



Full length article

Near miss experiences of transport and recreational cyclists in New South Wales, Australia. Findings from a prospective cohort study



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ABSTRACT

This paper investigates events in which cyclists perceive a cycling crash is narrowly avoided (henceforth, a near miss). A cohort of 2038 adult transport and recreational cyclists from New South Wales (Australia) provided self-reported prospectively collected data from cycling diaries to allow the calculation of an exposure-based rate of near misses and investigation of near miss circumstances. During 25,971 days of cycling, 3437 near misses were reported. For a given time cycling, cyclists who rode mainly for transport (compared with those who rode mainly for recreation), and cyclists with less experience (compared to those with more experience) were more likely to report a near miss; older cyclists (60+ years) were less likely to report a near miss than younger cyclists (25–59 years). Where type of near miss was recorded, 72.0% involved motor vehicles, 10.9% involved pedestrians and 6.9% involved other cyclists. Results indicate some similarities between near misses and crashes reported by this cohort during the same reporting period. A bias toward reporting near misses with motor vehicles was suggested, which likely reflects cyclists' perceptions that crashes involving motor vehicles are particularly serious, and highlights their impact on perceived safety. Given the relative rarity of crashes, and the limited breadth and depth of administrative data, collection of near miss data may contribute to our understanding of cycling safety by increasing the volume and detail of information available for analysis. Addressing the causes of near misses may offer an opportunity to improve both perceived and actual safety for cyclists.

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1. Introduction

Australia, like many other nations, has policies to support and increase cycling participation. Despite this however, the proportion of the population that participates in cycling remains low. The most recent national cycling participation survey (2105) found that 17.4% of Australians reported participating in cycling over the previous week (Munro 2015); with the most often cited purpose for cycling being recreation (Munro 2015). National census data on methods of travel to work in 2011 indicate that only 1% of employed persons aged 15 years and over travelled to work by bicycle (Australian Bureau of Statistics, 2011).

Research has found a range of barriers to cycling, including distance to destination, weather and topography, lack of bicycle

infrastructure, and attitudes and perceptions of comfort (Dill and Voros 2007; Parkin et al., 2008; King et al., 2010). Fear of traffic is also a frequently identified barrier to cycling (for example, Jacobsen et al. 2009). A random survey of 1000 adults in Australia found that road traffic conditions and safety issues were the most commonly identified deterrents to transport cycling (Cycling Promotion Fund and the Heart Foundation, 2011). Similar results were found in focus group research in Brisbane (Australia), with safety being a major deterrent to using a public bicycle scheme for both infrequent and regular cyclists (Fishman et al., 2012). A national survey of Australian adults found that 12.7% considered "road safety issues/hazardous" and 4.9% "concerned about personal safety" to be reasons for not cycling to work or full time study (Australian Bureau of Statistics, 2012). Research elsewhere also identifies perceived risk as a reason for people's reluctance to ride bicycles. For example, a population-based random sample of current and potential cyclists in Metro Vancouver, Canada, found that concerns about safety and interactions with motor vehicles were among those factors with the most influence on the likelihood of cycling (Winters

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et al., 2011); perceptions of too much traffic and no nearby safe places to bike were also barriers to cycling, and to cycling more, in a survey of a random sample of adults in the Portland, Oregon metropolitan region (Dill and Voros 2007).

Evidence suggests that near miss events (where a crash is narrowly avoided) are frequent and have an impact on perceived traffic risk. A study of cyclists in the San Francisco Bay Area, USA, found that 86% of those who rode a bicycle at least annually had experienced some type of near miss (Sanders 2015). Further, the study found that respondents' experiences with not only collisions, but also near misses, were significantly related to perceptions of traffic risk, prompting the call for a better understanding of the dynamics of both (Sanders 2015). A small study of cyclists in Oxford, UK, examined all reported incidents or near misses (defined as those that required the cyclist to take avoiding action or that caused worry or annoyance) over a one-week period (Joshi et al., 2001). Cyclists recorded an average rate of 0.7 incidents per day cycled, being on average about an incident every 5.59 miles, with cyclists perceiving their risk of incidents to be 7.45 times greater than that of motorised road users (Joshi et al., 2001). A more recent, larger national study of cyclists in the UK found that frightening or annoying non-injury incidents were an everyday experience for most cyclists in the UK (Aldred and Crossweller 2015). Incidents with motor vehicles, especially those involving large vehicles, were reported to be the most frightening for cyclists. Using data from several different sources, the authors estimated that near miss/non-injury events for a regular UK commuting cyclist riding 2500 miles per year are many times more frequent than events causing injury or death (with the approximate incident rates given ranging from 450 per year for any near miss/non-injury incident, to 0.05 per year for any injury (reported or not), to 0.0025 for reported serious injury, and to 0.000125 per year for death). They concluded that preventing near misses was valuable both for injury reduction (by paying attention to events which are more likely to lead to injury) and for improving the experience of cycling (Aldred and Crossweller 2015).

