, Vic. 3168, Australia. Tel.: +61 3 9902 0353.
E-mail addresses: Marilyn.johnson@monash.edu (M. Johnson), Jennie.oxley@monash.edu.au (J. Oxley), Stuart.newstead@monash.edu.au (S. Newstead), Judith.charlton@monash.edu.au (J. Charlton).

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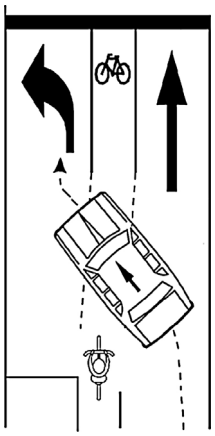

Fig. 1. Example of a driver turning left across the path of a cyclist.

when a driver turns left across the path of a cyclist (see Fig. 1). In two naturalistic cycling studies this driver behaviour was frequently observed in collision and near-collision events (Melbourne: 74%; Australian Capital Territory: 45%) (Johnson et al., 2010a,b; Johnson et al., in review). Due to the high frequency of this interaction, three component parts of this driver behaviour were analysed: (1) indicating (signalling) prior to turn; (2) head check; and (3) lateral clearance distance provided when overtaking cyclists.

1.1.1. Indicating (signalling) prior to turning

Inadequate indication time prior to turning is a contributing factor in cyclist-driver collisions and near-collisions (Rowe et al., 1995; National Coroners Information System, 2006; Johnson et al., 2010a,b). In Australia, drivers must give 'sufficient warning' prior to changing direction, however, the duration is not specified (Australian Transport Council, 1999). When a driver turns left without adequate indication, the cyclist may need to take evasive action to avoid the vehicle such as rapid braking or swerving, which may increase the cyclist's crash risk (Johnson et al., 2010a,b).

1.1.2. Head check

Drivers turning their head to check for other road users is an important part of safe turning practice (VicRoads, 2010). Head checks have been used as a proxy for looking behaviour (Herslund and Jørgensen, 2003) although it is not possible to differentiate between an observed head check, drivers who looked and drivers who or looked-but-failed-to-see (Australian Transport Safety Bureau, 2006).

1.1.3. Clearance distance

Inadequate clearance distance when overtaking cyclists increases collision risk (McCarthy and Gilbert, 1996). Observations of overtaking distance have reported wide variations by drivers, from four metres to no clearance (resulting in a collision) (Walker, 2007). Currently in Australia, the road rules do not specify the lateral clearance distance a driver must provide when overtaking a cyclist. Recommendations vary between jurisdictions and range from at least one metre (1 m) (VicRoads, 2010) to two metres in higher speed zones (over 70 km/h) (Department of Transport, 2010).

1.2. Knowledge

Painted white lines with bike symbols are increasingly being applied to roads across Australia. However, there is confusion, or potential disregard, by some drivers about the correct use. Knowledge about rules related to cycling-related infrastructure was explored, specifically in relation to bike lanes and bike boxes.

1.2.1. Bike lanes

Bike lanes are the most common cycling-related infrastructure in Australia. In the main, drivers must not travel in bike lanes, with some exceptions. Drivers are permitted to travel in a bike lane for up to 50 m to manoeuvre around a turning vehicle; and drivers can enter/cross a dashed bike lane.

1.2.2. Bike boxes

Bike boxes have been implemented in urban areas in Australia since the 1990s, however, there has been little promotion of the related rules. Bike boxes, also known as bicycle storage box, advanced stop line or head start area, are installed at some signalised intersections in urban areas. The intention of the bike box is to create a separate space for cyclists to wait during the red light phase, cyclists can enter the intersection first and gain their balance and momentum ahead of moving vehicles (Daff and Barton, 2005; Pucher et al., 2010). This positioning increases cyclists' conspicuity and driver awareness (McClintock and Cleary, 1996; Pucher et al., 2010). However, bike boxes are only effective if drivers stop before the bike box and leave the space clear for cyclists (Hunter, 2000; Newman, 2002; Allen et al., 2005; Johnson et al., 2010a,b; Dill et al., 2012).

