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Public Opinion towards Bicycle Lanes: The Case of New York

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Abstract: As bicycles gradually become an established form of transportation in the United States, planners and policymakers need new evidence to determine how best to expand bicycle infrastructure. Using logistic regression analysis of 2012 public opinion data from New York City, this article explores the demographics behind support of bicycle lanes. Due to an absence of literature on public opinion toward bike lanes, it examines a breadth of variables in order to provide a basis for future research, answering the question: What personal characteristics are important in one's support for bike lanes? This study also demonstrates the distinction between demographics of bicycle ridership and demographics of supporters of bicycle infrastructure.

Keywords: Public opinion, bike lanes, transportation policy, urban planning, demographics

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Introduction

One night in September 2013, cyclists descended upon New York City's Sixth Avenue to paint an extension of the bicycle lane that abruptly ended at 42nd Street (Moynihan 2013). The effort materialized after a bicycle-taxi crash near where the lane ended that severed the cyclist's leg. Was this group a rogue band of miscreants or a team of urbanist superheroes? Were they something in between? One cyclist acknowledged the act's dubious legality but justified it because it served the "public good" (Moynihan 2013).^{1,2} The new lane, in any case, was removed within days, presumably by the city (Goodyear 2013).³ Bicycle facilities, one element of the conflict between motorized and non-motorized transport, are a key topic in contemporary urban planning. In this article, I illuminate the complexities of public opinion toward bicycle lanes in New York City and the demographic and socioeconomic divisions associated with such opinion.

This study focuses on attitudes toward and use of bicycle facilities.⁴ I ask who commutes by bicycle with regards to demographic and socioeconomic characteristics. How do particular traits relate to one's opinion toward bicycle lanes? No literature discussing opinion toward bicycle facilities exists, so I review proxy research on bicycle use.⁵ Next, I hypothesize about how factors that encourage ridership extend toward support of bicycle lanes. Past works cover how characteristics affect one's choice to cycle, connecting cycling to traits like gender and neighborhood layout (e.g., Garrard et al. 2008; Handy and Xing 2011; Buehler and Pucher 2012). Additionally, some literature discusses the impact of bicycle facilities on ridership and issues like walkability, illustrating the relevance of such infrastructure (e.g., Kang et al. 2013).

¹ Abruptly ending lanes negatively influence the decision to cycle of potential bicycle commuters (Krizek and

² See Wogan (2014) for more instances of "guerrilla traffic-calming efforts."

³ However, the city has added about 300 miles of bicycle lanes since 2006, totaling over 600 (Mann 2013).

⁴ "Bicycle facilities" refers to bicycle paths, on-street bicycle lanes, signage, etc. (see Jackson and Ruehr 1998).

⁵ I aim to review the literature on utilitarian cycling, but some useful sources do not distinguish this from recreation.

This study contributes significantly to the urban studies literature, relating practically to policymakers, urban planners, and cyclists themselves. Sustainable transportation is a key focus of urban and environmental policy, and new infrastructure like bicycle lanes is critical to comprehensive policy application.⁶ Considering occasional fervent opposition to bicycle lanes, such as that in Brooklyn's Prospect Park West, decision-makers should understand which factors contribute to support or disapproval of such facilities.⁷ Using recent data, this study describes which groups are likely to disapprove, enabling policymakers to address their concerns.

In this paper, I first review the literature related to bicycle travel and bicycle facilities. Reviewing sources that describe characteristics correlated with bicycle use enables me to hypothesize about how such characteristics affect support of bicycle lanes. Because of the lack of literature on public opinion toward bicycle infrastructure, I examine a range of potentially significant variables, building a basis for further research. Next, I describe the method employed to analyze the 2012 survey data, connecting personal characteristics to responses to the following question: "As you may know, more than 250 miles of bicycle lanes have been added in the past four years. Do you think bike lanes are a good idea OR a bad idea?" (CBS News and *New York Times*, 2013).⁸ Finally, I discuss the results and their implications for transport policy.

Review of the Literature on Bicycle Lanes and Bicycle Use

Comprehensive studies on variables influencing public opinion toward bicycle lanes do not exist, so I use a proxy literature to build a basis for hypotheses on many variables. The literature on bicycle lanes and use falls into several categories: the impact of bicycle

⁶ Nearly half of trips in American cities are less than three miles, indicating immense potential for bicycling as a mainstream tool of urban travel (Pucher et al. 1999, 625).

⁷ Groups challenged the Prospect Park West lane with a lawsuit in 2011, which was dismissed (Grynbaum 2011).

⁸ The survey had 97 variables and 1026 participants. The *Times* mentioned its results in August 2012, showing bivariate statistics on bicycle ownership's impact on opinion toward bicycle lanes ("New Yorkers and Bike Lanes," 2012). My study, in contrast, uses multivariate regression.

infrastructure on ridership and safety (which may influence opinion), personal traits associated with bicycle use, and neighborhood characteristics associated with bicycle use. Next, I briefly discuss attitudinal factors that explain other variation between supporters and opponents of bicycle lanes. An assumption I make when reviewing the literature is that New York City's bicycle lanes mostly attract those commuting, not cycling for recreation; cycling on crowded streets is likely not strictly for enjoyment or fitness (i.e., urban bikeways versus paths in parks).

Impact of Bicycle Infrastructure

Before examining characteristics that influence bicycle ridership and attitudes toward bicycle facilities, it is important to understand such facilities' effects on ridership.⁹ Additionally, gains in cyclist safety with improved facilities are important to understanding why some groups may unexpectedly support bicycle lanes. Primarily, bicycle lanes encourage clean and efficient travel that uses minute amounts of space on car-crowded streets (see Forester 1977; Fram 1977). As other modes of transit—particularly those powered by fossil fuels—become more expensive, short-range and low-cost transportation like bicycles will become more attractive.¹⁰

Bicycle infrastructure, including segregated paths, on-street lanes, and signage, can lead to more bicycle commuting in some cases, although only under certain circumstances (Dill and Carr 2003, 7; Krizek and Johnson 2006; Moudon et al. 2005; see Tilahun et al. 2007; Heinen 2011, 145). The previous literature is conflicted: some studies report modest increases in bicycle traffic (Martens 2007, 334; Wardman et al. 2007, 347), while others assert that most increases

⁹ A distinction exists: bicycle paths, "Class I" facilities, are "physically separated from motor vehicle traffic," while Class II facilities, the subject of my study, are "separated ... by a painted stripe" (Jackson and Ruehr 1998, 2). Class I facilities require more space and investment, while Class II facilities are more easily integrated. I focus on bicycle lanes where possible, but survey participants may have not known or considered the difference, especially because New York City's network contains a mix of different facility types.

