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## The Fall 2008 UNL Bike Survey: Examining the status of bicycle transportation at the Univeristy of Nebraska-Lincoln

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THE FALL 2008 UNL BIKE SURVEY: EXAMINING THE STATUS OF BICYCLE  
TRANSPORTATION AT THE UNIVERSITY OF NEBRASKA-LINCOLN

Brent Schmoker, B.S.

University of Nebraska-Lincoln, 2008

Advisers: Dr. J. Allen Williams and Dr. Susan L. Wortmann

This study evaluates the state of bicycle use by University of Nebraska-Lincoln (UNL) students during the fall semester of 2008. An online survey was administered to a random sample of graduate and undergraduate students to determine the factors that encourage and inhibit students from using bikes for transportation to campus. The results suggest that a significant portion of the student population uses bikes for transportation to campus but several factors combine to keep the overall number of bicycle commuters low. The paper concludes with suggestions for increasing bike commuting to UNL and predictions about the future of transportation in the United States.

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“From the moment its machines could put more than a certain horsepower behind any one passenger, [the automotive] industry has reduced equality, restricted mobility to a system of industrially defined routes, and created time scarcity of unprecedented severity. As the speed of their vehicles crosses a threshold, citizens become transportation consumers...”

-Ivan Illich, *Toward a History of Needs*

“The bicycle is the most civilized conveyance known to man. Other forms of transport grow daily more nightmarish. Only the bicycle remains pure in heart.”

-Iris Murdoch

“Every time I see an adult on a bicycle, I no longer despair for the future of the human race.”

-H.G. Wells

**INTRODUCTION:**

Following the collapse of the Interstate 35W bridge in Minneapolis on August 1, 2007, federal authorities scrambled to determine how such an important bridge could have been weak enough to collapse during rush hour. In the aftermath of a catastrophe that killed 13 people and highlighted the sorry state of America's transportation infrastructure, Secretary of Transportation Mary Peters refused to talk about politically complex issues such as traffic congestion, outdated roads and bridges, and the lack of alternative transportation. Instead, she chose to place the blame on the only group of people who had done their part to alleviate the problem: the nation's bicyclists.

In an interview with Jim Lehrer, Peters shied away from suggestions that the government should increase gas taxes to replace the country's crumbling infrastructure and proceeded to blast federal earmarks that were "wasting" transportation funds on bike paths, bike lanes, and multi-use trails (Mieszkowski 2007). She followed by saying that bike paths are "not really transportation," continuing the federal trend of stripping funds from bike transportation projects such as the Transportation Enhancements program and redirecting them into building more highways (Mieszkowski 2003). While Peters' skepticism over the value of bike infrastructure is merely a reflection of the conventional American belief that bikes are for recreation and cars are for transportation, the fact that she directed the outrage over the bridge collapse onto bike projects was enough to make even the most cynical bicycle activist cringe. The tragedy of the situation was not lost on the Minneapolis biking community, who noted that by biking to work instead of driving, they were directly reducing the traffic congestion that undoubtedly contributed to the bridge's failure.

Peters' opinion that funding and encouraging bicycle transportation is not a realistic option for the American public is a continuation of what bicycle advocates including author John Forester call the "toy bike syndrome," the notion that bicycles are great for children and recreational users, but do not constitute a vehicle that can be used for transportation (Forester 2001). Forester argues that this belief is based on "emotion" and "superstition," and has never been substantiated by scientific evidence (Forester 1994, 5). Indeed, many cities and countries in the world have strong traditions of successfully integrating bicycles into their transportation policy, infrastructure, and lifestyle. Some exceptional examples from Europe include: the Netherlands, where 27% of all trips are made by bike; Copenhagen (Denmark), where one-third of the population commutes to work by bike; and Berlin (Germany), where bikes account for 12% of all transportation (Harden 2008). Significant progress in encouraging bike use has also been made in places like Bogotá (Colombia) and Taipei (Taiwan), where bike use has surged in recent years (Harden 2008).

While there are clear differences between the transportation situation in the U.S. and the bike-friendly cities of Europe, several American cities demonstrate that bicycle transportation can be effective in North America as well. Portland, OR is widely considered the pinnacle of bike-friendly cities in the U.S. By constructing bike lanes and funding commuter safety programs over the past 15 years, Portland has increased its bike use by nearly 400% and cycling now comprises 4% of the city's total transportation (the highest rate among major U.S. cities) (Harden 2008). Other cycling success stories in the U.S. include San Francisco (most bike commuters of any U.S. city), Davis, CA (17% of

all trips made by bike), and Boulder, CO (21% of commute trips made by bike). (Preston 2007, 10-17)

Several factors contribute to these cities' success in encouraging bicycle transportation, including high population density in the case of Portland and San Francisco, large university populations in the case of Boulder and Davis, and temperate climates that encourage outdoor activity. While most American cities do not enjoy all of these characteristics and many tend to be spread out over vast areas, a study conducted by the Department of Transportation in 2001 found that roughly 40% of the trips made by Americans are within 2 miles of their house (U.S. Department of Transportation 2003). This finding suggests that while it may be difficult to use a bike to commute to work for people living in the sprawling cities of the Midwest and Southeast, a significant number of short-range trips currently made by car could be replaced by ten-minute bike rides.

