Bike Lanes or Blocked Lanes:
An Observational Study of Obstructions of New York City's Bike Lanes

Conducted by Hunter College Students

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Introduction

Over the last several years, New York City has undertaken a number of initiatives to make its street landscape more inviting for cyclists. These initiatives have been spurred by the growing recognition of cycling as a more environmentally-friendly alternative to motorized vehicles and as a means of promoting personal health.

One of the key initiatives which has been implemented is the creation of a city-wide network of bike lanes. At present the City has approximately 1,250 miles of bike lanes. Of these, 480 miles (38.4%), are protected bike lanes, indicating they have a physical barrier which separates them from vehicular traffic.[1] Moreover, the mayor and the City Council have recently proposed a $1.7 billion plan that would dramatically increase the number of protected bike lanes as well as include other features to promote cycling safety. The proposed plan entails expanding the existing network of bike lanes by 250 miles in the next few years.[2]

A number of studies have shown that improving the biking infrastructure, such as the installation of dedicated bike lanes, not only encourages biking, but also reduces the risk of injuries to cyclists.[3-8] Gu et al, using a Markov model to evaluate the cost-effectiveness of installing additional bike lanes in New York City, concluded that "investments in bicycle lanes come with an exceptionally good value because they simultaneously address multiple public health problems." The authors further state that: "Investments in bike lanes are more cost-effective than the majority of preventive approaches used today."[9]

While the existing literature makes abundantly clear the benefits of bike lanes, there is a paucity of data which has been collected on bike lane obstructions. If bike lanes are to decrease the risk of injury to cyclists, they must remain clear of obstacles. Otherwise, the very reason for their existence is undermined. If cyclists encounter obstacles in the bike lanes, then cyclists may need to veer into vehicular traffic at their peril.

Though the internet is filled with anecdotal data about the impediments confronting cyclists in bike lanes, to our knowledge only one systematic study has been carried out on this topic. This study examined the rate of obstructions in protected bike lanes in ten zones in Manhattan.[10] The study noted that objects (i.e., inanimate objects large enough to impede a bike rider) were the most common type of obstruction, followed by pedestrians, and then by vehicles. Altogether, the average number of obstructions was 6.6 per mile. The authors acknowledged two limitations of the study: it was confined to just one borough (Manhattan) and to just protected bike lanes.

The research presented here builds on these findings. This study examines the frequency and types of obstructions in both protected and "conventional" (i.e., standard) bike lanes in New York City. The geographic scope of the study encompasses bike lanes in Manhattan as well as bike lanes in the outlying boroughs, with the exception of Staten Island. The study also tallies the number of cyclists riding in the bike lanes during a standardized interval of time.

Methodology

The results of this study are based upon observations of bike lane obstructions and cyclists at 42 different locations in New York City. Each location consisted of bike lanes straddling a distance of approximately 10 city blocks. On the average these distances measured .65 of a mile. The locations were chosen from two separate lists, each list organized by borough. The first list consisted of conventional bike lanes or those which have a bicycle logo painted on them at various intervals and have solid painted lines on both sides delineating their boundaries. The second list consisted of protected bike lanes which are demarcated by either wide buffered areas or have physical barriers separating them from vehicular traffic. "Shared Lanes" in which motorized vehicles and bikes can occupy the same street space and "Signed Routes" which simply designate a "suggested" route for cyclists were omitted from the analysis. Bike lanes straddling bridges were also omitted from the analysis.

The locations (also designated as 10-block "street ranges") were selected using a purposive sampling methodology. The sample frame consisted of bike lanes (both protected and conventional) which extended a minimum of 15 city blocks, disaggregated by borough. (Blocks stretching between avenues were thought of as the equivalent of two blocks stretching between streets.) Researchers gathering the observational data then chose a 10-block street range within the boundaries of these bike lanes. A disproportionate number of street-ranges were selected from bike lanes in Manhattan because of the heavy presence of cyclists in this borough. For comparative purposes, a smaller sample of 10-block street ranges was chosen from the bike lanes in the outlying boroughs, excluding Staten Island.

All observations were carried out by Hunter College students enrolled in one of three different courses in the Fall semester of 2019. Two of the courses were undergraduate-level courses offered in the Department of Sociology (two sections of Introduction to Research Methods). The other course was a graduate-level course also offered in the Department of Sociology (Intermediate Statistics).

Students were given strict methodological guidelines in carrying out their observations. Students were given the option of conducting their observations accompanied by another student or conducting their observations by themselves. If they opted to gather data by themselves, they were strongly encouraged to be joined by a friend or family member to help in the data-gathering process. Importantly, students were told they had to remain as inconspicuous as possible.

