



Bike Lane Obstructions in Manhattan, New York City: Implications for Bicyclist Safety

Corey H. Basch¹ · Danna Ethan² · Charles E. Basch³

Published online: 12 December 2018
© Springer Science+Business Media, LLC, part of Springer Nature 2018

Abstract

Over the past 5 years, the number of regular cyclists in New York City (NYC) increased by ~140,000 to over 800,000 regular riders. Aiming to promote safe cycling, NYC has developed over 1000 miles of planned commuting and recreational bike paths across its five boroughs. Bike lane obstructions pose a safety risk to cyclists but the extent of such obstructions is unknown. The purpose of this cross-sectional study was to document the frequency and rate of obstructions in protected bike lanes throughout Manhattan, NYC. During the fall of 2018, bicycle obstructions were observed in ten zones of Manhattan, NYC. Three kinds of obstructions within the bicycle lanes were coded: object, pedestrian, and vehicle. A total of 233 obstructions in the protected bike lanes were observed in this study. Obstructions per zone ranged from 11 to 39. The most common type of obstruction was objects, which accounted for 53.2% (n = 124) of obstructions and ranged through zones from 2 to 22. People were the second most common obstruction, which accounted for 28.3% (n = 66) of the obstructions, with a range of 1–22. Vehicles accounted for the remaining 18.5% (n = 43) of the obstructions with a range of 1–9 throughout zones. Findings of this study indicate that, even in “protected” lanes, bikers may be forced into traffic or to approach parked cars, increasing the risk of being “doored.”

Keywords Bicycling · New York City · Obstructions · Bike lanes

Introduction

Over the past 5 years, the number of regular cyclists in New York City (NYC) increased by ~140,000 to over 800,000 regular riders [1]. Roughly one-quarter of adult New Yorkers (1.6 million) cycled at least once in the last year, and there are more than 460,000 trips taken each day [1]. Compared with similar urban centers, NYC has experienced almost twice the growth of cyclists commuting to work (70% growth versus 37%) [1]. In 2013, the introduction of Citi Bike (the City’s bike share program) has contributed to this surge in cycling, with 12,000 bikes and 750 docking stations available for public use across 60 NYC neighborhoods [2].

Aiming to promote safe cycling, NYC has developed over 1000 miles of planned commuting and recreational bike paths across its five boroughs [3]. This expansion in recent years highlights the City’s agenda to increase access to bicycles across the City, to reduce traffic congestion, and to help ensure the safety of cyclists sharing the road with vehicles [3]. Other benefits include physical activity, reduced environmental pollution, and community well-being [3].

The City has implemented several measures to promote bike safety, including a 2018 pilot program (in 50 intersections) that permits cyclists to follow pedestrian “head start” signals and proceed 7–11 s before vehicles as traffic lights change from red to green [4]. Several laws are in place that cyclists must follow such as riding with traffic, stopping at red lights and stop signs, traveling on marked bike paths and lanes where available, wearing only one ear phone of an audio device, and using streets versus sidewalks (teens and older) [5]. Although not a law, bike helmet use is encouraged by the NYC government, which provides helmet giveaways and fittings across the city. A safety pledge is provided through the City Government’s website, and safety recommendations are encouraged through a handbook and

✉ Corey H. Basch
baschc@wpunj.edu

¹ Department of Public Health, William Paterson University, University Hall 366, Wayne, NJ 07470, USA

² Department of Health Sciences, Lehman College, The City University of New York, Bronx, NY 10468, USA

³ Health and Behavior Studies, Teachers College, Columbia University, New York, NY 10027, USA

safety campaign featuring celebrities [6, 7]. These measures reflect a larger, nationwide initiative, *Vision Zero*, that aims to increase equitable and safe travel and eliminate travel-related injuries and deaths [8]. NYC's participation in this program has demonstrated progress, nevertheless the goal has not been fully met, as evidenced by over 4,800 bicycle crash-related injuries and 25 deaths in 2017 [9].

Bike safety initiatives are not new in NYC. City agencies have collaborated to improve street safety and to increase helmet use [10]. Helmets are beneficial as they reduce head and facial injuries [11]. Unfortunately, cyclists in NYC have been shown to have low rates of helmet use, particularly among rental bike [12] and Citi Bike [13, 14] users. Research on safety in NYC has been conducted in various ways [15, 16], and actions have been implemented as part of NYC's Bike Smart initiative [17]. Despite these positive efforts, an aspect of bike safety that has received little research is obstructions in bike lanes.