In spite of its potential usefulness in alleviating traffic congestion and other social and environmental concerns, American bike use still accounts for less than 1% of all trips and bike advocates are searching for ways to lessen the marginalized status of cycling in the U.S. In a recent article published at Rutgers University, John Pucher and Ralph Buehler contrast the policy decisions made by the U.S. and Great Britain (where cycling also accounts for around 1% of transportation) with the Netherlands, Denmark, and Germany, three countries that have succeeded in making cycling a "safe, convenient, and attractive" way to get around cities (Pucher and Buehler 2008, 497). Since all five countries are affluent, capitalist democracies with high levels of car ownership, the authors suggest that the primary reason that cycling is safer and more popular in the

Netherlands, Denmark, and Germany is the difference in policymaking between the two groups.

In the three countries with the highest levels of bike use *and* bike safety, the local and national governments have coordinated an array of policies including: designing effective bike lanes, paths, and intersections; ample bike parking; coordination with public transportation; and cycling safety and promotion campaigns (Pucher and Buehler 2008, 510). In addition to regulations aimed at limiting the use of cars in neighborhoods and downtown areas, these policies have directly contributed to tremendous increases in bike use and reductions in bike-related accidents and injuries (Pucher and Buehler 2008, 507-508). In contrast, the majority of American and British cities have enacted just a fraction of the pro-bike policies (bike lanes, bike education and promotion, etc.) found in Europe, and policies aimed at addressing the externalities associated with the personal automobile (congestion and gas taxes, reduced speed limits, car-free districts, etc.) are politically impossible in most areas of the U.S (Pucher and Buehler 2008, 518). Without the mutually reinforcing effects of pro-bike infrastructure coupled with policies that make car use more expensive to account for its externalities, the United States may never realize the substantial social and environmental benefits that could be gained through widespread bike use and the country will be left to deal with the consequences of its dependency on cars.

In addition to overcrowded roadways and deteriorating infrastructure, America's dependency on the personal automobile inflicts an array of social and environmental maladies that could be reduced by supporting bicycle transportation as a partial replacement for driving. The negative externalities associated with perpetual car use in



the U.S. have been valued at over \$300 billion per year and include the following: (1) the tremendous amount of property damage and loss of life caused by car accidents (more than 40,000 Americans die in car crashes each year), (2) air pollution caused by car exhaust (including 45% of the world's automotive-based greenhouse gas emissions), (3) fragmentation and loss of wildlife habitat caused by highways and urban sprawl, and (4) the tremendous amount of resources needed to build and maintain the interstate highway system (Dubner and Levitt 2008; Ripley 2008; DeCicco and Fung 2007, 5). Car dependency also facilitates the sedentary lifestyle that contributes to America's epidemic levels of obesity, diabetes, and the general disconnect with nature identified by writer Richard Louv (Louv 2005). A society based upon the personal automobile also requires a constant supply of foreign oil, a situation that undoubtedly shapes the country's foreign policy decisions and compromises national security and world peace.

Despite the tremendous potential of bicycles to reduce air pollution, congestion, traffic accidents, and obesity in urban areas, relatively little research has examined the factors that encourage and discourage people from using their bikes as a form of transportation. Of particular interest should be the behavior and beliefs of current university students, a group of Americans who have come of age in an era when the personal automobile has drawn increasing criticism due to its association with environmental catastrophe, public health crises, mass congestion and deteriorating infrastructure, and geopolitical conflicts in petroleum-rich areas of the world. As the numerous financial, environmental, medical, and psychological costs of America's dependency on automobiles become increasingly evident, research is needed to determine

whether the current generation of university students is modifying its transportation behavior compared to the general population of the United States.

In March 2001, the University of Colorado at Boulder conducted a survey on student bicycle use. The study found that 52% of students owned a bike in Boulder and among bike-owners, 72% used their bike to get to work, campus, or the store (UCSU Environmental Center 2001). A similar survey conducted at San Jose State University found that the number of students commuting by bicycle has increased by 16% over the past 2 years (Salas 2007). Apart from these two surveys, few, if any, studies have been done on the transportation habits of university students. Since both of these studies were conducted at universities in cities with relatively high bike use, a study is needed to measure the level of bike use in Lincoln, NE, where the U.S. Census in 2005 found that bikes account for 0.9% of total transportation (U.S. Department of Transportation 2005).

The purpose of this study is to evaluate the state of bicycle use among students enrolled at the University of Nebraska-Lincoln (UNL) during the fall semester of 2008. By administering a web-based survey, the following questions were asked: (1) what percentage of UNL students use bicycles for transportation (i.e. commute to school, work, or shopping by bicycle)? (2) Among students who commute by bicycle, what are the most important factors that motivate their bike use? And (3) Among students who do not commute by bicycle, what are the most important factors that deter them from using bikes for transportation? The thesis concludes with suggestions for increasing bicycle commuting to UNL and improving the overall quality of the biking culture in Lincoln.

**MATERIALS AND METHODS:**

An online survey was created using the platform available from the Survey Monkey website (<http://www.surveymonkey.com>). This website allows researchers to design web-based questionnaires and send links to potential participants via e-mail. All of the questions used during the study are shown in the Appendix. In addition to the wording and format provided in the Appendix, the online survey also includes skip logic, in which a participant's response to a question determines the subsequent questions that he or she will receive. For example, if a participant answers "No" to the first question ("Do you own a bicycle in Lincoln?"), then the next question will be about other modes of transportation. In contrast, a person answering "Yes" on the first question will receive subsequent questions about how they use their bike in Lincoln.