Each student or pair of students was assigned a bike lane from which they selected a 10-block street range. The students visited these 10-block street ranges on two separate occasions. They were instructed to visit their sites during one "peak time" and one "off-peak time." Peak times included weekdays from either 7:00 am – 9:30 am or 4:30 pm – 6:30 pm. Off-peak times consisted of weekdays between 9:31 am – 4:29 pm or between 7:00 am -- 6:30 pm on Saturday or Sunday.

When students visited their sites, they were told to walk alongside the bike lane and observe both the frequency and type of obstructions which existed in each of the 10-blocks constituting the street range under study. The type of obstructions included five categories: objects, pedestrians, vehicles, construction, or other. For an obstruction to be coded as an object, the following rule was applied: the object had to be large enough to obstruct a person riding on a bike in a bike lane. So, for example, objects could include things like garbage cans, metal objects, shopping carts, etc. Pedestrians included individuals walking or running in the bike lane. Importantly, individuals who were standing in the bike path at the crosswalk when pedestrians had the right-of-way to cross the street were not to be considered as obstructions. Vehicles included all motorized forms of transport such as cars, trucks, taxis, mopeds, motorcycles, etc. Construction referred to ongoing construction which overlapped the bike lane. Subsumed under the "other" category were obstructions such as a pot hole with designated markings, or a segment of the bike lane cordoned off by Con Ed, or cyclists riding in the bike lane but riding in wrong direction, or even skateboarders.

For obstructions which were labelled as vehicles, students noted the type of vehicle and whether it was parked, temporarily stationary, or moving. The type of vehicles were classified as follows: 1) cars, 2) trucks, 3) buses, 4) taxis, Uber, Lyft, etc., 5) police, 6) emergency, 7) motorcycle, or 8) other.

In addition to recording the frequency and type of obstructions in each of the 10 blocks comprising the street range being studied, students tallied the number of cyclists riding in the bike lane at the end of the 10th block. So as to insure uniformity in gathering this type of information, the counting of the number of cyclists was confined to a period of exactly 15 minutes. Students were told not to deviate in any way from this time interval.

Also, information about the site of the observations was appended to each record. Site attributes included whether the observations were carried out on a conventional or protected bike lane, the beginning and ending names of the streets/avenues demarcating the street range, and the distance of the street range in miles. Finally, visit number, the calendar date, day of the week, and time period on which observations were conducted were recorded.

All observations were carried out between September 20th and October 27th, 2019.

Beyond gathering the observational data, students took two photos of the site in which they carried out their observations. One photo displayed the name of the street or avenue straddling the bike lane and the other photo was a picture of the bike lane itself.

Findings

Obstructions

Altogether, there were an average of 7.5 obstructions per visit to a 10-block street range. Since the average distance of a 10-block street range was .65 of a mile, the number of obstructions per mile could be estimated as being roughly 11.5.

Coinciding with expectations, the average number of obstructions in Manhattan per street range was greater than the average number in the outlying boroughs (8.1 vs. 6.8). There was also a higher incidence of obstructions in weekday peak hours than in weekday off-peak hours (8.5 vs. 5.8). The corresponding number for weekend hours was 8.0. Somewhat surprisingly, the average number of obstructions in protected bike lanes exceeded the number in conventional bike lanes (8.5 vs. 6.8).

Table 1 below presents the average number of each of the five types of obstructions per 10-block range by type of bike lane and by geographic location. Overall, the most common type of obstruction was pedestrians followed by motorized vehicles and then by construction sites. Excluding the "other" category, objects were the least common type of obstruction.

Table 1. Average Number of Obstructions Per 10-Block Street Range by Type of Bike Lane and Borough

Type of Obstruction	Total Average	Protected Bike Lane Average	Conven-tional Bike Lane Average	Manhattan Average	Outlying Boroughs Average
Pedestrian	3.14	5.58	1.47	4.28	1.88
Vehicular	3.00	1.17	4.29	2.47	3.63
Construction	0.66	0.44	0.80	0.57	0.75
Object	0.17	0.22	0.14	0.24	0.10
Other	0.48	1.06	0.08	0.51	0.45
(Number of visits to 10-block street ranges)	(87)	(36)	(51)	(47)	(40)

The prevalence of these types of obstructions varies, though, by type of bike lane and location. As might be expected, pedestrian obstructions are far more frequent in protected vs. conventional bike lanes (5.58 vs. 1.47) and in Manhattan than in the outer boroughs (4.28 vs. 1.88). Conversely, vehicular obstructions are more numerous in conventional than in protected bike lanes (4.29 vs. 1.17). "Other" obstructions figured more prominently in protected bike lanes than in conventional bike lanes.