1.3. Attitudes

Positive attitudes towards cyclists are most frequently associated with drivers who also cycle (Gatersleben and Uzzell, 2007). Driver attitudes influence driver behaviour towards cyclists (Miles and Johnson, 2003; Vanlaar et al., 2008) and consequently, cyclist safety (Aultman-Hall and Hall, 1998).

In Australia, negative attitudes of some drivers towards cyclists have been associated with poorer knowledge of road rules and lower tolerance of cyclists on the roads (Rissel et al., 2002). In the UK, drivers consider on-road cyclists with an 'impatient caution', considering cyclists to be unpredictable and feel uncomfortable sharing the road with cyclists, particularly when there are no cycling-related line markings on the road (Joshi et al., 2001; Basford et al., 2002).

The aim of this study was to test one tenet of Jacobsen's safety in number theory. The objectives were to: (1) identify the differences in behaviour, knowledge of cycling-related road rules and attitudes towards cyclists of Australian drivers who are also cyclists (cyclist-drivers) and Australian drivers who do not cycle (drivers); and (2) determine if there are associations between behaviour, knowledge and attitudes.

2. Methods

An online survey was conducted to investigate a range of driver and cyclist behaviours on the road. Study protocols were approved by the Monash University Human Research Ethics Committee. The survey was conducted from February to May 2010.

2.1. Participants

Participants were aged 18 years or older and participation was voluntary. The first survey page was an explanatory statement and consent was implied in the submission of the survey.

A convenience sample was used. The main recruitment method was online via several websites (Monash University webpage and intranet, Amy Gillett Foundation webpage and social network page). In addition, a snowball recruitment strategy was used, the

survey link was sent to participants from previous cycling studies at Monash University Accident Research Centre and they were invited to forward the link. The survey was also publicised during a radio interview.

2.2. Data analysis

Respondents were classified (cyclist-driver/driver) based on their response to: 'Do you ride a bicycle?' (Yes, I often ride my bike; Yes, I ride occasionally; No (you may or may not have ridden a bicycle as a child, but now you're an adult you do not ride a bicycle)). Respondents who self-identified as riding often were classified as *cyclist-drivers* and respondents who rode occasionally or who did not ride were classified as *drivers*. Six demographic characteristic variables were analysed: gender, age, marital status, work status, educational level and income. Only participants who held a current driver's licence were included in this analysis.

2.2.1. Behaviour

Three questions about self-reported driver behaviour were analysed: (1) time drivers indicated (signalled) prior to turning (5+ seconds was considered sufficient); (2) head check before turning left; and (3) distance provided when overtaking cyclists.

2.2.2. Knowledge

Four statements regarding knowledge of cycling-related road rules were analysed (correct response); When you are driving on a road with a white painted bike lane you can: (1) drive in the bike lane for 50 m to manoeuvre around other vehicles (true); (2) enter when the bike lane is a dashed line (true). When you are arrive as a driver at an intersection with a bicycle storage box can you: (3) Stop before the bike storage box, you need to keep it clear at all times (true); (4) stop in the bike storage box if you are turning left (false). The response categories for all four questions were: true, false, don't know.

2.2.3. Attitudes

A 5-point Likert scale (strongly disagree to strongly agree) was use to report attitudes to six statements: (1) most cyclists ride safely; (2) I think cyclists are unpredictable; (3) 1 feel comfortable driving with cyclist when there are no line markings for cyclists; (4) I feel comfortable driving with cyclists on the road when there are line markings for cyclists; (5) I am more cautious when there are cyclists on the road, and; (6) I feel frustrated when I have to keep passing the same cyclist.