¹⁰ Jane Jacobs wrote, "The automobile is overdepended upon ... It will be supplanted by many different kinds of vehicles ... based not upon crude common denominators of moving people and goods, but on differentiations. Nor will the automobile be wholly supplanted" (1969, 242). She is correct here in predicting that diverse, specialized transportation (i.e., bicycles and related facilities for short trips in dense cities) will become relevant and common.

are due to leisure cyclists, not commuters, or that ridership increases mostly among those who already cycle (Davies et al. 2001; Bergstrom and Magnusson 2003; see Gatersleben and Appleton 2007, 303). To increase bicycle commuting, infrastructure must be well implemented: facilities should link desirable locations, commuters should know that cycling is an option, and facilities should form a network (Dill and Carr 2003, 7; Krizek and Roland 2005, 56, 66; see Drake 1977, 127; Slade 1977, 437, 444; Stinson and Bhat 2003; Titze et al. 2008, 256).^{11,12}

Safety is significant in perceptions of cycling, and improved safety can increase its appeal (discussed further below). Statistics substantiate concerns over bicycle safety: American cyclists “were 12 times more likely to get killed than car occupants per mile traveled” (Dill and Voros 2007, 10).¹³ Traffic safety concerned Americans when choosing whether to commute by bicycle in one study, but Dutch participants rarely mentioned it; bicycle facilities may add more utility for Americans than Europeans (Heinen 2011, 143; see Pucher 2001, 25; U.S. DOT 2008a, 40). Additionally, perceptions matter, not just objective safety (Heinen 2011, 39; see McClintock and Cleary 1996; Klobucar and Fricker 2006). Cycling safety is a serious issue in New York City: in 2012, 3,882 cyclist injuries were reported as well as 18 cyclist fatalities from crashes with motor vehicles (New York City DOT 2012).¹⁴ The most crashes (1,610) took place in Brooklyn, which equaled Queens for most cyclist fatalities (five), although Queens had only 794 crashes.¹⁵

Bicycle lanes increase ridership without increasing crashes, despite posing some risk

¹¹ A majority of survey respondents hardly used bicycle lanes when they were available because they were not available where such respondents wanted to go (U.S. DOT 2008a, 60).

¹² They also add to the walkability and safety of neighborhoods by separating pedestrians and bicycles (Kang et al. 2013). In New York City in 2012, there were 244 pedestrian injuries, 32 bicyclist injuries, and one bicyclist fatality resulting from pedestrian-bicycle crashes reported to NYPD (New York City DOT 2012).

¹³ Statistics vary widely within the U.S.; cyclists in Mississippi were 10 times more likely to be killed than cyclists in Oregon (Alliance for Walking & Biking, 57).

¹⁴ New York City was the most dangerous city for cycling in a 2011 study that compared nine North American cities (Pucher et al. 2011, 463).

¹⁵ Manhattan had 1,118 crashes and four cyclist deaths, the Bronx had 326 crashes and three deaths, and Staten Island had 52 crashes and one death.

(Cohen 2013, E443; see McClintock and Cleary 1996; Krizek and Roland 2005; Buehler and Pucher 2012; Chen et al. 2012, 1126). Contrary to the assumption that more cyclists would lead to more accidents, more cyclists create a safer environment due to increased awareness among drivers (Buehler and Pucher 2012, 422; Chen et al. 2012, 1125). Safety concerns are legitimate in the United States and strongly contribute to some groups' decisions to cycle, so bicycle lanes may encourage ridership (discussed below in demographics section).¹⁶ Additionally, the Federal Highway Administration suggests addition of bicycle lanes in places with cyclists inexperienced with operating a bicycle in traffic (Krizek and Roland 2005, 56; see McClintock and Cleary 1996, 72; Minnesota DOT 1996; U.S. DOT 1999).¹⁷ However, Americans *in general* are also preoccupied by cycling safety, and bicycle lanes can help make it a more attractive option.

Bicycle facilities add options for urban transport and, when properly applied, can increase ridership. The literature is somewhat conflicting regarding the effect that bicycle lanes *alone* have; however, facilities can have an impact when bicycle lanes serve useful locations and when people are informed of commuting options. Furthermore, safety is a critical consideration for Americans; bicycle lanes offer increased safety, and particular groups as well as Americans in general may find cycling to be more attractive after the addition of such facilities.

Particular Groups' Use of Bicycles and Bicycle Infrastructure

The purpose of this study is to determine which demographic factors influence public opinion toward bicycle lanes. Because this is the first study to examine this subject, I examine a proxy literature that describes how demographic characteristics influence *use* of bicycles and

¹⁶ This addresses the claim that there is "a group of people who would like to cycle and could be persuaded to cycle under the right circumstances" (Gatersleben and Appleton 2007, 302). Such groups are target demographics for policymakers looking to expand bicycle networks (discussed further below).

¹⁷ Krizek and Roland (2005) discuss this claim from the FHWA (U.S. DOT 1999), which recommended facilities for "group 'B' cyclists." The Minnesota DOT (1996) source defined "group 'B' cyclists" as I have summarized above.

hypothesize based on those findings. The literature shows that some traits, like gender and life stage, are significant in predicting whether certain individuals are prone to cycle. However, other factors lack clear relationships, making hypothesizing on such variables inappropriate.

Studies of gender and cycling show that one group may receive greater utility from new bicycle facilities. Men ride more in countries in which bicycling is not a significant method of commuting, like the United States (Garrard et al. 2008, 55; see Dickinson et al. 2003; Dill and Voros 2007; Handy and Xing 2011; Pucher et al. 2011).^{18,19} However, females may actually be *more* inclined to support bicycle lanes: females were more likely to cite traffic and motorist aggression as dissuading them from cycling, and they more often favor traffic safety measures (Garrard et al. 2006, 5; Garrard et al. 2008; Girasek 2013, 1116; see Krizek et al. 2005; Heesch et al. 2012, 8).²⁰ Additionally, the presence of bicycle facilities is more important to females than males in route choice, and female cyclists are more likely to be encouraged to cycle by “more bicycle lanes” (Garrard et al. 2008, 56; Tin Tin et al. 2010, 58; see DeGruyter 2003).²¹ Because females consider safety more important, they may support bicycle lanes more strongly than would be expected given their low ridership.²²

Some studies conclude that a negative relationship exists between age and ridership, but support for bicycle facilities may differ from ridership in a similar way as for females.²³ Many studies agree that young people are more likely to cycle (Pucher et al. 1999; Pucher and Renne

¹⁸ Many English-speaking countries are deficient in active transport (Garrard et al. 2008, 55; see Pucher and Dijkstra 2003; Heinen 2011; Heesch et al. 2012). About 1% of U.S., Australian, and New Zealand trips are by bicycle, as are less than 3% of commutes in Great Britain (Dill and Voros 2007, 9; Vreugdenhil and Williams 2013, 283; Tin Tin et al. 2010, 55; Parkin et al. 2008, 94). Canadians cycle more than Americans, with the modal share topping 2% in some provinces, but national rates are small compared to some European countries (Pucher et al. 2011).

¹⁹ Females were only 20% of bicycle commuters in New York City (the national average is 24%) (Pucher et al. 2011, 463).

²⁰ Females are also more likely to be encouraged to ride by reduction of vehicle speeds (Tin Tin et al. 2010, 58).

²¹ Garrard et al. (2008) describe DeGruyter’s (2003) discussion of route choice, which I was unable to access.

²² Women in Tin Tin et al. (2010) and Heesch et al. (2012) were cyclists, but I extrapolate these trends to all women.

²³ Ryley (2006), discussed below, suggests “life stage” is more important than age in determining ridership.