After its creation, the survey gained approval from the UNL Institutional Review Board (IRB), which found that it posed no significant risks for human participants. Once the IRB approved the study, the author worked with Juan Carlos Gutierrez from the UNL Admissions Office to generate a random sample of student e-mail addresses that would receive an invitation and a link to take the survey (the text of the e-mail message is included in the Appendix). E-mail invitations were sent to a total of 2,400 randomly selected graduate and undergraduate student e-mail addresses on Tuesday, November 4, 2008. The survey was kept active for the following month and results were compiled after a total 461 responses had been collected.

**RESULTS:**

The survey generated a response rate of 19.21% (461 responses from 2,400 e-mail invitations). Figure 1 shows that of the 461 students surveyed, 230 ( $49.89 \pm 4.52\%$ , Confidence Interval = 95%) own bicycles in Lincoln. Of these 230 students, 166 (72.17%) use their bikes for recreation and 150 (65.22%) use them for transportation (see Figures 2 and 3). Figure 4 shows that among the 150 students that reported using their bicycles for transportation, 131 (28.42% of the total sample) use them to commute to classes at UNL. Figure 5 depicts the primary mode of transportation for the remaining 311 participants. The sample included 266 females (57.70%) and 195 males (42.30%), which represents an oversampling of females compared to the overall gender distribution at UNL (47.5% female, 52.5% male). This difference suggests that the confidence interval for the statistics reported above may be closer to  $\pm 10\%$  rather than  $\pm 5\%$ .

After UNL bicycle commuters had been identified, they were asked a series of questions about how often they commute by bicycle and given the opportunity to identify factors that encourage and discourage them from biking to UNL. The results of the frequency questions are depicted in Table 1. The first column depicts the number of bike commuters that fell into each of the four frequency categories (biked to UNL 0 times/week, 1-2 times/week, 3-4 times/week, and 5 or more times/week) during the fall semester of 2008. The second and third columns of Table 1 show the number of times that participants expect to commute during winter and spring months of the school year.

Figure 6 shows the number of participants who indicated that each of four factors (health/fitness, saves money, environmental concern, and enjoyment) was important in motivating them to commute to UNL by bicycle. Space was also provided for

participants to enter additional factors that motivate their bike use and 18 participants indicated that biking saves them time in comparison to driving a car or taking the bus. Figure 7 shows the results of a subsequent question that asked bicycle commuters to identify factors that would encourage them to bike to campus more often, with over 60% of participants indicating that safer routes such as bike paths and bike lanes would boost the number of times they commute to campus using a bike.

Participants who did not own a bike were asked to identify the factors that prevent them from biking to UNL. Their responses are depicted in Figure 8. Of the 231 participants without a bike, the factors that were selected most often were distance, weather, and personal preference. Among the 53 comments entered into the “other” section of this question were concerns about safety and the inability to transport children without a car.

## **DISCUSSION:**

The results of this study suggest that the prevalence of bicycle commuting among UNL students (28.42%) compares very favorably to the prevalence observed in the wider population of Lincoln (0.9%) measured in 2005. This result is not surprising considering the tendency for students to have lower incomes, greater physical fitness, and closer proximity to school or work compared to the adult public. The degree of bike commuting at UNL also approaches the 37.44% measured at the University of Colorado, although it's likely that the difference in sampling and survey methodology between the two studies could significantly alter these results (e.g. the CU survey conducted telephone interviews during the spring semester). While the finding that over one-fourth of all

UNL students from a representative sample have commuted to campus by bike at least once this year is encouraging, excitement should be tempered by considering two flaws in methodology.

First, the Internet survey method required the author to disclose a fair amount of information about the study in order to interest potential test subjects to participate. As seen in the e-mail invitation in the appendix, the invitation says that the survey is about bicycles and transportation to UNL. As a result, it is probable that students with an interest in cycling and UNL's transportation situation were over-sampled because they were more likely to participate in a study that applies to their everyday experience.

The second factor that could be artificially inflating the prevalence of bicycle commuting to UNL is the fact that 26.3% of the students who participated in the survey live on UNL's city campus. Although it's still great that these on-campus students are biking to class, their bike trips are most likely replacing short walks across campus instead of commuting trips made by car or bus. This interpretation is also supported by the fact that only 50% of the students without bikes got to campus by car, a finding that would shock anyone who has searched in vain for parking on campus during the school year. In future research, more in depth questioning is needed to measure the distance and location of bicycle commutes in order to differentiate bike trips made entirely on campus sidewalks versus bicycle commutes that originate in other parts of the city.

It is also important to note that this survey was administered in early November 2008, when gas prices have dipped below \$2 per gallon. Had the study been conducted in late August, when the threat of \$4 gas was still fresh in the minds of most Lincolniters, the number of students experimenting with alternative forms of transportation may have

been greater. As a result, the current study may represent a baseline for interest in biking and future depletion of fossil fuel supplies may encourage even more students to consider the viability of biking to campus.

The second major finding of this study is that student bicycle commuters appear to appreciate the many benefits associated with biking, with saving money on gas, parking, and car repairs as the most common factor that motivates their behavior. A significant number of participants also entered “saves time” as another reason that they bike to campus and future research should add this to list of answers available for this question. Similarly, the question that asked bicycle commuters what would encourage them to bike to campus more often elicited an array of responses. In this case, the most common factor was clear: 80 participants selected safer routes to campus as an important concern while the second most common choice (secure storage) garnered only 49 responses. The result that bicycle infrastructure, sufficient storage facilities, and integration with public transportation (adding bike racks to the city buses) were seen as ways to increase cycling frequency supports the findings of the Rutgers study and suggests that the European model of bike policy may be beneficial in Lincoln.