Obstructions in bike lanes can result in bicyclists having to veer into traffic, increasing safety risk. Although Citi Bikes have been deemed quite safe [18], a Citi Bike user who veered around a car was killed after becoming wedged between a bus and a parked car [19, 20], and more recently, a cyclist veered around an illegally parked car in a bike lane and was killed by a passing sanitation truck [21]. Bike lane obstructions pose a safety risk to cyclists but the extent of such obstructions is unknown. The purpose of this study was, therefore, to document the frequency and rate of obstructions in protected bike lanes throughout Manhattan, NYC.

Methods

The research design was cross-sectional. During the fall of 2018, one researcher (CHB) observed bicycle obstructions in ten zones of Manhattan, NYC, created in a prior study [22]: Zone 1: Uptown East—above 96th Street; Zone 2: Uptown West—above 96th Street; Zone 3: Midtown East—between 34th Street and 59th Street; Zone 4: Midtown West—between 34th Street and 59th Street; Zone 5: Between Midtown and Downtown East between 34th Street and 14th Street; Zone 6: Between Midtown and Downtown West 34th Street and 14th Street; Zone 7: Downtown West Below 14th Street; Zone 8: Downtown East Below 14th Street; Zone 9: Between Midtown and Uptown West between 59th Street and 96th Street; Zone 10: Between Midtown and Uptown East between 59th Street and 96th Street.

There are several types of bike lanes in Manhattan, including conventional bike lanes, shared bike lanes, and protected bike lanes with access points. Demarcated by signage and pavement markings, a conventional bike lane is space allocated only for cyclists who ride in the same

direction as vehicular traffic. Shared bike lanes allow vehicles and cyclists to travel in the lane environment together [23]. A protected bike lane is space designated exclusively for cyclists that uses stationary, vertical measures (e.g. curbs, planters, parked cars) to separate the lane from moving vehicular traffic [24].

This study was delimited in scope to protected bike lanes with the assumption that these would be the safest places to ride since presumably they are more “shielded” from traffic than the other types of bike lanes. In addition, two areas of Manhattan with protected bike lanes, Central Park and the perimeter of the island, were excluded from this study as they do not have exposure to public vehicles. Using an updated bike map of NYC, zones were demarcated and mileage was estimated using the given legend [25]. Within each zone, the researcher walked on the sidewalk adjacent to the protected bike lanes, so as not to disrupt cyclists. Three kinds of obstructions within the bicycle lanes were coded: object, pedestrian, and vehicle. Objects were defined as inanimate objects that were large enough to obstruct a person on a bike such as shopping carts, bags of trash and other pieces of trash, garbage cans, etc. Pedestrians included people who were walking or running in the bike lane, workers, and others who were standing in the bike lane. In several instances ($n = 18$), a person in the bike lane was also pushing an object such as a cart, or walking a dog, which was coded a person. The vehicular category included all vehicles such as motorcycles, mopeds, cars, utility trucks, etc. In order to be counted, the vehicle had to be parked in a way that obstructed the bike lane or driving in the bike lane. Sections of bike lanes that were closed due to construction or other factors were excluded from this study. Data was collected throughout all days of the week during daylight hours.

Descriptive statistics, including frequencies and percentages were calculated. The Institutional Review Board at William Paterson University does not review studies that do not involve human subjects. The Institutional Review Board at Teachers College, Columbia University approved this study.

Results

A total of 233 obstructions in the protected bike lanes were observed in this study. Obstructions per zone ranged from 11 to 39 (Table 1). The most common type of obstruction was objects, which accounted for 53.2% ($n = 124$) of obstructions and ranged through zones from 2 to 22. People were the second most common obstruction, which accounted for 28.3% ($n = 66$) of the obstructions, with a range of 1–22. Vehicles accounted for the remaining 18.5% ($n = 43$) of the obstructions with a range of 1–9 throughout zones. There was a total of 6.6 obstructions per mile, with a range of 2.75–9.7 obstructions per mile across the ten zones (Table 2).

Table 1 Obstructions by type and zone

Zone	Total number of obstructions in zone	Type of obstruction: object	Type of obstruction: person	Type of obstruction: vehicle
1	11	9 (82.0)	1 (9.0)	1 (9.0)
2	14	6 (43.0)	7 (50.0)	1 (7.0)
3	19	10 (53.0)	7 (37.0)	2 (10.0)
4	27	2 (7.0)	22 (81.0)	3 (11.0)
5	31	21 (68.0)	6 (19.0)	4 (13.0)
6	39	21 (54.0)	10 (26.0)	8 (20.0)
7	15	11 (73.0)	1 (7.0)	3 (20.0)
8	29	17 (59.0)	6 (21.0)	6 (21.0)
9	16	5 (58.6)	5 (20.7)	6 (20.7)
10	32	22 (69.0)	1 (3.0)	9 (28.0)
Total	233	124 (53.2)	66 (28.3)	43 (18.5)