2003; Moudon et al. 2005; Dill and Voros 2007; Wardman et al. 2007; Pucher et al. 2011; see Heinen 2011, 33).²⁴ Others find constant rates until older ages, at which point rates sharply decrease (Zacharias 2005, 338; Coughlin and D'Ambrosio 2012, 45). However, other studies find no relationship between age and ridership (Kitamura et al. 1997, 143). Like females, people over 35 are more often encouraged to cycle by “more bicycle paths,” and older respondents more often favored safety measures (Tin Tin et al. 2010, 56; Girasek 2013, 1116). Although this refers to paths and not lanes, this indicates a division between who supports bicycle facilities and who actually rides, a similar phenomenon to women’s support of bicycle facilities due to safety.

Studies of income also yield conflicting relationships, but the distinction between commuter and recreational cycling allows a hypothesis. As measured by both income and job prestige, a two-peaked distribution emerges, with high-earners and those in prestigious positions commuting by bike most often as well as middle-class earners and those in less-prestigious jobs (Dill and Voros 2007, 13; Parkin et al. 2008, 102; see Pucher and Renne 2003, 62, for contrast, although this includes recreation). Plaut (2005) finds that individual and family incomes are typically lower for those who *commute* by bicycle (354). Foreseeably, people with higher incomes are more likely to have access to a bicycle, especially compared to those earning under \$15,000: “lack of access” was the most-cited reason for choosing not to cycle (U.S. DOT 2008a 6, 18; Parkin et al. 2008, 103).²⁵ Higher incomes, however, also correlate with car ownership, which leads to lower ridership, confounding somewhat the relationship (Heinen 2011, 34; see Plaut 2005, 352; Pucher and Renne 2003, 55, 58; Parkin et al. 2008, 101; Pucher et al. 2011;

²⁴ Dill and Voros (2007) define young as 18-34, while Moudon et al. (2005) examine the group from 25-45.

²⁵ The second reason given was lack of need or want to (U.S. DOT 2008a, 18).

Buehler and Pucher 2012, 416).²⁶ An overall relationship is not clear, but *for utilitarian reasons*, there may be a negative relationship between income and cycling.

Transportation data illuminate differences in ridership between people of various racial and ethnic backgrounds. In 2002, Hispanics most likely rode once per week, followed by white non-Hispanics, black non-Hispanics, and Asians (U.S. DOT 2008a, 9; see Pucher and Renne 2003, 68).²⁷ Another study notes that whites and Hispanics are most likely to cycle, although Hispanics typically cycle to commute and whites cycle more for recreation, feasibly aligning with differences bicycle use among different income groups (Pucher and Renne 2003, 67; see Moudon et al. 2005).²⁸ Hispanics are also more likely to support increased traffic safety, and blacks are more likely than whites to support such measures, which may indicate higher support for bicycle facilities (Girasek 2013, 1115). Multiple studies support variations between racial and ethnic groups, with Hispanics reporting higher bicycle commuting than any other group.

Life stage and employment play a significant role in the choice to commute by bicycle (Ryley 2006; see Handy and Xing 2011, 105). Students, those who are in-between jobs, and those in part-time jobs without children have a higher propensity to commute by bicycle or by foot (Ryley 2006, 374). On the other hand, retirees and “high earners” without children rely more on cars.^{29,30} Students conceivably cycle more due to short commutes and lack of cars and steady income (Buehler and Pucher 2012, 416, 422; see Dill and Carr 2003; Pucher and Buehler 2006; Heinen et al. 2010). Commuters who cycle are also likely more educated than those who drive cars (Plaut 2005, 350; De Geus et al. 2008). Additionally, “cyclists are more likely to be single,

²⁶ Car ownership was, contrastingly, found to increase the likelihood of being a cyclist in Moudon et al. (2005). This may be confounded by the fact that their study’s participants were overwhelmingly white and cycled for recreation.

²⁷ This follows for riding once in the past month, except blacks rode less than Asians (U.S. DOT 2008a, 14).

²⁸ Heinen (2011) also notes that motivations behind cycling for recreation and for transport are quite different (22).

²⁹ Those with “medium propensity” include “mid earners” and high-earners and part-timers with children (374).

³⁰ Those who work less hours more likely to cycle: either part-time workers (commuting) or those with enough income to have leisure time (recreation, most of Moudon et al.’s (2005) participants) (Moudon et al. 2005).

and less likely to be divorced/widowed/separated, than non-cyclists,” (Moudon et al. 2005, 253).

Significant literature is devoted to bicycling demographics, although it is a relatively new area of study and will benefit from further research. Some characteristics have an unclear impact on ridership, but may contribute significantly to support of bicycle facilities. Some traits, on the other hand, clearly make individuals more likely to cycle. These characteristics are important when analyzing opinion data, especially when determining the propensity to support bicycle lanes among groups that already cycle. Additionally, groups that may support bicycle lanes but are less likely to cycle may play an important role in shaping this opinion. In addition to demographics, other studies that discuss the likelihood to cycle are discussed below.

Neighborhood Characteristics Correlated with Bicycling

Several other variables related to neighborhoods and land use help determine individuals’ propensity to cycle. Bicycle use positively correlates with grid-pattern road networks, higher density, and mixed-use development, and negatively correlates with longer commutes (Buehler and Pucher 2012, 416; Heinen 2011, 24; see Walsh 1977, 104; Daecher 1977, 388; U.S. DOT 2008a, 30; Dill 2009, S109).³¹ Correspondingly, “central city” residents more likely commute by bicycle, as well as transit users (Plaut 2005, 354; Moudon et al. 2005, 253; Rietveld and Daniel 2004, 535; see Parkin et al. 2008; Tin Tin et al. 2010, 58).³² Bicycle commuters are also more likely to live in apartment buildings (35% of participants) than car commuters (15% of participants) and less likely to live in single-family detached residences (Plaut 2005, 351-352). Unsurprisingly, commuter cycling is more popular in places with dense population, mixed-use

³¹ One study concludes that attitudes more strongly correlate with travel mode than does land use (Kitamura et al. 1997, 156; see Heinen et al. 2011). The authors do not say land use is *not* important, just that attitudes are *more* important, although they also note a plausible connection between attitudes and where people choose to live. In any case, my study is concerned more with causal demographic factors than with associated attitudinal causes.

³² Cycling must not compete with, but rather may complement, public transit (Rietveld and Daniel 2004, 535).

development, and places in which it is less feasible to own a car.

Attitudes and Choice

Although this study primarily concerns socioeconomic traits that influence opinion toward bicycle lanes, it is useful to identify several theories on why people make particular choices, as the dataset contains relevant attitudinal questions that merit investigation. Several questions relate to bicycles, including thoughts about the bicycle share program. As rational beings, humans act to maximize personal benefit and therefore support policies that benefit themselves (Downs 1957, 36-37). In political language, people will vote for politicians who they believe will benefit them the most (36).³³ Theodore Newcomb (1943), in his discussion of reference groups, contends that individuals will adopt beliefs and attitudes held by particular groups when trying to identify with and relate to those groups (275). This is relevant in that certain appealing communities and individuals may see their own beliefs established in others. Regarding attitudes in general, Heinen (2011) notes that many studies on ridership use only utility theory and fail to ask why people in similar socioeconomic situations make different choices regarding cycling (102; see Daecher 1977, 388; Gatersleben and Appleton 2007, 311; Gatersleben and Uzzell 2007). However, as this study is the first to cover public opinion toward bicycle lanes, I focus on socioeconomic characteristics. Furthermore, the survey does not contain many questions on attitudes related to bicycles, but I include such information when available.