The third primary objective of this study was to determine the factors that prevent UNL students from commuting to campus by bike. The results in Figure 8 suggest that while personal preference for other forms of transportation likely leaves a considerable segment of the population “unreachable” by pro-bike policy, a number of non-biking students indicated that distance from campus and safety concerns prevent them from attempting their first commute. Improving the city’s bike paths could alleviate both of these concerns and adding bike racks to the city’s bus fleet would allow people to use a

combination of biking and bus riding to get to school or work. While radical changes in Lincoln's lifestyle and infrastructure (and climate) would be needed to significantly increase the city's broader cycling population, the results of this survey suggest that there is a healthy degree of interest in bicycle transportation even among students who do not own a bike.

In future research, questions that ask participants to identify factors that encourage or discourage them from biking should be changed from the "choose all that apply" typology to a format that asks students to rank the relative importance of a list of factors. This ranking method would be more effective because it would provide information about the relative importance of the various factors, allowing the researcher to identify the most important factor that motivates bike use rather than the "most common factor" analysis provided in this study. In addition, future research asking cyclists to rate the importance of transportation factors will be more comprehensive due to the variety of responses collected in the "other" category of the present questions. With a comprehensive list of the factors that cyclists and non-cyclists are thinking about, questions that rank the relative importance of the factors could be useful in helping communities determine the most pressing needs of bikers and efficiently investing their limited transportation dollars.

The results of the 2008 UNL Bike Survey suggest that there is a tremendous amount of interest in biking among the student population and that a significant number of students have already experienced the benefits associated with biking to campus instead of driving. While the current study has a number of limitations including the sampling bias introduced by e-mail invitations, the inability to ask follow-up questions in



an online survey, and the fact that several distance learning students (people taking correspondence courses over the Internet) were accidentally included in the sample, this study provides a baseline for future inquiry into the state of Lincoln's cycling community. With a small amount of funding, the results of a similar study could be significantly more informative and the university could gain valuable insight into the potential benefits of bicycle-based transportation.

**ACKNOWLEDGEMENTS:**

The author wishes to thank Dr. J. Allen Williams, Dr. Susan Wortmann, Dr. Robert Kuzelka, Sara Winn, and Juan Carlos Gutierrez, whose guidance, effort, and encouragement made this project possible. I'd also like to thank the students in my thesis planning classes (UHON198H and ENVR499H) and everyone who took the time to complete the survey. Finally, I'd like to thank my family for their unwavering love and support over the past 22 years.

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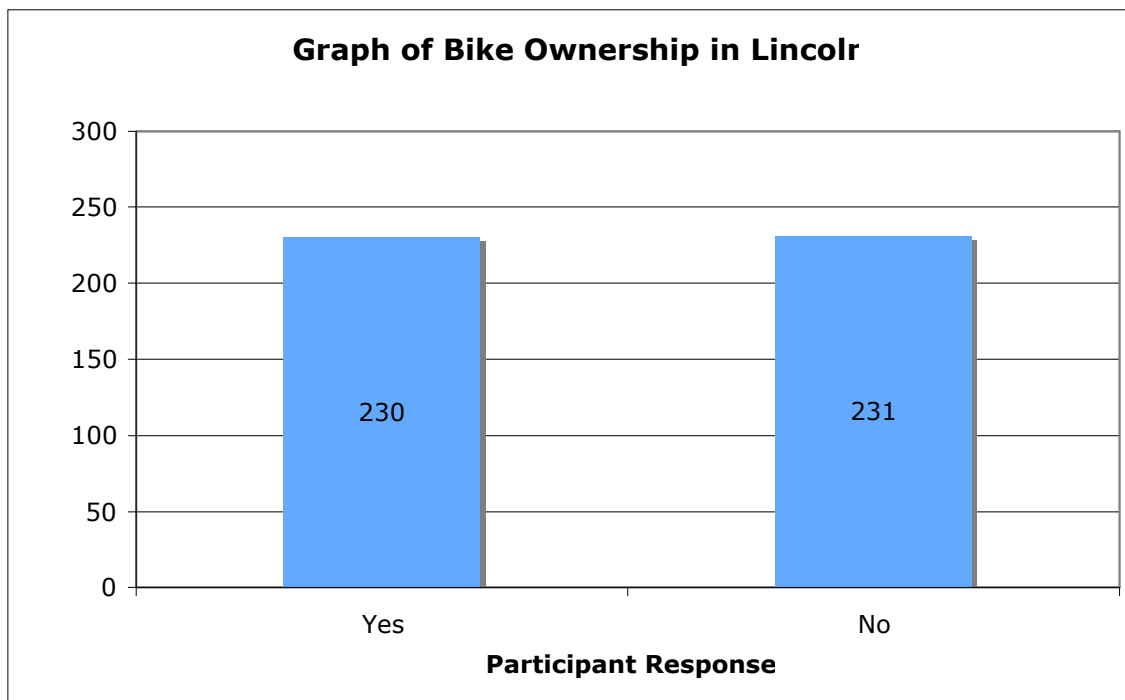
**FIGURES AND TABLES:**

Figure 1. This graph depicts the number of participants answering yes or no in response to the question “Do you own a bicycle in Lincoln?”

