



Free-Floating Bikeshare and Helmet Use in Seattle, WA

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Abstract

Wearing a helmet when bicycling prevents traumatic brain injury in the event of a crash. Most cyclists nationwide use helmets when riding. However, the growth of free-floating bike sharing systems, which offer short-term access to bicycles but not helmets, may erode helmet-wearing norms among cyclists. We counted cyclists over several hours at four locations in Seattle, WA. We categorized each rider according to whether he or she was wearing a helmet and to whether or not he or she was riding a bike share bike. Whereas 91% of riders of private bikes wore helmets, only 20% of bike share riders wore helmets. Moreover, in locations where a greater proportion of riders were on bike share bikes, fewer riders of private bicycles wore helmets ($r = -0.96$, $p = 0.04$). The impact of bike sharing programs on helmet wearing norms among private bike riders warrants further exploration.

Keywords Helmet · Injury prevention · Bicycling · Free-floating bike share

Introduction

The bicycle helmet is an inexpensive and widely available technology that prevents traumatic brain injury among bicyclists involved in collisions or falls [1, 2]. Recently, many cities have launched bike sharing programs in which operators make bicycles available for immediate short-term rental throughout the city [3]. Bike share riders rarely wear helmets [4–7], though whether this affects population incidence of head injury remains an area of active research [8, 9].

An increasing number of bike share programs support “dockless” or “free-floating” use [10], wherein bikes can be locked in place rather than returned to a dock when the ride is complete. Such free-floating programs may further discourage helmet use among riders, both because the ubiquity of bikes throughout a city [11] may encourage unplanned use

and because lack of docking stations precludes provisions to offer helmets at stations.

From a community health perspective, these programs may affect head injury risk in two ways. First, riders who choose not to wear helmets and subsequently crash may be at greater risk. Less often considered is the risk that lack of helmet use by share riders may change descriptive helmet-wearing norms such that private bike riders also wear helmets less often [12, 13].

Seattle, Washington recently launched North America’s first dockless bike sharing program. We assessed helmet use in relation to bike share use among cyclists riding at four locations in Seattle in July 2018.

Methods

Seattle is a mid-sized city in the Pacific Northwest region of the United States with an infrequently enforced law requiring all cyclists to wear helmets [14]. As of July 2018, approximately 10,000 bicycles, all easily identified visually, were available from three bike share operating companies [15]. These bicycles were all ‘free-floating’—that is, they could be locked in place anywhere in the city after use. No operating company provided helmets with bicycles.

We selected four locations (the Fremont Bridge, the Burke-Gilman Trail, Broadway Bike Lane, and NW 58th

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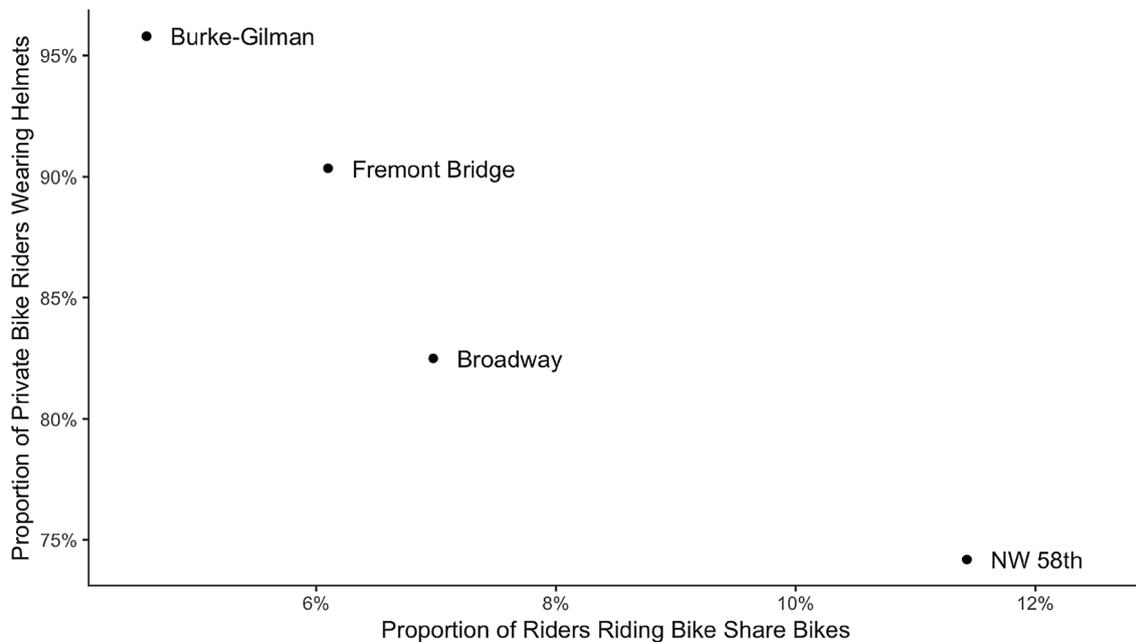


