Institution: University of Bath		
Unit of Assessment: A4 Psychology, Psychiatry and Neuroscience		
Title of case study: Improving the safety of cyclists		
Period when the underpinning research was undertaken: 2006-2014		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Dr Ian Walker	Senior Lecturer, previously Lecturer	September 2000 to present
Period when the claimed impact occurred: August 2013-2020		
Is this case study continued from a case study submitted in 2014? No		

1. Summary of the impact

Dr Walker's research on driver behaviour demonstrated that most of the variance in proximity (and therefore collision risk) between a cyclist and an overtaking motorist derives from factors outside the cyclist's control. This research directly led to an Australian charity lobbying for legal changes in that country, leading to all Australia's eight states and territories implementing the "A Metre Matters" law between 2014 and 2020. Government evaluations of these new laws let us estimate that they are saving 7 lives per year, preventing 260 serious injuries per year and benefiting the economy of Australia by over AUD34,000,000 per year due to these casualty reductions.

2. Underpinning research

In 2007, Dr Walker published the first of two major empirical studies, conducted at University of Bath, on what affects the safety margin when motorists pass bicyclists on roads. These studies took objective, *in vivo* measurements of driver behaviour, measuring the space drivers left when overtaking a bicyclist in real traffic – something that had not been done before [1-2, see also 3 for further analysis and theoretical expansion]. Theoretically, the studies were rooted in the psychology of stereotype activation, and looked for systematic variations in drivers' overtaking behaviours as a function of the rider's appearance and behaviour. The visual appearance of the rider was posited to lead to a rapid assessment from the approaching motorist, which would be influenced by any stereotypes or other such top-down influences already present in that driver. These studies revealed that driver behaviour indeed varied systematically as a function of how the rider looks or acts. For example, drivers tended to leave more space when passing female riders compared to male riders (a finding since replicated in the USA and Taiwan) and less space when bicyclists rode away from the edge of their lane or wore a helmet. The second study [2] showed that driver behaviour is not much changed by other key variables such as the rider's clothing (e.g., high-visibility jackets) or markers of the rider's experience. That study included a power analysis to show that the lack of any effect was unlikely to have been a result of under-sampling.

These studies collectively show that drivers respond to bicyclists' appearance in a way that can affect safety. Critically, however, the studies also showed that **bicyclists cannot do much about this phenomenon to make themselves safer**, and **the majority of variance in safety during overtaking manoeuvres lies in factors outside the bicyclists' control**. For example, Walker [1] found that 92% of variance in passing proximity remained

unexplained even after all the bicyclist's behaviours, such as lateral position on the road, had been included in the analysis. The studies therefore showed that action is needed from motorists and/or policy makers if safety is to be improved, rather than from the bicyclists. This development is important, as road safety policy up to this point had traditionally focused on encouraging vulnerable road users to be the ones to act (e.g., by wearing bright clothing or by riding on the "right" part of the road) rather than motorists.

3. References to the research

1. Walker, I 2007, 'Drivers overtaking bicyclists: Objective data on the effects of riding position, helmet use, vehicle type and apparent gender', *Accident Analysis and Prevention*, vol. 39, no. 2, pp. 417-425. https://doi.org/10.1016/j.aap.2006.08.010
2. Walker, I, Garrard, I & Jowitt, F 2014, 'The influence of a bicycle commuter's appearance on drivers' overtaking proximities: an on-road test of bicyclist stereotypes, high-visibility clothing and safety aids in the United Kingdom', *Accident Analysis and Prevention*, vol. 64, pp. 69-77. https://doi.org/10.1016/j.aap.2013.11.007
3. Robinson, D & Walker, I 2019, 'Bicycle helmet wearing is associated with closer overtaking by drivers: A response to Olivier and Walter, 2013', *Accident Analysis and Prevention*, vol. 123, pp. 107-113. https://doi.org/10.1016/j.aap.2018.11.015

The original 2007 study was funded by the EPSRC to Ian Walker (as sole investigator), University of Bath, Grant reference EP/D059593/1. GBP5,612, Feb – Aug 2006.

4. Details of the impact

Legal changes based on Dr Walker's research are saving around 7 lives each year in Australia, preventing around 260 more serious injuries, and saving the Australian economy more than AUD34,000,000 annually due to lives saved.

Dr Walker's research demonstrated empirically that the variance in safety during overtaking manoeuvres attributable to the rider's appearance or actions was far lower than the variance in safety associated with non-cyclist variables such as inter-driver differences and situational factors. In other words, Walker's work demonstrated for the first time that how a bicyclist looks or acts could only ever be a minor factor in determining their safety, and the behaviour of the overtaking driver, and their interaction with the physical environment, is far more important. As such, the research demonstrated that, above all, it is driver behaviour that needs to change to achieve greater safety. This insight directly informed policy changes, and also fed into public understanding of this road safety topic.