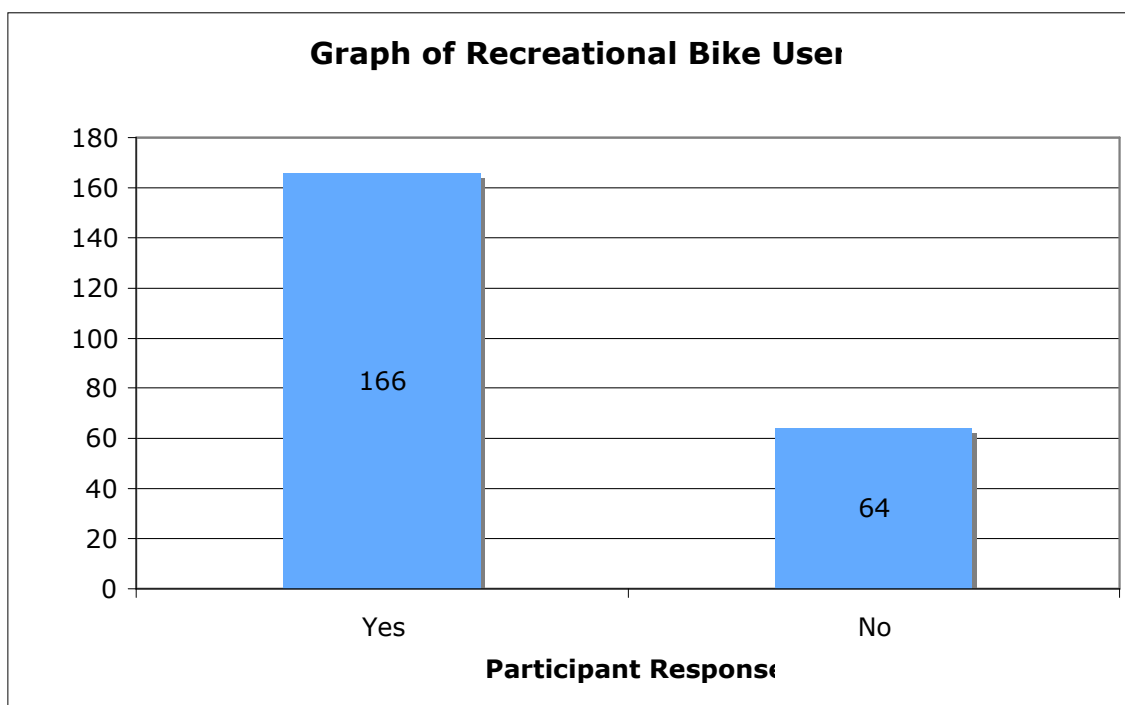
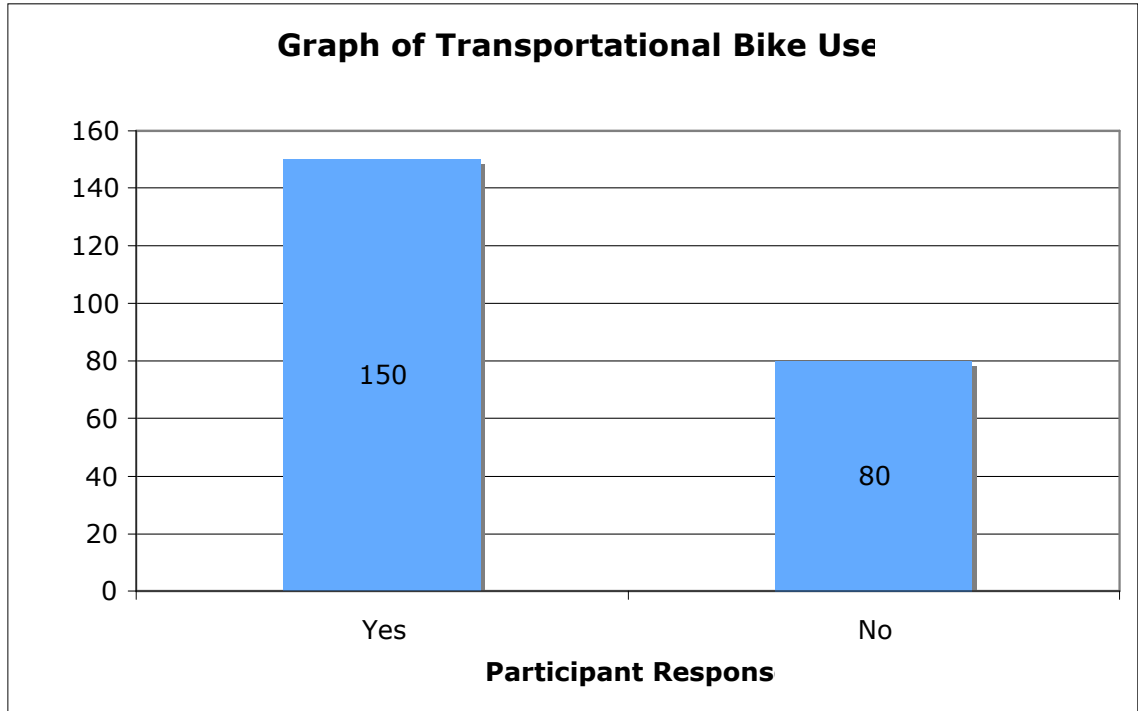
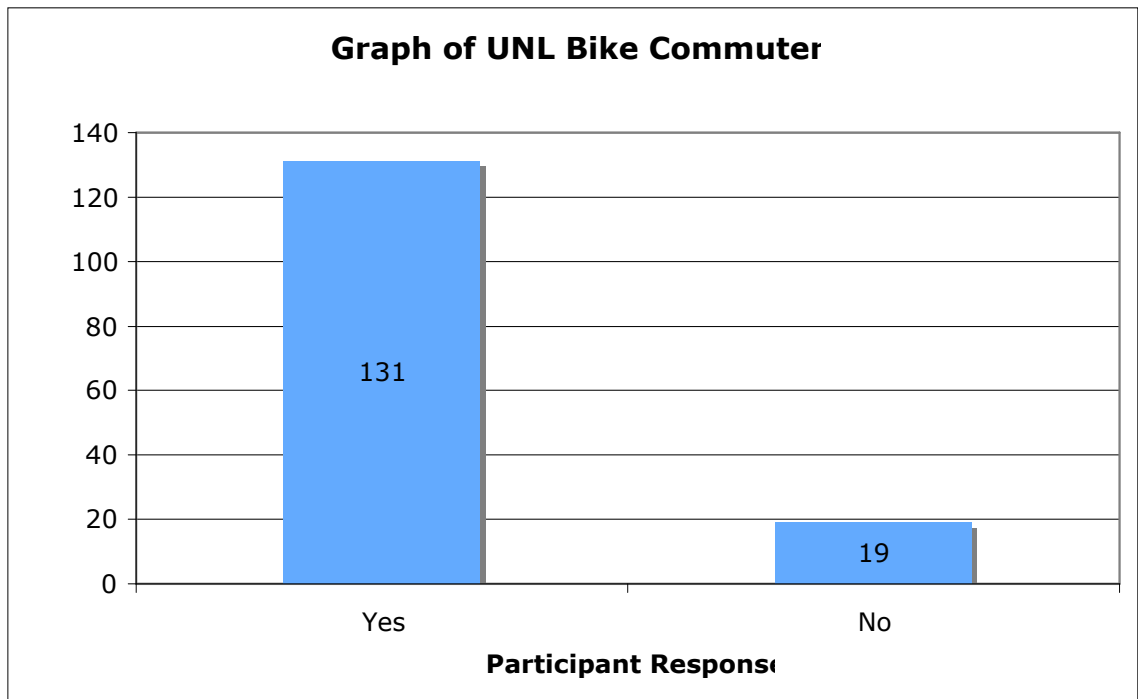