Fig. 1 Relationship between the proportion of riders riding bikeshare bikes at each location and the proportion of private bike riders wearing helmets at that location

Street at 22nd Ave NW) where the City of Seattle has counted cyclists using automatic counters since at least 2014. Facilities for bicycling varied across the four locations: the Fremont bridge has a sidewalk dedicated to cyclist and pedestrian use, the Burke-Gilman Trail is a multi-use trail fully separated from motor vehicle access, the Broadway bike lane is a two-way on-street lane separated from traffic by parking, and NW 58th Street is a residential street designated as a bike boulevard but without separate facilities for cyclists. At each location, teams of four observers counted cyclists over the course of 4 h midday on Wednesday, July 18, 2018. For each cyclist passing each location, observers recorded the time, whether the cyclist was riding a share bike, and whether he or she was wearing a helmet.

In August 2018, we cross-tabulated helmet use and bikes use at each location and used a Chi square test to assess significance of association. To assess impacts of bike share on helmet norms, we compared the proportion of bike share users in a given location to the proportion of private bike users wearing helmets. We used R for MacOS version 3.4.3 (Vienna, Austria) for all analyses.

Results

We observed a total 1011 cyclists in the four locations: 541 on the Fremont Bridge, 35 on NW 58th Street, 86 on Broadway, and 349 on the Burke Gilman Trail. All in-person counts were within one standard deviation of average hourly

automated counts for each location for 10:00 am–3:00 pm on Wednesdays in July in the previous 4 years. The proportion of riders riding share bikes ranged from 5% on the Burke-Gilman Trail to 11% on NW 58th Street. Helmet use was most common on the Burke-Gilman (96%) and least common on NW 58th Street (74%).

Of the 952 (94%) cyclists riding private bikes, 867 (91%) wore helmets, whereas of the 59 cyclists riding share bikes, only 12 (20%) wore helmets (chi-squared $p < 0.01$). In locations where bike share riders were more common, private bike riders wore helmets less often (Fig. 1, $r = -0.96$, $p = 0.04$).

Discussion

In a field study of helmet use among cyclists at four locations in Seattle, WA, we found that 91% of people riding private bikes wore helmets whereas only 20% of bike share riders did. Locations with more bike share riders had lower proportions of private bike riders wearing helmets. In contrast with prior study of the relation between bike facility and helmet use [5], we observed *more* helmet use at locations where cyclists were more protected from traffic.

Our finding that 20% of bike share riders wore helmets is consistent with the 15% observed in New York, NY [4], but somewhat lower than the 39% observed in Boston, MA [16] and much lower than the 64% observed in Vancouver, BC [5]. Vancouver may be the best direct comparison for Seattle

because the two cities are in the same region, are of similar size, have similar urban forms, and each have laws requiring adults to wear helmets when riding bicycles. The much higher helmet usage observed in Vancouver may be because Vancouver's system, Mobi, offers helmets with share bikes whereas Seattle's systems do not.

Our results are subject to several limitations. First, we only observed bikes for a limited period of time on a single day. While prior work suggests the middle of the day captures the mean proportion of riders wearing helmets [5], further research on time-of-day and day-of-week variation in injury risk factors is warranted. Second, location-specific variation in trip purpose (e.g. if there were more commuters in some locations than others, and commuters wear helmets more often than casual riders and ride bike share bikes less often) could account for the correlation between bike share use and private bike helmet wearing.

Future research should investigate potential impacts of bike share use on helmet-wearing norms and incorporate injury prevalence, severity, and outcomes among bike share and private bike users.

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Compliance with Ethical Standards

Conflict of interest The authors have no conflicts of interest to declare.

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