



June 24, 2014

Dr. Mary Northridge
Editor-in-Chief
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Dear Dr. Northridge

We are writing to submit the following as a Letter to the Editor about the recently published article by Graves et al. "Public bicycle share programs and head injuries".

You may know that the first of us (Kay) has already commented on aspects of this paper in social media and via various news outlets, as well as to the authors of the paper itself, because of concerns that incorrect information was spreading in the transportation world and could set before more traditional academic responses would be made. We hope this does not disqualify this much more normal means of academic communication.

Here we comment on some of the simple matters that reached the popular press, as well as subtler ones more suitable to an academic audience. We hope we have also provided some useful data on bicycling in the study cities.

Yours sincerely

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Graves *et al.*¹ examine injuries in cities with and without public bike share programs (PBSP). Their results were widely reported, with errors that arose in part from the paper itself.

Injury *numbers* are listed in Table 2, but not discussed. In PBSP cities, injuries of all types declined after implementation; head injuries fell 14% and non-head injuries fell 38%. Initial media reports announced that head injuries rose.²

The authors did not calculate injury *risk*, i.e., *incidence rate* (number of injuries divided by the at-risk population – bicyclists), but draw conclusions about it. National survey data on bicycling to work^{3,4} (often used as a surrogate for all bicycling; see table below) show that cycling consistently increased in the PBSP cities, suggesting that head injury *risk* dropped even more than head injury *numbers*. The opposite, increased risk, was reported.^{1,5}

	Proportion of Commuters Who Travel by Bicycle†		% Change in Bicycle Commuting
	Pre-implementation	Post-Implementation	
PBSP Cities*			
Montreal	2.4%	3.2%	+33%
Washington DC	2.3%	3.2%	+39%
Minneapolis	3.5%	4.5%	+30%
Boston	1.6%	2.0%	+29%
Control Cities			
Vancouver	3.7%	4.4%	+19%
Seattle	3.6%	4.1%	+14%
New York	0.6%	0.8%	+33%
Milwaukee	0.75%	0.9%	+13%
Los Angeles	0.95%	1.0%	+11%

† American cities, data from pre- and post-implementation years; Canadian cities, from census years 2006 and 2011

* Data not available for Miami Beach

The authors focused on *head injuries as a proportion of all injuries*, but do not indicate why. In helmet research,⁶ non-head injuries are often assumed to track with bicycling and used as a surrogate denominator; changes in head injuries relative to non-head injuries are assumed to indicate a change in head injury risk.⁵ The data above show this assumption is not valid here, since non-head injuries declined while bicycling increased.

The authors' postulate that *head injuries as a proportion of all injuries* increased in PBSP cities because fewer PBSP users than private bike users wear helmets, but the data do not support this explanation. Children <15 are not allowed to join the study city PBSPs. The head injury proportion rose more in children (37.1% to 49.5%) than in older ages (43.5% to 49.3%), thus unhelmeted riding on PBSP bicycles is highly unlikely to explain the increase. An alternate explanation is reduced injury severity. The head injury proportion in this study was extraordinarily high (36-50%¹ vs. 20-30% elsewhere^{7,8}) suggesting that head injuries are preferentially transported to Level I and II trauma centers (Trauma Registry data source). If injury severity declined in PBSP cities, mild head injuries may still have been preferentially transported. The data support this possibility: moderate to severe head injuries fell 27% in PBSP cities, while mild injuries remained stable.

In sum, study¹ data indicate declines in non-head injuries, head injuries, and head injury severity, and suggest declines in non-head and head injury risk in PBSP cities; whether PBSP is the source of these positive developments remains speculation.

1. Graves JM, Pless B, Moore L, Nathens AB, Hunte G, Rivara FP. Public bicycle share programs and head injuries. *Am J Public Health* 2014(0):e1-e6.
2. Bernstein L. Original title “Cities with bike share programs see rise in cyclist head injuries” changed to “Proportion of head injuries rises in cities with bike share programs”. <http://www.washingtonpost.com/news/to-your-health/wp/2014/06/12/cities-with-bike-share-programs-see-rise-in-cyclist-head-injuries/>
3. US Census Bureau. American Community Survey. <https://www.census.gov/acs/www/>
4. Statistics Canada. National Household Survey. <http://www12.statcan.gc.ca/nhs-enm/2011/as-sa/fogs-spg/Pages/CSDSelector.cfm?lang=E&level=4#PR59>
5. Hensley S. “Head injury risk rose in cities after bike-sharing rolled out”. <http://www.npr.org/blogs/health/2014/06/12/321332737/brain-injuries-rose-in-cities-where-bike-sharing-rolled-out>
6. Olivier J, Walter SR, Grzebieta RH. Long term bicycle related head injury trends for New South Wales, Australia following mandatory helmet legislation. *Accid Anal Prev* 2013;50:1128-34
7. Thompson DC, Rivara FP, Thompson RS. Effectiveness of bicycle safety helmets in preventing head injuries. *JAMA* 1996;276:1968-1973
8. Dennis J1, Ramsay T, Turgeon AF, Zarychanski R. Helmet legislation and admissions to hospital for cycling related head injuries in Canadian provinces and territories: interrupted time series analysis. *BMJ* 2013;346:f2674