The time period in which the observations were carried out also is related to the incidence of the different types of obstructions (Table 2). The highest incidence of pedestrian obstructions was found during the weekend time interval (4.13) followed by weekday peak hours (3.40) and lastly by weekday off-peak hours (2.12). Aligned with expectations, vehicular obstructions were noted more often during weekday peak hours than weekday off-peak hours (3.69 vs. 2.58).

Table 2. Average Number of Obstructions Per 10-Block Street Range by Time Period

Type of Obstruction	Weekday Peak Average	Weekday Off-peak Average	Weekend Average
Pedestrian	3.40	2.12	4.13
Vehicular	3.69	2.58	2.46
Construction	0.83	0.62	0.42
Object	0.12	0.23	0.13
Other	0.43	0.23	0.88
(Number of visits to 10 -block street ranges)	(35)	(26)	(24)

Not surprisingly, cars constitute the highest number of vehicular obstructions per 10-block street range (Table 3). Trucks and taxis (including rideshare services such as Uber and Lyft) were the second and third most numerous obstructions, respectively. Buses occupied the fourth-place ranking.

Table 3. Average Number of Vehicular Obstructions Per 10-Block Street Range by Type of Vehicle

Type of Vehicular Obstruction*	Total Average
Car	2.01
Truck	0.30
Taxi, Uber, Lyft, etc.	0.21
Bus	0.18
Motorcycle	0.07
Emergency	0.05
Police	0.02
Other	0.17
(Number of visits to 10-block street ranges)	(87)

Table 4 below presents the average duration of vehicular obstructions per 10-block street range by type of bike lane and geographic location. The data reveal that the majority of vehicular obstructions were of a fleeting nature. Most vehicles were found to be either moving or only temporarily parked. As would be expected, parked vehicles were observed to be much more common in conventional than in protected bike lanes.

Table 4. Average Duration of Vehicular Obstructions Per 10-Block Street Range by Type of Bike Lane and Geographic Location

Duration of Vehicular Obstruction	Total Average	Protected Bike Lane Average	Conven-tional Bike Lane Average	Manhattan Average	Outlying Boroughs Average
Moving vehicles	1.04	0.64	1.29	0.57	1.55
Temporarily-parked vehicles	1.28	0.44	1.86	1.36	1.18
Parked vehicles	0.72	0.14	1.14	0.57	0.90

The duration of time a vehicle obstructed a bike lane is also associated with the time period in which observations were conducted. During weekday peak hours, vehicular obstructions were far more likely to be transitory in nature than during either weekday off-peak hours or weekends (Table 5).

Table 5. Average Duration of Vehicular Obstructions Per 10-Block Street Range by Time Period

Duration of Vehicular Obstruction	Weekday Peak Average	Weekday Off-peak Average	Weekend Average
Moving Vehicles	1.62	0.58	0.74
Temporarily-parked vehicles	1.40	1.46	0.79
Parked vehicles	0.71	0.54	0.96

Number of Cyclists

The number of cyclists counted per 15-minute time interval varied markedly by type of bike lane, geographic location, and hour in which the data were gathered (Table 6). The average number of cyclists per quarter hour in protected bike lanes exceeded the average number in conventional bike lanes by a margin of almost 4.5-to-1 (36.61 to 8.22). Cyclists were also found to be more numerous in Manhattan than in the outlying boroughs (27.34 to 11.30). As expected, too, the presence of cyclists was more noticeable during weekday peak hours than during weekday off-peak hours (21.23 vs. 11.15). Interestingly, though, the tally of cyclists during weekend hours (23.46) slightly outpaced the tally for weekday peak hours.

Table 6. Average Number of Cyclists Per 15 Minute Time Span by Type of Bike Lane, Geographic Location, and Time Period

	Average Number of Cyclists Per 15-Minute Time Span	Number of Visits To 10-Block Street Range
Type of Bike Lane:		
Protected Bike Lane	36.61	36
Conventional Bike Lane	8.22	51
Location:		
Manhattan	27.34	47
Outlying Boroughs	11.30	40
Time Period:		
Weekday Peak Hours	21.23	35
Weekday Off-peak Hours	11.15	26
Weekend	23.46	24

It is instructive to note that the greater number of cyclists found in protected vs. conventional bike lanes persists even when controlling for geographic location or hour in which the data were collected. For example, the average number of cyclists in protected as opposed to conventional bike lanes in just Manhattan was 41.33 vs. 8.45. Similarly, the average number of cyclists in protected bike lanes outstripped the corresponding average number of cyclists in conventional bike lanes in each of the three time periods in which the data were collected. For weekday peak hours, the ratio was 39.14 to 9.29; for weekday off-peak hours, the ratio was 18.14 to 8.58; and, finally for weekend hours, the ratio was 38.62 to 5.55. Thus, the numerical superiority of cyclists in protected bike lanes versus conventional bike lanes cannot be attributed to either being in Manhattan or to day and time of the week.