In reviewing the related literature, I explore the web of variables that influence bicycle ridership. Furthermore, I discuss the impact of bicycle lanes, and how safety can affect particular groups' perceptions of them. Some variables, such as gender, show clear-cut differences in

³³ This does not mean only cyclists will support bicycle lanes: Downs (1957) notes the ability for altruism to exist, where people who believe bicycle lanes improve society (but who do not use them) can support them, given that they agree with devoting limited resources to such projects rather than to ones that affect them directly (5, 36).

ridership within the United States. Others, however, like income, have complicated relationships. Below, I describe the method by which I examine the data, next determining which variables influence support for bicycle lanes. Table 1 displays the relevant survey variables, as well as my hypotheses on their relationship to support of bicycle lanes.

Table 1. Variables and Hypothesized Relationships

	Relationship in the Literature	Hypothesized Effect on NYC Bike Lane Support	Related Survey Question (CBS News and New York Times 2013) [Spanish not included]
Sex	Women ride less, more concerned with safety (e.g., DeGruyter 2003, Garrard et al. 2006, Tin Tin et al. 2010, Heesch et al. 2012)	Women more likely support due to bike lanes improving safety	Verbatim question not listed in codebook
Age	Young people ride more (e.g., Moudon et al. 2005; Dill and Voros 2007) but safety concerns older people more; 35+ think more bike facilities would influence riding (Girasek 2013; Tin Tin et al. 2010)	Young, middle-aged support more than older groups, who may not get as much utility from bicycle lanes	Verbatim question not listed in codebook
Education	Bike commuters more educated (Plaut 2005); students support (Ryley 2006, Buehler and Pucher 2012) but education leads to higher job prestige, decreasing support (Parkin et al. 2008)	Those in low- and high-prestige use bicycles; I hypothesize no significant effect	“What was the last grade in school you completed?”
Race	Whites ride more than blacks, Asians (U.S. DOT 2008a) but more for recreation (Pucher and Renne 2003); blacks support government attention to traffic safety more (Girasek 2013)	Whites more likely support; black safety concerns may not override white ridership	“Are you White, Black, Asian, or some other race?”
Latino or Hispanic	Latinos ride more than any racial/ethnic group, more for utilitarian purposes (U.S. DOT 2008a, Pucher and Renne 2003)	Latinos more likely support	“Are you of Hispanic origin or descent, or not?”
Income	Income lower for those who <i>commute</i> by bicycle (Plaut 2005); middle class and upper class more likely to be “regular cyclists,” <i>including recreation</i> (Dill and Voros 2007); high income is a proxy for bicycle and car ownership (Buehler and Pucher 2012; Heinen 2011)	Lower incomes more likely support (assumption that bicycle lanes in NYC mostly attract commuters, not those who want recreation)	“Was it under \$15,000, between \$15,000 and \$30,000, or between \$30,000 and \$50,000?” / “Was it between \$50,000 and \$75,000, or between \$75,000 and \$100,000 or was it over \$100,000?”
Employment	Those with part time jobs and in between jobs are more likely to commute by bicycle (Ryley 2006), while retirees are less likely	Temporarily out of work more likely support; out of the market less likely support	“Are you currently employed, or are you temporarily out of work, or are you not in the market for work at all?”
Marital Status	Singles are more likely to cycle, divorced, widowed, separated less likely (Moudon et al. 2005)	Single people will support more often	“Are you now married, widowed, divorced, separated, or have you never been married?”
Bicycle Education	Bicycle infrastructure, to increase ridership, should be accompanied by education/advertising efforts (Dill and Carr 2003)	Those who have heard/read more about the program will more likely support	“How much have you heard or read about the new bicycle sharing program in New York city — a lot, some, not much or nothing at all?”
Bicycle Access	Ownership → ridership (Heinen 2011); self interest (Downs 1957)	Those with access will support more	“Do you or anyone else in your household own a bicycle?”
Population Density	Higher density correlated with higher ridership (Buehler and Pucher 2012, 416)	Those living in higher-density boroughs more likely support	“What borough do you NOW live in?”
Bicycle Ridership	Rational self interest (Downs 1957)	Those who more often ride bicycles will support bicycle lanes more	“How often would you say you ride your bicycle — every day, a few times a week, about once a week, a few times a month, about once a month, or less often than that?”
Bicycle Share Use	Rational self interest (Downs 1957)	Those who expect to use the bicycle share system more often will support bicycle lanes more	“Bike sharing allows people to rent bicycles for short rides. For a small fee, riders can pick-up and drop off bikes at stations throughout the city. How likely do you think it is that you would use this service – very likely, somewhat likely, not very likely, or not likely at all?”
Political Philosophy	Liberals are more predisposed to supporting experimental government projects, environmental sustainability	Liberal respondents more likely support government work to create bicycle lanes	“How would you describe your views on most political matters? Generally do you think of yourself as liberal, moderate, or conservative?”
Political Party ID	See above; Democrats more likely liberal	Democrats more likely support	“Generally speaking, do you consider yourself a Republican, a Democrat, an Independent, or what?”
Bloomberg Approval	Bloomberg avidly supported bicycle commuting as mayor (Flegenheimer 2013); Newcomb’s (1943) reference group theory: people may adopt the views of those they like or respect	Supporters of Bloomberg will more often support his policies (bike lanes)	“Do you approve or disapprove of the way Michael Bloomberg is handling his job as Mayor?”
Time in NYC	May be confounded with age at high values	Unclear relationship	“How long have you lived in New York City?”

Notes: Spanish question for bicycle ridership excludes options for “about once a week” and “a few times a month.” It is not clear if this error is unique to the codebook. The question on ridership was posed only to those who had access to a bicycle.

Methods and Data

In this section, I describe the dataset used and the method I use for analysis, addressing the following question: How do particular characteristics relate to one's opinion toward bicycle lanes? This study employs data from a 2012 New York City public opinion survey, conducted August 10-15 (CBS News and *New York Times* 2012). New York suits my inquiry because of its dense population, culture of public transit use, and ex-Mayor Bloomberg's avid support of bicycle commuting (Flegenheimer 2013). This 97-variable survey was administered via telephone to 1,026 participants, covering issues such as the stop-and-frisk policy and large soda ban, as well as bicycle issues and demographics.³⁴ The study selected from New York City households with telephones (landlines and cell phones), employing a "variation of random-digit dialing (RDD) using primary sampling units ... of blocks of 100 telephone numbers identical through the eighth digit and stratified by geographic region, area code, and size of place" (CBS News and *New York Times* 2013). Within households, interviewers selected one adult to interview, "using a method developed by Leslie Kish and modified by Charles Backstrom and Gerald Hursh" (see Backstrom and Hursh-Cesar 1963). They adjusted data for national demographic patterns and for the decreased likelihood of residents who share a telephone to be surveyed.