Table 2 Obstructions per mile

Zone	Frequency of obstructions in zone	Mileage	Obstructions per mile
1	11	4 miles	2.75
2	14	2 miles	7
3	19	3 miles	6.3
4	27	3 miles	9
5	31	4 miles	7.75
6	39	6.5 miles	6
7	15	2 miles	7.5
8	29	3 miles	9.7
9	16	4 miles	4
10	32	4 miles	8
Total	233	35.5 miles	6.6

Discussion

To our knowledge this is the first study to document obstructions in bicycle lanes in urban areas. It is noteworthy that obstructions were identified in all zones throughout Manhattan and in some places, were quite abundant. The intent of protected bicycle lanes is to provide a safe route of passage and obstructions may undermine that goal. It should be noted that in other venues, bikers may actually pose a danger to pedestrians as well as to vehicular traffic, however clearing bike lanes could mitigate these dangers.

Study limitations include the cross-sectional design, data collection by one observer, and only sampling protected bike lanes in one of the five boroughs. In addition, we were unable to identify the proportionality of biker use

in the different types of bike lanes, which further limits the study. Nevertheless, the results suggest that obstructions in protected bike lanes are common and may pose a safety risk for cyclists. As additional resources are invested in urban bike lanes, additional research is needed to verify the findings and address the limitations in this novel study.

Attention has focused on infrastructure development and bicycle safety [26]. However, recent fatalities in NYC have highlighted the fact that cyclists still need to be cautious when using bike lanes [27]. Findings of this study indicate that, even in “protected” lanes, bikers may be forced into traffic or to approach parked cars, increasing the risk of being “doored” [28].

Existing data also indicate that accidents are still common in protected bike lanes [26, 29]. Suggestions for improving bike safety in bike lanes begin with monitoring the presence of obstructions. This study demonstrates that, based on the sample of time observed, this is rather common. Enforcement of policies, such as issuance of tickets, to deter vehicular traffic in the bike lanes is necessary and underway [27]. As some of the vehicular traffic observed in this study were the law enforcement or city vehicles such as sanitation trucks, the need for training on this issue warrants consideration. A recent action plan on safer cycling in NYC did not include addressing obstructions in bike lanes [30]. Investment in bike lanes shows to be cost effective [31], yet left unmonitored, unexpected obstructions can hinder the purpose of providing what is expected to be a safe zone for cyclists.

Compliance with Ethical Standards

Conflict of interest The authors declare no conflicts of interest.

References

1. New York City Department of Transportation. (2018). *Cycling in the city*. Retrieved October 20, 2018 from <http://www.nyc.gov/html/dot/html/bicyclists/cyclinginthecity.shtml>.
2. Citi Bike. (2018). *Citi Bike*. Retrieved October 20, 2018 from <https://www.citibikenyc.com>.
3. New York City Department of Transportation. (2015). *NYC DOT and NYC Parks announce completion of over 1000 miles in the city's bicycle network*. Retrieved October 20, 2018 from <http://www.nyc.gov/html/dot/html/pr2015/pr15-096.shtml>.
4. New York City Department of Transportation. (2018). *New pilot program will allow bicyclists to follow pedestrian head-start signals at fifty intersections*. Retrieved October 20, 2018 from <http://www.nyc.gov/html/dot/html/pr2018/pr18-018.shtml>.
5. New York City Department of Transportation. (n.d.). *Safe bicycling in New York City*. Retrieved October 20, 2018 from http://www.nyc.gov/html/dot/downloads/pdf/bicyclerules_english.pdf.
6. New York City Department of Transportation. (2018). *Bike Smart pledge*. Retrieved October 20, 2018 from <http://www.nyc.gov/html/dot/html/bicyclists/bikesmartpledge.shtml>.