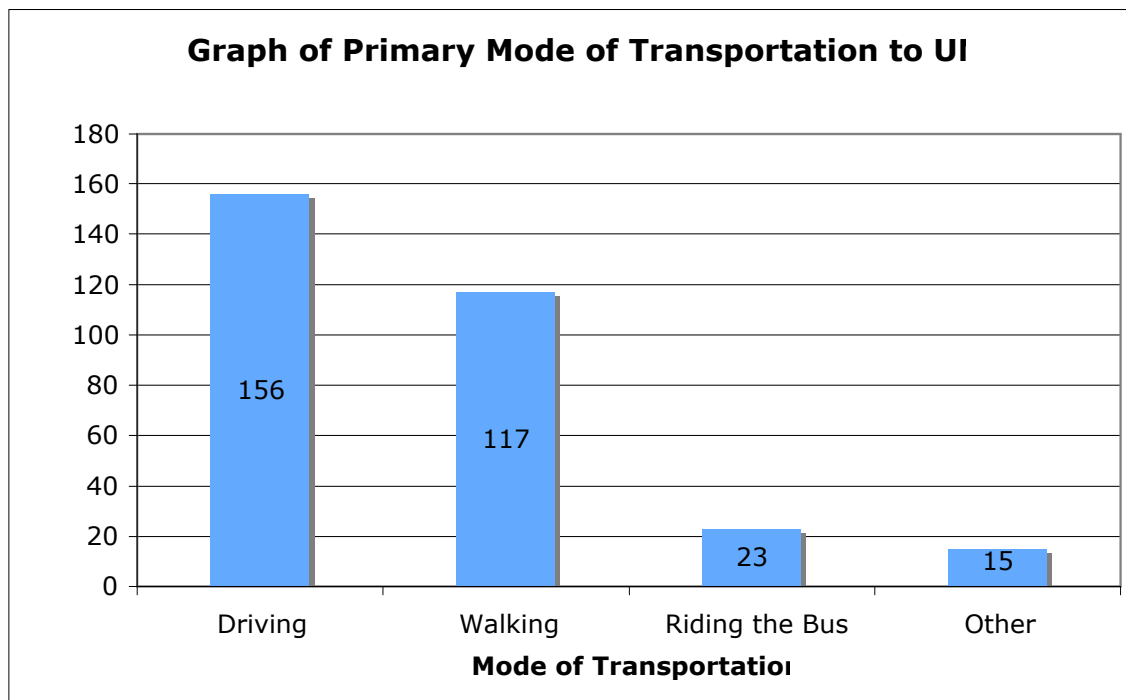
Figure 2. This graph depicts the number of participants answering yes or no to the question “Do you use your bike for recreation?”