Descriptive statistics were used to summarise demographic characteristics and responses to behaviour, knowledge and attitude questions. Differences between the two groups were controlled for in multivariate analyses. To determine whether there was a significant association between self-reported behaviours and respondents' knowledge and attitudes, additional binary logistic regressions models were constructed. A fourth model was constructed with all three behaviour responses aggregated (combined driver behaviour) where a correct response was only recorded if all three component behaviour responses were correct.

All statistical analyses were conducted using SPSS Version 21 (IBM Corp, 2012). Statistical significance was set at $p \leq 0.05$.

3. Results

In total, 1984 completed surveys were received and the majority were classified as cyclist-drivers (80.8%). This was considerably higher than the reported proportion of the population who ride (rode in previous week was 18% of the population) (Australian Bicycle Council and Austroads, 2011). The two groups were significantly different across all demographic characteristics (Table 1). The majority of respondents were male (67.2%). Males are overrepresented in cycling participation in Australia (64.4%) (Department of Communications Information Technology and the Arts, 2011) however, within the respondents classified as cyclist-drivers, a greater proportion was male (72.4%) than in the reported cycling population.

3.1. Behaviour

The majority of respondents reported that when driving they indicated for 5 s or more before turning and slightly more cyclist-drivers reported they head checked before turning left, however these effects were not statistically significant ($p > 0.05$). More cyclist-drivers were aware of the need to provide at least 1 m clearance when overtaking cyclists than drivers ($p < 0.01$) (Table 2).

Table 1
Summary of key demographic characteristics by respondent group (cyclist-driver/driver).

		Respondent group		
		Cyclist-driver ($n = 1604$)	Driver ($n = 380$)	Total ($n = 1984$)
Gender*	Female	27.6%	54.5%	32.8%
	Male	72.4%	45.5%	67.2%
Age*	18–29 years	14.7%	24.7%	16.6%
	30–49 years	59.7%	48.4%	57.5%
	50+ years	25.7%	26.8%	25.9%
Marital status*	Single/never married	19.7%	29.4%	21.5%
	Married/relationship	74.0%	62.4%	71.8%
	Other	6.3%	8.2%	6.7%
Work status*	Work full time	78.2%	65.9%	75.8%
	Work part time	9.7%	15.9%	10.9%
	Student	5.9%	11.6%	7.0%
	Not working/retired	6.2%	6.6%	6.3%
Education*	Secondary	7.7%	12.1%	8.5%
	Technical school or TAFE	12.5%	14.8%	12.9%
	University degree	51.1%	44.9%	49.9%
	Higher degree	28.8%	28.2%	28.7%
Income*	Less than $20,000	2.1%	4.2%	2.5%
	$20,000–$39,999	4.6%	5.0%	4.7%
	$40,000–$99,999	37.0%	47.9%	39.1%
	Over $100,000	56.3%	42.9%	53.7%
Cyclist crash involvement with a vehicle		45.4%	–	–

* Statistically significant difference between respondent groups, $p < 0.01$.

Table 2
Summary of behaviour, knowledge and attitudes by respondent group (cyclist-driver/driver).

	% respondents correct		
	Cyclist-driver	Driver	χ^2
Behaviours			
Indicate for 5 s or more before turning	88.8%	88.7%	0.003
Head check before turning left	69.3%	66.8%	0.840
Provide at least 1 m lateral clearance when overtaking cyclist	93.3%	85.3%	26.506*
Knowledge			
Drivers permitted to travel in bike lane for up to 50 m to manoeuvre around turning vehicle	25.9%	26.1%	0.005
Drivers can enter/cross a dashed bike lane	62.5%	62.4%	0.003
Drivers must keep bike box clear	92.5%	83.2%	31.416*
Drivers must keep bike box clear even if turning left	91.0%	79.5%	40.629*
Attitudes			
About cyclists:			
Most cyclists ride safely	81.0%	65.0%	46.064*
I think cyclists are unpredictable	19.1%	40.0%	75.178*
Comfortable driving with cyclists with:			
With on-road cycling-related line markings	91.5%	78.7%	51.260*
Without on-road cycling-related line markings	71.1%	45.0%	93.683*
When driving:			
More cautious when cyclists are on the road	92.3%	91.8%	0.780
Repeatedly overtaking cyclist is frustrating	13.2%	30.5%	67.351*

* Statistically significant difference between respondent groups, $p < 0.01$.