I examine a variety of independent variables arising from extant research, including gender, race, and neighborhood characteristics. My dependent variable is support for bicycle lanes and is based on the following question: "As you may know, more than 250 miles of bicycle lanes have been added in the past four years. Do you think bike lanes are a good idea OR a bad

³⁴ Six variables concern bicycles: if and why participants support or oppose bicycle lanes (two questions), how much participants have heard of or read about the bicycle sharing program, the likelihood that participants would use that program, whether the participant has access to a bicycle, and, if so, how often the participant rides his or her bicycle.

idea?” (CBS News and *New York Times*, 2013).^{35,36} I lay out my variables and hypotheses in Table 1 above.

“Do you think bicycle lanes are a good idea or a bad idea?”	Number	Percentage
Good Idea	666	64.9
Bad Idea	291	28.4
Don’t know N/A	69	6.7

Source: CBS News and New York Times 2013

Binary logistic regression is frequently used with dichotomous dependent variables such as this one. Such an analysis investigates relationships between discrete independent variables and opinion toward bicycle lanes, determining which variables affect, and how much they affect, opinion (Vogt 2005, 180). Additionally, a particular question asks participants to expand upon their view of bicycle lanes, asking them *why* they answered as they did. This question is not suitable for quantitative analysis, but I discuss these responses in my conclusion. It explains some of what the logistic model cannot, particularly beliefs that were not directly measured by any question analyzed in the regression.

Results

Table 3 contains my logistic analysis of the opinion data, with the binary dependent variable of support for bicycle lanes against nineteen demographic variables and three interaction terms (I include regression results from before and after inclusion of the interaction terms). Additionally, I discuss several attitudinal variables below. Due to the large number of variables, only 813 out of 1026 cases were valid after listwise deletion of missing values.

³⁵ The survey included the questions in Spanish as well. 21 respondents, around 2%, interviewed in Spanish, and another 154 (15% of respondents) self-identified as Hispanic but were surveyed in English.

³⁶ In my study, to “think bicycle lanes are a good idea” and to “support bicycle lanes” are interchangeable.

Table 3. Coefficients for Bike Lane Support, Logistic Regression

	No Interaction Terms		With Interaction Terms	
	b	Odds Ratios	b	Odds Ratios
Education Level	.048 (.078)	1.049 (.081)	.142 (.088)	1.152 (.102)
Male	-.006 (.168)	.994 (.167)	-.034 (.170)	.966 (.165)
Income Level ³⁷	-.134* (.064)	.875* (.056)	-.146* (.065)	.864* (.056)
Black	.401 (.210)	1.494 (.314)	1.493** (.557)	4.449** (2.479)
Asian	-.157 (.395)	.855 (.337)	-.280 (.400)	.756 (.302)
Other Race	-.213 (.300)	.808 (.242)	-.256 (.306)	.774 (.237)
Hispanic	.321 (.270)	1.378 (.372)	.019 (.289)	1.019 (.294)
Bicycle Access	.429* (.169)	1.536* (.260)	.431* (.172)	1.539* (.264)
Married	.168 (.210)	1.183 (.249)	.321 (.222)	1.378 (.306)
Div. Wid. Sep.	.119 (.225)	1.126 (.253)	.174 (.228)	1.190 (.271)
Age between 18-29	.772* (.326)	2.164* (.705)	1.160*** (.378)	3.192*** (1.208)
Age between 30-44	.008 (.223)	1.008 (.224)	.022 (.228)	1.022 (.229)
Bronx	-.604* (.294)	.547* (.161)	-.496 (.297)	.609 (.181)
Brooklyn	-.614* (.294)	.541* (.161)	-.738*** (.297)	.478*** (.181)

³⁷ The yearly income variable in the survey was ordinal, so these results describe moving from one grouping to the next. Intervals were above/below/between the following: \$15,000, \$30,000, \$50,000, \$75,000, and \$100,000.

	(.239)	(.129)	(.246)	(.118)
Queens	-.635**	.530**	-.566*	.569*
	(.241)	(.128)	(.243)	(.138)
Staten Island	-.930***	.395***	-.942***	.390***
	(.310)	(.122)	(.313)	(.122)
Unemployed	-.244	.784	-.274	.760
	(.265)	(.208)	(.269)	(.204)
Not Seeking Employment	.157	1.170	.108	1.114
	(.206)	(.241)	(.209)	(.233)
Years Lived in NYC	-.011*	.989*	-.011*	.989*
	(.005)	(.004)	(.005)	(.005)
<i>Hispanic × Brooklyn</i>			2.559*	12.917*
			(1.078)	(13.930)
<i>Young × Married</i>			-1.779**	.169**
			(.657)	(.111)
<i>Education × Black</i>			-.351*	.704*
			(.160)	(.112)
Constant	1.526	4.598	1.216	3.375
	(.481)	(2.211)	(.511)	(1.725)

* $p < .05$, ** $p < .01$, *** $p < .005$

Note: Dependent variable is the binary response to the question on support of bicycle lanes. Standard error terms appear in parentheses. Interaction terms appear in italics. Range for non-dummy variables: Education from 1 = *Did not finish high school* to 5 = *Post-grad work or degree*; Income from 1 = *Under \$15,000* to 6 = *Over \$100,000*; Years Lived in NYC from 0 to 90; Education × Black from 0 = *Not black and any level of education* to 5 = *black and post-grad work or degree*

Table 4. Linear Regression Statistics

	No interaction terms	With interaction terms
Sample Size (n) =	813	813
Degrees of Freedom (df.)	20	23
Likelihood Ratio χ^2 =	54.61	75.31
P-value for Model =	0.0000	0.0000
Pseudo R^2 =	0.0549	0.0757

Of the 19 variables presented in the initial regression (before interaction terms were incorporated), eight were significant. Higher income decreased the propensity to support bicycle

lanes, as well as living in boroughs other than Manhattan. Residents of the Bronx, Brooklyn, and Queens had support reduced by similar magnitudes compared to Manhattan (the default for dummy variables) while residents of Staten Island were *far* less supportive of bicycle lanes (the least supportive borough). Table 5 displays the densities of each borough: Manhattan is far denser than others, while Staten Island has a low comparative density. Additionally, car ownership is much higher in Staten Island than any other borough, further explaining the lack of support in that borough (New York City Economic Development Corporation 2012; Buehler and Pucher 2012, 416). Additionally, the most supportive borough, Manhattan, has not only high population density but also low car ownership.

Table 5: Boroughs of New York City

	Population Density, persons per square mile	Car Ownership, percentage of households
Bronx	32,903.6	46
Brooklyn	35,369.1	44
Manhattan	69,467.5	23
Queens	20,553.6	64
Staten Island	8,030.3	84

Source: U.S. Census Bureau 2014 [Population Density] and New York City Economic Development Corporation 2012 [Car Ownership]

Note: A linear regression of these data shows high correlation ($R^2 = 0.92$)

Actual age had a non-linear relationship with support for bicycle lanes, so I substituted two dummy variables from the age *group* variable: one dummy refers to respondents 18-29 years old and the other to respondents 30-44 years old (compared to the default, those 45 and above). While support from respondents 30-44 years old did not differ significantly from the default, the dummy variable for 18-29 years old was significant: young respondents had higher rates of support than their older counterparts. On a related note, respondents who had lived in New York

for longer were less likely to support bicycle lanes.