**Figure 3.** This graph depicts the number of participants answering yes or no to the question “Do you use your bike to commute to places you need to go (e.g. school, work, shopping, etc.)?”



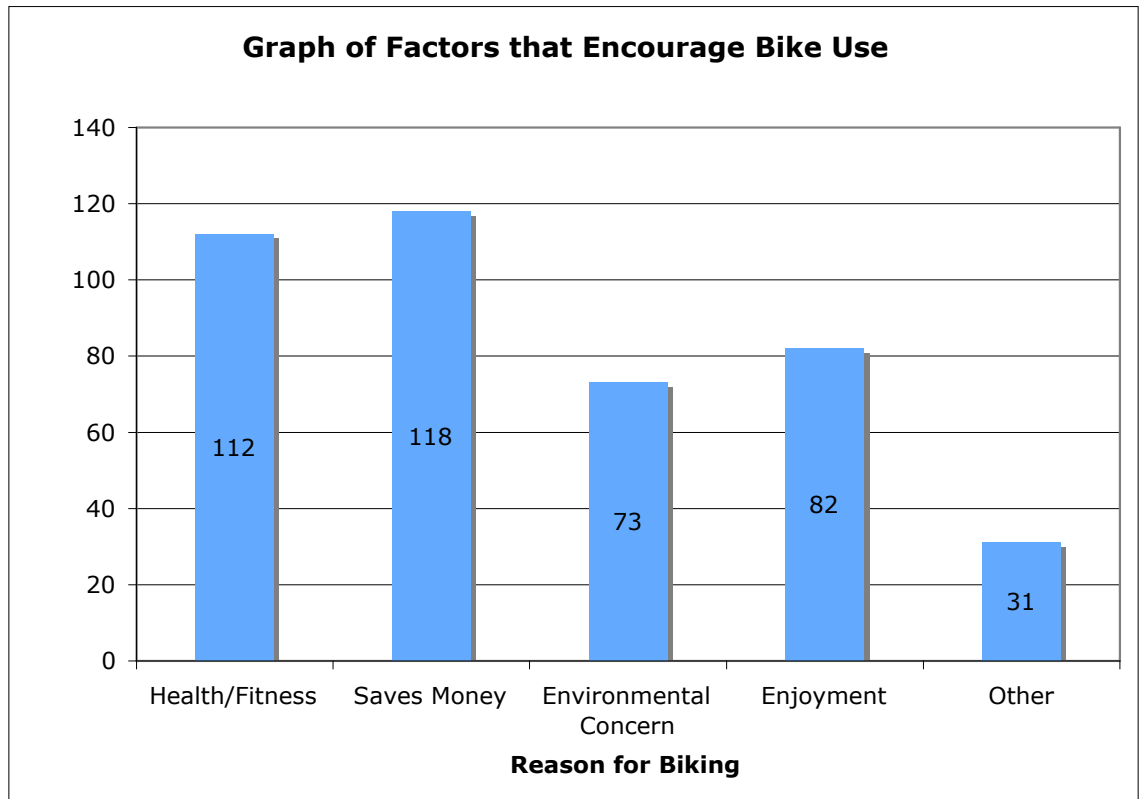
**Figure 4.** This graph depicts the number of participants answering yes or no to the question “Do you use your bike to commute to UNL?”



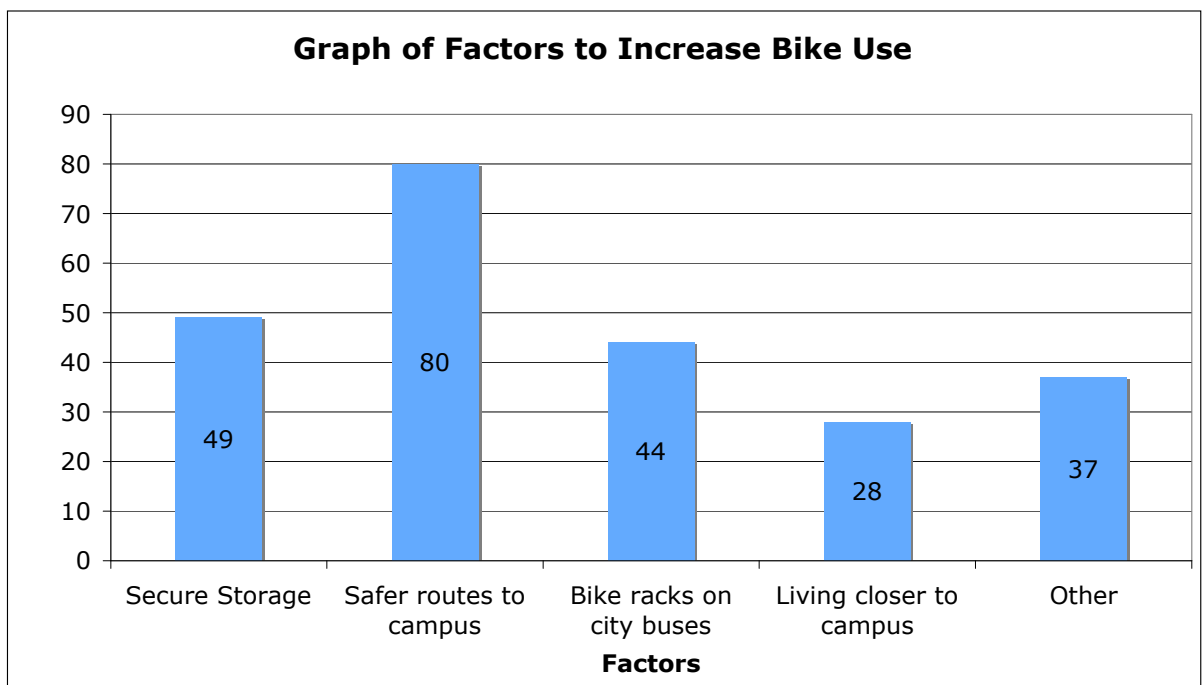
**Figure 5.** This graph depicts the number of participants that identified driving, walking, riding the bus, or other as their primary mode of transportation to UNL (n=311).