How the Impact occurred: The Amy Gillett Foundation

Walker's research has proved particularly important in Australia, which has taken the lead in legislating for bicyclist safety during overtakes. Australia had identified collisions during overtaking as a critical problem: at the time this research began in 2006, central government in Australia was reporting "the most common type of crash in which cyclists were fatally injured was the cyclist being hit from behind by a motor vehicle travelling in the same lane in the same direction" [E, p.2]. In 2008, Dr Walker's research was taken up by the Amy Gillett Foundation, a leading cycling safety organisation in Australia, driven by a core mission to reduce the death and injury of cyclists. The Amy Gillett Foundation describe Dr Walker's findings as "pivotal" [A, B], explicitly listing it as the starting point for their A Metre Matters campaign to address overtaking collisions for bicyclists [A, B]. "Dr Walker's finding about the variation in lateral clearance distance was the specific feature of the paper that provided insights to the campaign", they write in their evidence letter [B]. A member of the Foundation used the methods and findings from Walker's study as the basis for additional research in the Australian context that was published in 2011, and the combined

scientific data [A,B] allowed the Foundation to argue to government that it was specifically driver behaviour during overtakes that needed regulation if bicyclist safety was to be improved. In 2009 The Foundation's A Metre Matters campaign was launched by the CEO of the Amy Gillett Foundation, with the Australian Minister for Infrastructure and Transport, Anthony Albanese. Between 2010 and 2012 an education campaign was rolled out across Australia including billboards and advertisements. However, the campaign aimed to go beyond education, to instigate legal changes.

Influencing legal changes in Australia

As detailed on the Foundation's website [A], between 2014 and 2020 all of Australia's 8 states and territories trialled, and then adopted, laws specifying minimum passing clearances when overtaking a bicyclist, and in each case this was directly in response to the charity's lobbying [A]. The Amy Gillett Foundation lists that one of its missions is to continue to "promote actions to make cycling safer in Australia, including the A metre matters laws across Australia, to make sure drivers pass cyclists safely" [G]. The population of Australia potentially affected by this law can be estimated from the overall population of 25,000,000. Based on data from 2019, for cyclists aged 50 or over (the population with the lowest figures, thereby providing the **most conservative** estimate), at least 6% of Australians cycle on a weekly basis, 10% monthly and 17% yearly. This equates to at least 1,500,000 people who cycle weekly, 2,500,000 monthly and 4,250,000 yearly. On average 31.7% of cycling was for transport purposes, suggesting at least this proportion of cyclists are road-users. Using these extremely conservative figures, this would indicate that across the whole population, for the lifetime of legal changes that can be traced back to Dr Walker's research, the changes protect approximately 475,000 people weekly, 792,500 monthly and 1,347,250 yearly [H, p.9, 11]. In particular, considering the number of commuters, figures from 2016 indicate that there were a combined total of 75,807 commuters in Melbourne, Sydney, Brisbane, Perth, Adelaide, Darwin and Hobart, which suggests that there are at least this many commuters across Australia protected by the new laws [I].

Saving lives, reducing injury rate and benefitting the economy through the A Metre Matters law

In each state or territory, the new overtaking laws were first introduced from 2014 onwards on a trial basis and later made permanent once official trials demonstrated they were effective at changing behaviour, and thereby improving road safety (for example see [C] for the New South Wales evaluation of their passing law trial). As the states would not introduce permanent legal changes until convinced they would work to improve safety, these government trials provide powerful evidence for the efficacy and impact of these laws that were underpinned by Dr Walker's research. The government evaluation from New South Wales estimated, after analysing 5,979 behavioural observations, as well as police records, that minimum passing distances led to a 15% reduction in casualty crashes [C, p.7]. In the years preceding the laws, there was an average of 48 cyclist deaths per year in Australia [E, p.5]. The New South Wales data thereby allow us defensibly to estimate the laws derived from Dr Walker's research are saving around 7 lives each year across the country. We can also estimate that these laws are preventing approximately 260 more serious injuries [D – Note that Australia's public data only report deaths, not injuries, so this value is estimated using the UK death:serious-injury ratio for cyclists, which should be comparable]. Australia's statistical value of life is AUD4,900,000 [F], meaning that even in the crudest monetary terms, and only counting the deaths, the safety improvements arising from this law are worth more than AUD34,000,000 to the Australian economy each year.

5. Sources to corroborate the impact

A. Amy Gillett Foundation "A Metre Matters" timeline (accessed 18 January 2021). https://www.amygillett.org.au/a-metre-matters

B. Letter from the Amy Gillett Foundation, 12 April 2017 explaining their use of Dr Walker's research as the starting point for their research and campaigning programme.

C. New South Wales government (2018). Trial of the Minimum Passing Distance Rule for drivers passing cyclists: Summary of findings. https://roadsafety.transport.nsw.gov.au/downloads/mpd-trial-summary.pdf

D. UK data (which are broadly representative for western countries) for 2018 show 37 serious pedal cycle injuries for each death. https://roadtraffic.dft.gov.uk/custom-downloads/road-accidents

E. Australian Transport Safety Bureau (2006). *Deaths of Cyclists due to Road Crashes.* https://www.infrastructure.gov.au/roads/safety/publications/2006/pdf/death_cyclists_road.pdf

F. Australian Government (2019). *Best Practice Regulation Guidance Note Value of Statistical Life.* https://www.pmc.gov.au/sites/default/files/publications/value-of-statistical-life-guidance-note_0_0.pdf

G: Amy Gillett Foundation "About Us" (accessed 18 January 2021). https://www.amygillett.org.au/homepage/about-us

H: Austroads (2019). Australian Cycling Participation: Results of the 2019 National Cycling Participation Survey. https://www.cycle-helmets.com/ncp-2019.pdf

I: Statista (2016). Number of bicycle riders commuting to work across Australia in 2016, by metropolitan area. https://www.statista.com/statistics/947237/australia-number-of-cyclists-by-metropolitan-area/