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

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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

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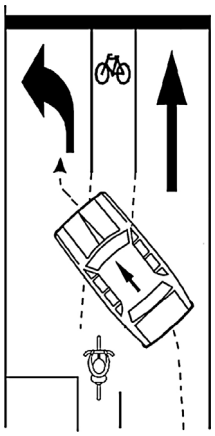

Fig. 1. Example of a driver turning left across the path of a cyclist.

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