7. New York City Department of Transportation. (2018). *Don't be a jerk*. Retrieved October 20, 2018 from <http://www.nyc.gov/html/dot/html/bicyclists/dontbeajerk.shtml>.
8. Vision Zero Network. (2018). *What is Vision Zero?* Retrieved October 20, 2018 from <https://visionzeronet.org/about/what-is-vision-zero/>.
9. New York City Department of Transportation. (2017). *Bicycle crash data report 2017*. Retrieved October 20, 2018 from <http://www.nyc.gov/html/dot/downloads/pdf/bicycle-crash-data-report-2017.pdf>.
10. Mandel-Ricci, J., Stayton, C., Nicaj, L., Assefa, S., Woloch, D., Jeffrey, K., et al. (2008). A multiagency effort to reduce bicyclist fatalities and serious injuries in New York City. *Public Health Reports*, 123, 652–654.
11. Thompson, D. C., Rivara, F., & Thompson, R. (2009). Helmets for preventing head and facial injuries in bicyclists. *Cochrane Database of Systematic Reviews*, 1.
12. Basch, C. H., Zagnit, E. A., Rajan, S., Ethan, D., & Basch, C. E. (2014). Helmet use among cyclists in New York City. *Journal of Community Health*, 39, 956–958.
13. Basch, C. H., Ethan, D., Rajan, S., Samayoa-Kozlowsky, S., & Basch, C. E. (2014). Helmet use among riders using the Citi Bike bicycle-sharing program: A pilot study in New York City. *Journal of Community Health*, 39, 503–507.
14. Basch, C. H., Ethan, D., Zybert, P., Afzaal, S., Spillane, M., & Basch, C. E. (2015). Public bike sharing in New York City: Helmet use behavior patterns at 25 Citi Bike™ stations. *Journal of Community Health*, 40, 530–533.
15. Chen, L., Chen, C., Ewing, R., McKnight, C. E., Srinivasan, R., & Roe, M. (2013). Safety countermeasures and crash reduction in New York City—Experience and lessons learned. *Accident Analysis and Prevention*, 50, 312–322.
16. Dimaggio, C. (2015). Small-area spatiotemporal analysis of pedestrian and bicyclist injuries in New York City. *Epidemiology*, 26, 247–254.
17. New York City Department of Transportation. (2018). *Bicycle safety initiatives*. Retrieved October 20, 2018 from <http://www.nyc.gov/html/dot/html/bicyclists/biketips.shtml>.
18. Nguyen, C. (2016). *Citi Bike hasn't had any fatalities in more than 3 years—Here's why*. Business Insider. Retrieved October 20, 2018 from <https://www.businessinsider.com/why-citi-bike-has-zero-fatalities-2016-6>.
19. Haag, M., & Alani, H. (2017). *Cyclist killed by bus in New York's first Citi Bike fatality*. The New York Times. Retrieved October 20, 2018 from <https://www.nytimes.com/2017/06/12/nyregion/citi-bike-death-manhattan.html>.
20. Whitford, E. (2018). *See it: Video shows bus driver killing Citi Bike rider Dan Hanegby*. StreetsBlog NYC. Retrieved October 20, 2018 from <https://nyc.streetsblog.org/2018/09/20/see-it-judge-releases-video-of-bus-driver-killing-citi-bike-rider-dan-hanegby/>.
21. Southall, A., & Rojas, R. (2018). *Australian tourist's death renews cyclist calls for safer lanes*. The New York Times. Retrieved October 20, 2018 from <https://www.nytimes.com/2018/08/12/nyregion/australian-tourist-nyc-bike-death.html>.
22. Basch, C. H., Guerra, L. A., MacDonald, Z., Marte, M., & Basch, C. E. (2015). Glove changing habits in mobile food vendors in New York City. *Journal of Community Health*, 40, 699–701.
23. National Association of City Transportation Officials. (n.d.). *Urban bikeway design guide*. Retrieved October 20, 2018 from <https://nacto.org/publication/urban-bikeway-design-guide/bike-lanes/conventional-bike-lanes/>.
24. Centre Regional Planning Agency. (n.d.). *Protected bike lanes fact sheet*. Retrieved October 20, 2018 from <https://www.crcog.net/vertical/sites/%7B6AD7E2DC-ECE4-41CD-B8E1-BAC6A6336348%7D/uploads/ProtectedBikeLanesRev.pdf>.
25. New York City Department of Transportation. (2018). *Bicycle maps*. Retrieved October 20, 2018 from <http://www.nyc.gov/html/dot/html/bicyclists/bikemaps.shtml>.
26. Reynolds, C. C., Harris, M. A., Teschke, K., Cripton, P. A., & Winters, M. (2009). The impact of transportation infrastructure on bicycling injuries and crashes: A review of the literature. *Environmental Health*, 8, 47.
27. Lyon, C. (2018). *CityViews: Death highlights need for the right kind of bike lane*. Retrieved October 20, 2018 from <https://citylimits.org/2018/08/15/cityviews-death-highlights-need-for-the-right-kind-of-nyc-bike-lane/>.
28. Schimek, P. (2018). Bike lanes next to on-street parallel parking. *Accident Analysis and Prevention*, 120, 74–82.
29. Beck, B., Stevenson, M., Newstead, S., Cameron, P., Judson, R., Edwards, E. R., et al. (2016). Bicycling crash characteristics: An in-depth crash investigation study. *Accident Analysis and Prevention*, 96, 219–227.
30. New York City Department of Transportation. (2018). *Safer cycling: Bicycle ridership and safety in New York City*. Retrieved October 20, 2018 from <http://www.nyc.gov/html/dot/html/bicyclists/bike-ridership-safety.shtml>.
31. Gu, J., Mohit, B., & Muennig, P. A. (2017). The cost-effectiveness of bike lanes in New York City. *Injury Prevention*, 4, 239–243.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.