3.2. Knowledge

Only a quarter of respondents knew that drivers are permitted to drive in a bike lane for up to 50 m to manoeuvre around a vehicle, while almost two thirds knew that drivers may enter/cross a dashed bike lane. Differences were not statistical significant ($p > 0.05$). More cyclist-drivers were aware of the bike box rules than drivers and the differences were statistically significant.

3.3. Attitudes

More cyclist-drivers than drivers responded that most cyclists ride safely while more drivers than cyclist-drivers reported that cyclists were unpredictable (p's < 0.01). Significant group differences were identified in levels of comfort about sharing the road. With line markings: the majority of both groups were comfortable sharing the road with cyclists. Without line markings: fewer than half of the drivers agreed, while cyclist-drivers were more likely to agree. Both groups were more cautious when cyclists were on the road ($p > 0.05$). Repeated overtaking of cyclists was a source of frustration for a minority of respondents, however drivers were significantly more likely to be frustrated than cyclist-drivers (Table 2).

3.4. Associations between behaviour, knowledge and attitude

A series of binary logistic regression models were constructed to explore the association between behaviours and respondents' knowledge and attitude. Separate models were constructed for each of the three behaviours and a fourth model was constructed with an aggregated behaviour response (i.e. correct responses for all three behaviours). A summary of the regression models including all significant factors is presented in Table 3.

Analyses revealed significant associations between respondents' use of indicator before turning and two attitude statements. Respondents who were comfortable sharing the road with cyclists without cycling-related line markings were less likely to use indicators appropriately than respondents who were not comfortable on roads without this facility. Respondents who were cautious when sharing the road were more likely to use their indicators appropriately than respondents who reported they were not cautious. Head checking before turning left was significantly associated with being comfortable sharing the road without cycling-related line markings. Driver provision of 1 metre lateral clearance when overtaking cyclists was associated with knowledge that drivers could enter/cross a dashed bike lane.

Table 3
Driving behaviour – relative odds of knowledge and attitude responses in the model (statistically significant factors only).

	Predictive factors (stat. sig. only)	Adj. Rel. odds of correct/agree	95% C.I. for odds	Stat. sig.
Behaviour				
Indicate for 5 s or more before turning	Attitude: comfortable without cycling-related line markings			
	Yes vs No	0.673	0.477–0.949	0.02
	Attitude: cautious			
	Yes vs No	1.622	1.032–2.548	0.03
Head check before turning left	Attitude: comfortable without cycling-related line markings			
	Yes vs No	1.290	1.038–1.604	0.02
Provide at least 1 m lateral clearance when overtaking cyclist	Knowledge: dashed bike lane			
	Yes vs No	1.481	1.066–2.059	0.01
All behaviour	Attitude: repeatedly overtaking cyclists is frustrating			
	Yes vs No	0.751	0.584–0.966	0.02

For the model examining all three behaviours combined (aggregated behaviour variable compared to the ten attitudinal statements), one attitude response was found to be significantly associated with safe driving: respondents who were frustrated by having to repeatedly overtake cyclists were less likely than respondents who were not frustrated to report safe driving behaviour.

4. Discussion

Drivers who regularly cycle were more likely to self-report safer driving behaviour related to providing adequate distance when overtaking, bike boxes and attitudes towards cyclists compared to drivers who do not cycle. Results are comparable with other studies about driver behaviour (Jacobsen, 2003; Pucher and Buehler, 2008) and attitudes (Gatersleben and Appleton, 2007) and support the safety in numbers theory of a positive association between cycling participation and cyclist safety, in this instance, safe driving behaviour (Jacobsen, 2003; Pucher and Buehler, 2008; Elvik, 2009).