Conclusions

Several important findings have emerged in this study. First, obstructions in bike lanes in New York City are a frequent occurrence. This study found an average of 7.5 obstructions per 10 city blocks. Measured in miles, this number is equivalent to approximately 11.5 obstructions per mile.

The two leading types of obstructions were pedestrians and motorized vehicles. Overall, there were approximately 3 pedestrian and 3 vehicular obstructions per 10-block range.

The third most frequent type of obstruction was construction. The number of impediments due to construction was .66 per 10-block range, or about 1 per mile. This last statistic is a particularly troubling one. While pedestrian and most vehicular obstructions are transitory in nature, construction sites, by definition, are more enduring and are a greater source of disruption to cyclists.

As would be expected, motorized vehicular obstructions were less common in protected than conventional bike lanes. Nevertheless, cyclists riding in protected bike lanes still confront an array of obstacles. In fact, the data show that the number of pedestrian obstructions in protected bike lanes greatly outpaces the corresponding number in conventional bike lanes. Similarly, the number of “other” obstructions (e.g., dogs, scooters, cyclists going against the flow of traffic, etc.) was notably greater in protected than conventional bike lanes.

In sum, obstructions in bike lanes are ubiquitous and pose a significant safety hazard to cyclists. If bike lanes, and particularly protected bike lanes, are to afford cyclists a safe environment in which to ride, than solutions need to be found to eliminate the myriad number of obstacles which impede cyclists riding in these lanes.

Another significant finding uncovered in this study is the greater popularity of protected bike lanes over conventional bike lanes. The average number of cyclists tallied in protected bike lanes exceeded the number tallied in conventional bike lanes by almost a margin of 4.5 to 1. Furthermore, the preponderance of cyclists in protected bike lanes was found irrespective of the borough or the day and time of week in which the data were gathered.

One might argue that the numerical superiority of cyclists noted in protected versus conventional bike lanes could be attributed to the fact that protected bike lanes straddle arterial roads whereas conventional bike lanes run alongside less major routes. Undoubtedly, this is one factor which accounts for the greater popularity of protected lanes.

Research shows, however, that the number of cyclists on protected bike lanes surpasses the number of cyclists on streets lacking bicycle facilities *which run along comparable routes*. A study carried out in Montreal found that the frequency of riders on cycle tracks (i.e., protected lanes) was 2.5 times the frequency found on *parallel* streets lacking bicycle facilities.[11] Another study found that protected lanes are not only safer for cyclists, but attract *new* riders who might otherwise opt for an alternative means of transportation. A team of researchers from Portland State University, who surveyed riders in 5 different U.S. cities, noted that 10 percent of the cyclists on newly-constructed bike lanes reported having shifted from a different transportation mode.[12] Consistent with these research findings, cyclists in New York city have expressly made known their preference for protected bike lanes. One current example demonstrating this preference has been their efforts to convert a conventional bike lane to a protected one on Central Park West.

Finally, this study has produced data showing that cycling in New York City is not confined just to weekdays. The average number of cyclists counted riding on Saturday or Sunday per 15-minute interval even exceeded the number counted during peak weekday hours. This finding buttresses the notion that cycling is not merely a more environmentally-friendly alternative means of transportation but that it also provides a healthy form of recreation.

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Sites

Manhattan

- 1st Ave (E. 90th Street and up)
- 1st Ave (68th to 78th)
- 2nd Ave (70th - 89th Street)
- 2nd Ave (Canal - 30th Street)
- Columbus Avenue (W. 78th St. - W. 109th St.)
- Columbus Avenue (W. 59st – W. 77th St.)
- Amsterdam Ave

- 26^{th} Street
- 55^{th}
- 90^{th} Street
- 91^{st} Street
- 106^{th} Street
- 9^{th} Avenue (30th St. - 58th St.)
- 9^{th} Avenue (29th St. - 10th St.)
- 7^{th} Ave. (10th St. - 29th St.)
- Avenue C (East Houston - 20th St.)
- Washington Street
- East Broadway
- Pike Street
- East Houston Street
- Broadway (17th - 27th)
- Lafayette Street

Brooklyn

- Kent Avenue
- Prospect Park West
- Bedford Avenue
- Bergen Street
- Dekalb Ave (BAM to Broadway)
- Evergreen Ave
- Neptune Ave

Bronx

- Grand Concourse
- E. 174^{th} Street
- Castle Hill Avenue

Queens

- Queens Blvd., Woodside
- Queens Blvd., Elmhurst
- Skillman Avenue

- 20^{th} Avenue
- 34^{th} Avenue
- 73^{rd} Avenue
- Parsons Blvd
- Jewel Ave