The final significant variable was access to a bicycle, which increased the propensity to support, although not as much as other variables like being young.³⁸ Bicycle access could feasibly be confounded with other variables: suppose, for example, that black males are more likely to own a bicycle *and* support bicycle lanes. The effect of black males might be included twice, then, in not only the black and male variables but also the bicycle access variable. To test for this, I ran the regression with and without the bicycle access variable. Each yielded the same significant variables, so bicycle access is not likely confounded with other variables.

After testing for 47 possible interaction terms, three were significant when introduced simultaneously into the regression: being Hispanic and living in Brooklyn, being young and married, and being black and educated.³⁹ The introduction of these three interaction terms made the black variable significant (not so in the first regression) and degraded the Bronx variable, making it insignificant in the second regression. According to the second regression, being black makes respondents more likely to support bicycle lanes. As for interaction terms, the Hispanic and Brooklyn interaction term has a high magnitude and positive effect on bicycle lane support, while the young and married term and black and highly educated term have negative effects on support. The second regression accounts for statistically significant interactions between several variables, providing a more accurate description of how each variable influences support for bicycle lanes. I more thoroughly discuss the significance of each interaction term below.

Example Case

To illustrate the magnitude of each significant variable, I offer an example case based on

³⁸ On the other hand, dummy variables for having ridden a bicycle in the last week and month were insignificant.

³⁹ The black and educated interaction term does not involve two dummy variables like the others; its effect increases with additional education.

the second regression (including interaction terms). By positing a subject with common traits, one can observe the effect of significant variables on a relatively typical person. Suppose this person, whom I will call “Elizabeth,” is a white female who is college-educated, earns \$45,000 yearly, and is 48 years old. She is single, employed, lives in Manhattan, has resided in New York City for five years, and does not have access to a bicycle. Given these characteristics, Elizabeth is about 78% likely to support bicycle lanes. Consider the changed probability of support after the following alterations are made to her identity, *ceteris paribus*:

Table 6: Example case “Elizabeth”

Identity change	Change in support of bicycle lanes	Resultant chance of support
None	N/A	78.42%
24 years old instead of 48 <i>and</i> not married (avoiding the interaction term)	+13.65%	92.07%
24 years old instead of 48 <i>and</i> married (interaction)	-5.46%	72.96%
Black instead of white (implies black/education interaction) ⁴⁰	+1.47%	79.89%
Makes \$25,000 instead of \$45,000 ⁴¹	+2.37%	80.79%
Makes \$110,000 instead of \$45,000 ⁴²	-8.33%	70.09%
Owens a bicycle	+6.41%	84.83%
Has lived in NYC for 30 years instead of 5	-4.97%	73.45%

⁴⁰ Being black instead of white correlates with higher support here, but being black and more educated correlates with lower support than being instead of black and less educated.

⁴¹ As discussed in an earlier footnote, income was an ordinal variable in this survey. The values here make the example more realistic, but this change describes moving groupings from \$30,000-\$50,000 to \$15,000-\$30,000.

⁴² Similarly, this change is actually moving from \$30,000-\$50,000 to \$100,000 and above.

Lives in Brooklyn instead of Manhattan (<i>and</i> not Hispanic, avoiding interaction effect)	-14.96%	63.46%
Lives in Queens instead of Manhattan	-11.07%	67.35%
Lives in Staten Island instead of Manhattan	-19.80%	58.62%
Lives in Brooklyn <i>and</i> is Hispanic (interaction)	+17.39%	95.81%

Note: Changes are not cumulative. Interaction effects noted.

From Table 6, one can gauge the magnitude and effect of each significant variable. Being between 18-29 years old (and not married, avoiding the interaction term) as opposed to 45 or older, for example, increases the chance that Elizabeth will support bicycle lanes by about 14%. The largest possible increase concerns the interaction term between being Hispanic *and* living in Brooklyn: if she lived in Brooklyn instead of Manhattan and were Hispanic instead of white, she would be about 17% more likely to support bicycle lanes.⁴³ On the other hand, the largest possible decrease concerns living in Staten Island instead of Manhattan; if this change occurred, Elizabeth would be almost 20% *less* likely to support bicycle lanes. Because she has a college degree, it is important to note the effect that the interaction term for being black and educated has on her. Being black has a greater effect in magnitude than being young does, but the interaction term distorts this in Table 6. Suppose instead that Elizabeth had completed only high school instead of college.⁴⁴ In this case, with the interaction effect less potent (as it increases with each additional level of education), being black rather than white would make her about 13% more

⁴³ Living in Brooklyn instead of Manhattan decreases her propensity to support bicycle lanes, but being Hispanic and living in Brooklyn counteracts that effect, netting a positive change in Elizabeth's propensity to support.

⁴⁴ Investigating this supposition requires changing the initial characteristics included in the calculation. Therefore, the initial support value is different than the original Elizabeth (73.24% instead of 78.42%). However, most important is demonstrating the amount that being black would *change* her support at different levels of education.

likely to support bicycle lanes instead of about 1% more likely with a college degree.⁴⁵

Other Significant Variables

Although the main focus of this paper is demographic and socioeconomic variables, the survey contained several relevant questions regarding personal attitudes. Because the direction of causality cannot be determined between particular attitudes and opinion toward bicycle lanes, I did not include such variables in the main regression. However, they provide pertinent information on the attitudes of those who support bicycle lanes. Each of the following was added to the second regression alone (without other attitudinal variables; the regression with interaction terms).

First, approval of Mayor Bloomberg correlates positively with support of bicycle lanes. As stated in Table 1, Bloomberg was a strong proponent of bicycle lanes (Flegenheimer 2013). Returning to the example of Elizabeth, supposing she did not support Bloomberg by default, supporting him instead would correlate with about a 17% higher chance of supporting bicycle lanes.⁴⁶ Political philosophy was also significant: conservatives were less likely to support bicycle lanes than liberals. Supposing Elizabeth claimed to be liberal, being conservative instead would decrease her chances of supporting bicycle lanes by about 12%. Dummy variables for party identification yielded no significant results.

Participants were also asked how much they had heard and read about the then-upcoming bicycle share program. Because Dill and Carr (2003) argue that new bicycle facilities are much more effective if the public is educated on their presence, I used this variable as a proxy for

⁴⁵ If she had not completed high school, being black rather than white would increase her support by almost 18%.

⁴⁶ Each variable in this section was added to the original regression alone, generating different resultant coefficients for each variable. However, the important part is the percentage *change* of support correlated with each variable. These results illustrate *approximate* values of the change correlated with attitudinal variables. The default Elizabeth was 78% likely to support bicycle lanes, while the Elizabeth in the regression regarding political philosophy began at 81% and the Elizabeth in the regression regarding Bloomberg began at 66%. Elizabeth in the regression regarding bicycle share use began at 50%.

“bicycle education.” I hypothesized that participants who had learned more would more often support bicycle lanes. However, this was incorrect; the relationship was negative. Supposing Elizabeth had originally read “not much” about bicycle sharing, reading “a lot” instead would have made her about 6% *less* likely to support bicycle lanes.