The concept of “critical incident”, “near miss”, “near accident” or “unsafe acts” event analysis as an approach to inform safety, including transport safety, has been applied for many years across many domains (Forbes 1957; Hydén 1987; Reason 1991). Yet, as observed by Reason (1991), the ratios between the different incident outcome types (fatal crash, injury crash, no-injury crash, and near misses) are typically not known, and this is true for cycling. In developing the objectives and study design for the Safer Cycling Study, the authors identified gaps in the then available literature on cycling risks, including the need to understand better cyclist crash rates (injury and no-injury), as well as near misses (Poulos et al., 2012).

This paper seeks to add to the knowledge base about cyclist near misses, by reporting on the near miss experience of a large cohort of adult cyclists in New South Wales (NSW), Australia. Specifically, it aims to provide an exposure-based rate of near misses which may be compared with crash rates from the same cohort over the same period (Poulos et al., 2015a), and to explore the role of personal characteristics and circumstances associated with cycling near misses.

2. Methods

2.1. Study design

The Safer Cycling Study is a prospective study of adult cyclists (aged 18 years and older) who resided in NSW, and rode a bicycle at least once per month. The study recruitment utilised the extensive email lists of a state cycling advocacy organisation, social

media sites, community cycling events, bicycle shops, media publicity, and word of mouth within the cycling community. Enrolment occurred between March and November 2011. Participants completed a baseline questionnaire, followed by six cycling diaries each of seven consecutive days commencing within weeks 8, 16, 24, 32, 40 and 48 from the date of the baseline questionnaire. Cyclists entered data via a secure website on a daily basis, or kept a record of daily travel on a 7-day version of the diary (downloadable PDF file) and entered their data at the end of the week. The details of the study protocol are provided elsewhere (Poulos et al., 2012). The study was approved by the University of New South Wales Human Research Ethics Committee.

2.2. Questionnaires

The baseline questionnaire collected data such as cyclist demographic characteristics (e.g. gender, age), self-reported cycling experience (novice, intermediate, experienced, advanced, or expert/professional), and self-identification of cyclist type (as a “mainly transport” or “mainly recreational”). Weekly cycling diaries included daily reports of distance travelled, minutes spent cycling, the proportion of cycling time spent in specified time periods (00:00–6:00, 6:00–10:00, 10:00–15:00, 15:00–19:00, 19:00–24:00 h), crashes, crash-related injuries, and near misses. Specifically, participants were asked to report how many near misses they had experienced on the day, and, for their three most serious near misses of the day, to classify each near miss by type (i.e. whether the near miss was associated with a motor vehicle, another bicycle, a pedestrian, an animal, a stationary object, an uneven or slippery surface, or other) and the infrastructure involved. For the near miss identified by the participant as the most serious of the day only, participants were asked to report further features of the near-miss, such as further details about near miss type (description of vehicle, animal, object or surface concerned), the manoeuvre involved, the time of occurrence, and where another road user was involved, to attribute fault for the event (to themselves, to the other road user, to both parties, or to neither party). Cyclists were also provided with an open text box to describe the circumstances surrounding their most serious near miss of the day.

Cyclists contributed daily exposure, crash and near miss data to the study with each diary day reported. Diary days in which cyclists either indicated they did not cycle, or did not enter any data, were assumed to be days of no cycling exposure.

2.3. Definitions

We defined a near miss as “an unexpected event while cycling that causes you or another party to take sudden evasive action, and without such action a crash (collision or fall) would have happened.” This definition reflects features of definitions of traffic conflict (Amundsen and Hydén, 1977) and near crashes (Guo et al., 2010) used elsewhere.

A crash was defined as either a collision or fall, based on the definitions given in the review by Reynolds et al. (2009).

The infrastructure was defined as one of six types: a pedestrian footpath being a sealed or unsealed path for pedestrian use; a shared path being a path that is off the road and is signed or marked for use as a shared path for bicycles and pedestrians; a bicycle path being a path that is signed or marked for use by bicycles only, including paths that are not on the road, and paths that are on the road but separated by a curb or other physical barrier; a bicycle lane being an on-road lane that is signed or marked with painted lines or a coloured surface for use by bicycles; a road that is shared with motor vehicles and does not have a signed or marked

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