How much space to vehicles provide when passing cyclists? The impact of vehicle type and road infrastructure

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Abstract

To reduce cyclist crashes and related injury, and improve the infrastructure provided to cyclists, there is a need to greater understand the distance vehicles provide when passing cyclists. To address this, we conducted an on-road observational study using a purpose-built device mounted on participants' bicycles. Sixty-three participants recorded 18,246 passing events, of which 6% were closer than one metre. Compared to roads with no marked bicycle lane and no parked cars, passing events in which the cyclist was riding in a marked bicycle lane next to parked cars resulted in passing distances that were 0.41m closer.

Background

Cycling-related injury rates are on the rise, with a more than doubling of the number of seriously injured cyclists in Victoria over a 9-year period (Beck et al. 2017). A large number of these on-road crashes involve interactions with motor vehicles (Teschke et al. 2012, Boufous et al. 2013, Yilmaz et al. 2013, Beck et al. 2016). In addition, motor vehicles driving too close to cyclists heightens subjective risk and creates a barrier to cycling participation (Heesch et al. 2011). In order to reduce cyclist crashes and related injury and inform the development of infrastructure that provides a safe environment for cyclists, there is a need to greater understand distances that vehicles provide when passing cyclists and the impact that road infrastructure has on this passing distance. This study aimed to quantify passing distance and assess whether passing distance is affected by specific types of road infrastructure.

Methods

An on-road observational study was conducted in Victoria. Victoria and the Northern Territory are the only Australian jurisdictions yet to amend the road rules to legislate a minimum passing distance. Volunteer participants, recruited using a convenience sample, recorded all cycling trips over a one to two-week period. Participants' bicycles were fitted with a purpose-built and independently calibrated device to measure lateral passing distance of all motor vehicles, a video camera and a GPS datalogger. For each passing event, road infrastructure (presence of marked on-road bicycle lane, intersection-related, etc) was classified using the Cycling Aspects of Austroads Guides (Austroads 2017) and the vehicle type was noted. Multi-level mixed-effects regression was used to investigate the effect of these factors on passing distance.

Results

Sixty-three participants recorded 18,246 passing events. Of these, 6% (n=1,084) were close passing events (closer than one metre). Results from the mixed-effects model demonstrated that factors associated with reduced passing distance included: the vehicle type being a taxi, four-wheel drive, or bus, relative to a sedan; passing events occurring in intersections, relative to mid-block; and the presence of a marked bicycle lane, relative to no bicycle lane. Specifically, compared to roads with no marked bicycle lane and no parked cars, passing events in which the cyclist was riding in a marked bicycle lane next to parked cars resulted in passing distances that were 0.41m closer.

Conclusions

These findings demonstrate that road infrastructure and design can have significant effects on passing distances. Globally, these data can be used to inform the selection and design of cycling-related infrastructure with the aim of improving safety for cyclists.

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