Finally related were variables related to bicycle use itself. Respondents who expected to use the then-upcoming bicycle share program were more likely to support bicycle lanes.⁴⁷ Suppose initially that Elizabeth, with the same characteristics as above, reported that she is “not likely at all” to use the bicycle share system.⁴⁸ If, instead, she had reported that she would be “somewhat likely,” her chances of supporting increase almost 12%. If she had reported that she would be “very likely,” her chances would increase about 29% as opposed to saying “not likely at all.” Also significant was having ridden a bicycle owned by someone in one’s household in the past month. Supposing Elizabeth had originally not ridden or had lacked access to a bicycle, having ridden in the past month (or, both obtaining a bicycle and riding it) instead would increase her chances of supporting bicycle lanes by over 10%. These two variables indicate correlation between related activities, demonstrating cyclists’ and bicycle share users’ self interest in supporting facilities that help them, as suggested by Downs (1957).

The logistic analysis of the public opinion dataset yielded many thought-provoking conclusions. Although some variables, like gender, were clear-cut in the literature with regards to bicycle ridership, opinion toward bicycle lanes did not reflect a corresponding pattern. On the other hand, relationships that seemed clear, like education on bicycle issues, had the opposite effect in the regression. Below, I analyze the predictive ability of ridership trends, posit why

⁴⁷ The survey was given in August 2012, and the Citi Bike program debuted on May 27, 2013 (Flegenheimer 2013).

⁴⁸ The survey question provided four options: “very likely,” “somewhat likely,” “not very likely,” and “not likely at all” (CBS News and *New York Times* 2013).

particular trends emerged, and discuss the future of bicycle lanes in New York.

Discussion and Conclusion

This study tests the relationship of a large number of possible correlates of support for bicycle lanes in order to serve as a basis for future research on public opinion toward bicycle lanes. In this section, I evaluate the predictive ability that ridership has on support of bicycle lanes. An important theme is the difference between bicycle ridership, which much of the literature discussed, and support of bicycle lanes. In some cases, trends follow from the proxy literature on ridership to opinion toward bicycle lanes, but in others, certain demographic characteristics do not significantly influence support as expected.

Factors That Predict Support

The data indicate that young people, those with access to bicycles, those living in higher density boroughs, those who planned to use the bicycle share system, those with lower incomes, liberals, and supporters of Bloomberg are more likely to support bicycle lanes. For example, young people were more likely to support bicycle lanes than those 45 and older, consistent with Ryley's (2006) life stage theory, which discusses young people's less consistent incomes, lack of car ownership, and living situations.⁴⁹ Regarding boroughs, Matt Flegenheimer, a *New York Times* correspondent, observed in a personal interview that low support among residents of Staten Island might be attributed to higher car dependency and conservatism than other boroughs, as well as lower population density. Furthermore, the *Staten Island Advance* published a fiery editorial opposing bicycle lanes in 2010, as well as an article entitled "More Bike Routes, Whether Staten Island Likes Them or Not," and another detailing the assault of a cyclist in a bicycle lane who was obstructing a turn lane (*Staten Island Advance* Editorial 2010; Yates 2009;

⁴⁹ In a personal interview, *New York Times* correspondent Matt Flegenheimer (2014) noted that young people likely consider the environmental impact of their actions more than older people, which encourages bicycle use.

Balsamini 2009). In regards to support of then-Mayor Bloomberg, the results are consistent with Newcomb's (1943) reference group theory in that people who support Bloomberg tend to support his policies as well.

Race proved to be a significant predictor, but not as anticipated. Black respondents were more likely to support bicycle lanes than whites, and were more in favor of more governmental action on traffic safety than whites. Typically more liberal political philosophies among blacks were not captured in the initial regression, which did not include attitudinal variables, so this may account for higher support as well. Furthermore, the survey does not account for wealth, as opposed to income. Due to low levels of wealth (historic and familial financial assets) compared to whites, blacks may be less able to invest in private transportation or afford more expensive homes nearer to public transit, spurring higher support for alternative transportation methods (see Oliver and Shapiro 1995; Shapiro 2004). However, the interaction term between being black and educated *decreases* the probability of supporting bicycle lanes with each additional level of education that black respondents attain. This interaction may occur because of greater image-consciousness among blacks; perhaps if they have completed higher education do not want to use or support a mode of transportation that may imply their own frugality. Furthermore, this relationship is conflicting due to the literature that states that more educated people cycle. As evidenced by the complexity of black and Hispanic opinion toward bicycle lanes, such issues merit further research.

Education on bicycle issues (having read or heard more about bicycle share) surprisingly correlated with a decreased probability of support of bicycle lanes. I hypothesized that if participants had learned more about the upcoming bicycle share program, they would be more likely to support bicycle lanes due to the literature that said commuters should be educated on

options in order to encourage bicycle travel. However, the relationship was the opposite, perhaps due to the presence of negative press coverage (see above examples from the *Staten Island Advance*). Finally, time lived in New York City also had a negative relationship. Flegenheimer (2014) remarked that long-time residents of the city might be suspicious of bicycle lanes as part of a general trend leading to gentrification and increasing rents in their neighborhoods, one example being Park Slope in Brooklyn. This could also be a proxy for age, perhaps introducing the possibility that people grow more conservative as they grow older (as actual age was not measured in the regression, just age group, with 45 and over as one group). Education on an issue and time lived in a particular place further demonstrate the complexities of opinion and the factors that influence it.

Although being conservative was a significant variable, being a Republican was not; this disconnect may be due to greater variation among New Yorkers in stated political philosophy than in party identification (the majority were Democrats, but less than 40% were liberal).⁵⁰ Neither lacking employment nor being single was significant. Part of Ryley's (2006) life stage theory was validated by the significance of the variable for young people, but the lack of significance for employment and marital status indicates that other portions of the theory do not hold for opinion toward bicycle lanes, despite differences in ridership. However, the interaction term for those who are young and married had a negative coefficient, speaking to the marital status component of Ryley (2006) and Moudon et al. (2005), but only when applied to young people, offsetting the positive effect that being young has.

After exploring several manipulations of ridership variables, one was significant. The

⁵⁰ Party identity in the survey data was very skewed towards Democrats (58.2% vs. 18.8% independent and 13.8% Republican). On the other hand, political philosophy was more evenly distributed (36.2% liberal, 32.1% moderate, 21.1% conservative). Percentages do not add to 100% due to "don't know/not applicable" answers.

survey question was only posed to those who had access to a bicycle, and adding that to the regression was not significant (this question was posed to only 489 of 1026 participants). Additionally, adding dummy variables for having ridden in the past week or in the past month were also insignificant. However, when all participants were included, the result was significant; respondents who had ridden a bicycle owned by someone in their household were more likely to support than those who either did not have access to a bicycle or, if they did, did not ride it within the past month. As this survey was given in August, it is reasonable to assume that inclement or cold weather did not contribute significantly to a lack of ridership.