4.1. Behaviour

Safe driving practices directly impact the safety of cyclists on the road. Previous naturalistic cycling studies in Melbourne, Victoria and the Australian Capital Territory (ACT) reported that in near-collision events some drivers failed to adequately indicate their intention to turn (Melbourne: 33.3%; ACT: 4.4%) (Johnson et al., 2010a,b, in review). In this study, the majority of drivers reported appropriate use of indicators when turning, however a small proportion of respondents rarely or seldom indicated prior to turning and a few did not indicate at all if there was no other traffic. Adequate signalling is essential to ensure a cyclist has sufficient time to react safely. However, as for all road users, cyclists need to be mindful of drivers' blind spots and avoid positioning themselves in areas are vehicles where they may not be observed by drivers. Greater driver education, and potentially enforcement of penalties, may be required to address driver who do not give adequate indication, particularly if the lack of indication leads to a crash.

The findings that significant proportions of cyclists and drivers did not head check prior to turning left are consistent with previous research on drivers' looking behaviour and visual search strategies indicating that drivers are more focused on the direction of traffic from the direction of greater threat (i.e. in Australia, traffic from the right) (Summala et al., 1996; Summala and Räsänen, 2000). Research in Finland which showed that drivers' head check behaviour on approach to intersections increases when speed limits are lowered (Summala et al., 1996). Further research is needed to determine an effective countermeasure for Australian roads to increase driver left head check behaviour prior to turning, including lower speeds.

The majority of all respondents (91.8%) were aware of the recommendation to provide at least 1 m lateral clearance when overtaking cyclists. This awareness may have been related to *A Metre Matters* (Amy Gillett Foundation, 2009) a national education/awareness campaign by the Amy Gillett Foundation. However, it is not possible to determine the impact of this campaign on respondents' knowledge. Strategies are needed to ensure safe overtaking behaviour by drivers, including legislative change.

4.2. Knowledge

Knowledge of cycling-related road rules was mixed. The low proportion of respondents who were familiar with the road rules related to bike lanes is particular concern, given the extensive implementation of bike lanes in urban areas.

Drivers who are unaware of the rule may drive in the bike lane further than the 50 m, effectively using the bike lane as an additional vehicle lane and increasing cyclists' exposure to risk. While cyclists who are unaware of this rule may not anticipate drivers entering the bike lane.

In contrast, there was high awareness of the road rules related to crossing over dashed bike lanes. Arguably this is not surprising; given a dashed line is a standard indicator of being permitted to cross in the Australian road network. Greater integration of the existing language of the road when designing and implementing cycling facilities may further improve the intuitiveness of cycling-related infrastructure and potentially increase driver compliance.

Overall, respondents' knowledge of bike box rules was high. Bike boxes have been implemented in Australia since the 1990s (Daff and Barton, 2005) and while there are details about the road rules available on the government road authorities websites, the rules about interacting with cyclists within the space are not explicitly stated in drivers' licence handbooks (VicRoads, 2010) and there has been little public education on these rules. The high awareness bike box rules contradicts observed behaviour which has reported low driver compliance at bike boxes with driver encroaching on the bike box, even with cyclists' present (Johnson et al., 2010a,b). Recent research from the US reported that drivers who did not ride a bike attributed greater travel delays to the implementation of bike boxes (Monsere et al., 2013). It is likely that knowledge of these road rules does not necessarily translate to compliant behaviour (Hunter, 2000; Newman, 2002; Allen et al., 2005; Johnson et al., 2010a,b). Interventions that increase road users understanding of the safety implications of their behaviour, and potentially enforcement, may be needed to ensure shifts to safe driving behaviour.