Factors That Do Not Predict Support

Variables that were not statistically significant include being female, Latino, unemployed, single, Republican, one's education, and one's bicycle ridership.⁵¹ I hypothesized that females would support bicycle lanes more often due to an elevated focus on safety, but the safety effect may have not mattered as significantly or may have been offset by high male ridership. Furthermore, this result indicates a distinction between those who *ride* and those who *support* bicycle lanes. Surprisingly, being Latino in Brooklyn was significant (and the largest interaction term), but being Latino in any other borough was insignificant. The proportion of Latinos is between 17.3% and 27.5% in all boroughs except the Bronx, in which it is 53.5%; Brooklyn has no unusually high Latino population for New York City that might explain the interaction term (New York City Dept. of City Planning 2010a). Therefore, it may be caused by a difference in opinion between Latino populations in different boroughs.⁵²

⁵¹ The Bronx was the only borough variable not significant under .05 after inclusion of the interaction terms.

⁵² I also examined the Latino population in each borough by origin (e.g., Mexico, Dominican Republic, Central America). Brooklyn contains no major subgroup in substantially higher or lower proportion of the entire Latino population than any other borough. For example, Puerto Ricans form 35.6% of Brooklyn's Latino population, 40.3%

Evaluation and Conclusion

One important question to answer is ridership fared as a predictor of support of bicycle lanes in this study. Much of the proxy literature reviewed dealt with ridership rates among particular groups, although substantial amounts looked also at concerns over safety and other factors. Many variables, had they been predicted solely by ridership (whether or not that was the case here), would not have the same outcomes when testing for opinion toward bicycle lanes. For example, males, the unemployed, students, and more educated people ride bicycles more often, but none of those variables was significant in predicting support of bicycle lanes. Others, like being Hispanic and being married (riding more and less, respectively), were not significant in themselves but part of an interaction term that influenced support in the same direction as ridership. Four traits' effects on ridership accurately depicted their effects on bicycle lane support: being young, living in a dense neighborhood, income level (when utilitarian use only considered), and bicycle access or ownership (no specific literature supports, but a clear connection). The inability of ridership alone to predict opinion certainly merits further research on this subject for its applicability to urban policy. It also offers the conclusion that people are willing to support policies they feel will improve society, even if they do not take advantage of them (recall this discussion of altruism in Downs (1957)). In an urban planning sense, people appear to be willing to support policies that might improve their neighborhood, even if they do not benefit directly. Such people may feel that bicycle lanes benefit the urban landscape, environment, or community in particular ways that extend beyond merely the expansion of active transportation. Policymakers and planners should adequately distinguish between these two ideas, as the groups who support the idea may not necessarily be the ones to take advantage of it

in the Bronx and 26.7% in Manhattan (New York City Dept. of City Planning 2010b). Such differences do not appear to set Brooklyn apart from *all other boroughs* with regards to any major subgroup.

in practice, and vice versa.⁵³ This also encourages future research on this subject to determine more particular reasons that encourage people, especially non-cyclists, to support bicycle facilities.

Although not comprehensive, the survey question asking participants to elaborate on their answer to the bicycle lane question does elucidate some of the attitudes discussed above, asking, “What’s the main reason you think bike lanes are a good/bad idea?” On the positive side, the most cited reasons were “space for bikes,” “better for environment,” and “health reasons” (CBS News and *New York Times* 2013). Significant numbers of participants also cited “general safety,” “safer for bikes,” and “bikes off sidewalks,” supporting the safety and walkability discussions in the literature review. Surprisingly, only 20 participants said bicycle lanes were “economical,” whereas 70-140 respondents chose other options; this suggests that cost-saving reasoning may not be as important in people’s decisions (although income level was a significant variable). On the other hand, the most cited reasons for bicycle lanes being a bad idea were “hinders traffic,” “dangerous,” and “don’t obey traffic laws.” These answers indicate, in addition to legitimate concerns with safety, a culture that has not yet adapted to cycling: some cyclists do not know or do not follow rules, and some respondents may retain the view that streets are solely for cars. Also cited were “unclear rules,” “not used enough,” and “decreased parking spaces.” Despite increases in cycling in New York City, it is still a minor mode relative to public transit and cars, and it will take time before cycling rules are common knowledge and before most people believe that cycling facilities are used sufficiently to justify their presence. However, ridership is increasing, giving a positive outlook for the future of cycling in New York City.

⁵³ As stated earlier in this study, the FHWA suggests implementing bicycle lanes in places with less experienced cyclists (Krizek and Roland 2005, 56; see McClintock and Cleary 1996, 72; Minnesota DOT 1996; U.S. DOT 1999).

Besides the results, there are several noteworthy trends regarding the future of bicycle lanes in New York City. Despite the negative relationship between income level and support for bicycle lanes, *Times* reporter Matt Flegenheimer also noted in an interview that cycling is starting to take hold in wealthier neighborhoods in New York (2014). Although income level was significant and changed probability of supporting by several percentage points for each level, other variables had effects of greater magnitude, illustrating that the income effect is not as powerful as other effects, such as which borough one lives in. Future research on this topic should consider how opinion changes for particular groups over time.

A survey from January 2014 provides a snapshot of opinion toward bicycle lanes a year and a half after the dataset I analyzed. The Quinnipiac University poll from January 9-15 contains the following question: “Do you think Mayor de Blasio should or should not expand bike lanes in New York City?” (Quinnipiac 2014).⁵⁴ This is, of course, a much different question than the dependent variable of my study, which asks if participants think bicycle lanes are a good or bad idea. However, some similar trends are evident, helping to bolster my results as well as demonstrate change over time. Residents of Staten Island were most opposed to expansion of bicycle lanes (59%), and residents of the Bronx and Manhattan were similar in their support for expansion (49% and 48%, respectively). Those aged 18-29 were most in favor (49%), a trend that declined with age to 31% among those 65 and older. This may also reflect a generational effect, in which older respondents are more conservative, or perhaps have lived in their neighborhoods longer and dislike change. Democrats favored the expansion much more than Republicans (48% and 32%), and Hispanics were the only racial group polled with the majority in favor (56%; white, 38%; black, 41%). Mayor de Blasio has publicly supported the expansion

⁵⁴ This poll had 1,288 participants.

of bicycle lanes and the bicycle-sharing program; time will tell how the new administration handles bicycle commuting and how the public responds to its approach (Mann 2013).

In this paper, I have reviewed numerous sources on bicycle commuting and ridership, analyzed public opinion data using logistic regression, and demonstrated the effect of numerous demographic and socioeconomic characteristics on public opinion toward bicycle lanes. Important variables in predicting support of bicycle lanes are income, race, bicycle ownership, being young, population density of neighborhoods (perhaps also car ownership rates), and how long one has lived in a particular neighborhood. Additionally, education levels matter in predicting support by African Americans, being Hispanic is only significant in Brooklyn, and those who are both young *and* married tend to support less. Several other variables correlate with bicycle support as well, including political philosophy and support of ex-Mayor Bloomberg. In regard to overall public opinion and urban planning, it appears that people are willing to support policies that do not directly benefit them (although they may feel advantages from a sense of overall neighborhood enhancement).

Overall, this study fills a critical gap in urban studies literature, generating practical results that can be used by policymakers to address the concerns of their constituents. The literature will benefit from future studies of this type that examine data from other cities within the United States and around the world, building a comprehensive analysis of public opinion toward bicycle facilities that allow policy and infrastructure development to be tailored more closely to constituents' wants and needs.

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