4.3. Attitude

There were significant differences between cyclist-drivers and drivers for most of the attitude statements. This finding concurs with previous research that differentiated between drivers who cycled and drivers who did not cycle (Basford et al., 2002). Cyclist-drivers agreed that most cyclists ride safely and felt more comfortable sharing the road with cyclists while driving, with and without cycling-related line markings – which may be due to being more aware of the hazards on the road for a cyclist and so find cyclists' behaviour more predictable (Jacobsen, 2003). These findings confirm earlier research that positive attitudes towards cyclists are most frequently associated with drivers who are also cyclists (Gatersleben and Uzzell, 2007).

Drivers were more likely to agree with negative attitudinal questions including cyclists are unpredictable and repeated overtaking is frustrating. It is possible that there is an association between drivers' attitudes and their own lack of cycling experience and this may be addressed by increasing cycling participation and subsequently drivers' empathy with cyclists' perspective. However, it is important to recognise that not all drivers will want to, or be able to, ride a bicycle on the road. Therefore, it will be important to identify ways of raising awareness amongst all drivers about safe driving behaviours when sharing the road with cyclists, regardless of drivers' cycling status. Furthermore, it may be that cyclists' own unsafe and/or illegal behaviour may also contribute to drivers' attitudes.

Drivers reported that that they were frustrated by repeatedly overtaking cyclists. The association between frustration with repeatedly overtaking cyclists and drivers being less likely to practice safe driving behaviour when interacting with cyclists is of concern. While this association does not evidence a causal relationship between attitude and cyclist-driver crash occurrence, it is important that driver frustration is addressed. Intuitive cycling facilities that allow cyclists and drivers to travel in parallel and minimises pinch points that create competition for space between road users may contribute to reduced driver frustration.

In contrast, respondents who felt comfortable sharing the road without cycling-related line markings were more likely to head check before turning left. Curiously, this group were less likely to indicate before turning but engaged in head checking behaviour. The explanation for this apparent mismatch is not clear. An association was also shown between knowledge of the road rule related to the dashed bike lane and providing at least 1 m clearance when overtaking cyclists.

Behaviour change is one part of creating a safer cycling environment. Effective behaviour change strategies, with greater sophistication that just road rule education, are essential. Such programs would augment enforcement of road rules that target unsafe driver behaviour and improved road design.

4.4. Strengths and limitations

This study provides new insights about self-reported driving behaviours in relation to safely interacting with cyclists on the road. The survey provided an opportunity to explore the associations between behaviour, attitudes and knowledge. The findings may assist the development of behaviour change and cyclist awareness campaigns to increase cyclist safety.

Methodological limitations were primarily related to potential sampling bias. Given the lack of accurate data in Australia on the numbers of cyclists and profiles of cyclists, it is difficult to determine the representativeness of the study samples. Improved cyclist profile data is needed to ensure future data accurately represents the cycling and non-cycling populations. Other biases may also have limited the responses, namely response bias with respondents providing answers that present them in a better light than their actual behaviour (Warner, 1965) and recall bias, some respondents may not have been fully cognisant of their behaviour and this may influence their response (Coughlin, 1990; Tarrant and Manfredo, 1993).

5. Conclusions

Drivers who are also cyclists are more likely than drivers do not ride a bike to report positive attitudes towards cyclists. Given the increasing number of cyclists on the road and the continuing installation of cycling facilities it is important that accurate and timely information is provided to all road users to ensure a high appreciation of the importance of safe behaviour when sharing the road with cyclists.

Findings from this study underscore the need for driver education about adequate indication, head checks and provision of sufficient space when overtaking cyclists, as well as cycling related road rules. Understanding of and compliance with cyclist-related road rules may lead to increased predictability and potentially improved safety for all road users. Finally, bicycles need to be recognised as a legitimate mode of transport on the roads, not just in policy documents. Greater integration and acknowledgement of cyclists as road users is needed in the development of a safe cycling environment. Specifically this means that all levels of government responsibility for road design need to incorporate cyclists and cyclists' need for a safe space in all new road and retrofitting existing roads in the network.

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