	Fall (August – October)	Winter (November – February)	Spring (March-May)
0 times/week	7 (5.3%)	42 (31.8%)	5 (3.8%)
1-2 times/week	32 (24.2%)	41 (31.1%)	22 (16.7%)
3-4 times/week	34 (25.8%)	23 (17.4%)	40 (30.3%)
5+ times/week	59 (44.7%)	26 (19.7%)	65 (49.2%)

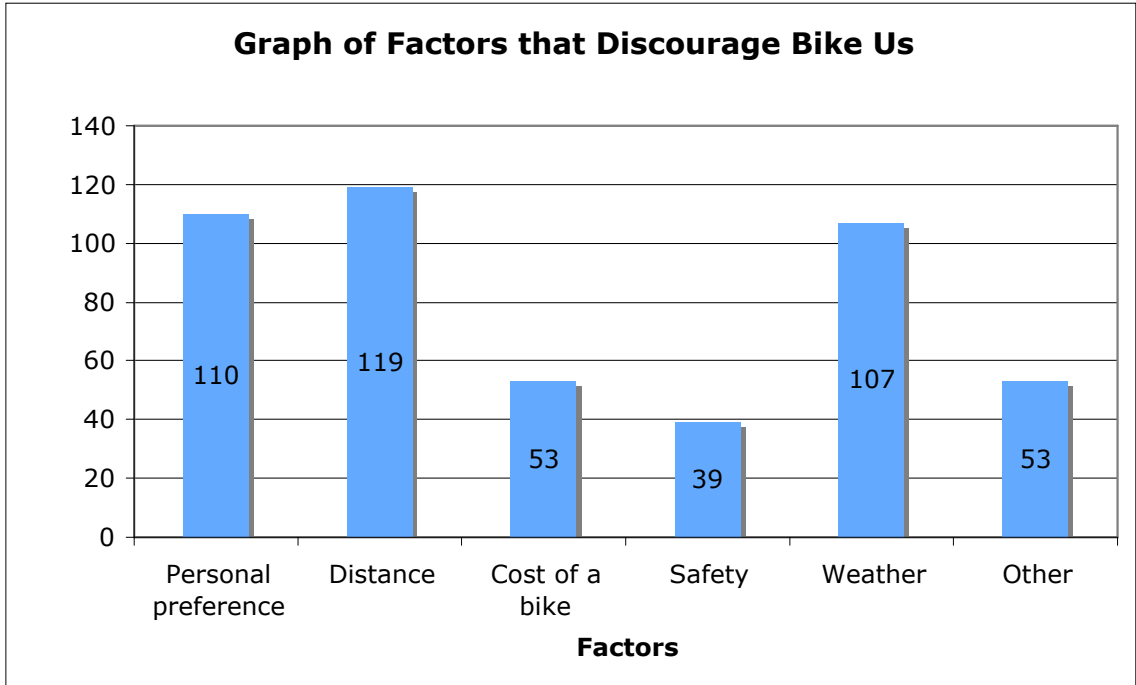
**Table 1.** This table lists the number of UNL cycling commuters that use their bikes to campus 0 times/week, 1-2 times/week, 3-4 times/week, or 5 or more times/week. Responses in the fall category reflect the average number of times that these students commuted to UNL by bike this August through October. Responses in the Winter and Spring categories represent the number of times that students plan to commute by bike during the winter and spring of 2008-2009 academic calendar (n=132).



**Figure 6.** This graph depicts the number of bicycle commuters that identified each factor as motivating them to use their bike to commute to campus. Participants were free to choose all that apply and the most common entry in the “other” category was that biking saves time (n=131).



**Figure 7.** This graph depicts the number of bicycle commuters that identified the following categories as factors that would encourage them to commute to UNL by bike more often. The most common response in the “other” category was better weather (n=131).



**Figure 8.** This graph depicts the number of non-bike owners that identified the following options as factors that discourage them from biking to UNL (n=231). Participants were free to choose all that apply and the most common entry in the “other” category was that bikes lack the space needed for transporting family members, groceries, and/or school supplies.

**APPENDIX:**  
**E-mail Invitation:**

Dear UNL student,

My name is Brent Schmoker and I am an undergraduate student writing my senior thesis through the Environmental Studies Program. I would like to ask you to participate in a very short research study that I am conducting in order to complete my thesis. The study focuses on the transportation habits of UNL students with an emphasis on bike use and ownership. Specifically, I am interested in seeing how many students use bikes for transportation and what encourages and discourages people from biking more. I am interested in collecting input from UNL students because we are particularly affected by transportation issues such as traffic congestion, parking, and the high price of gasoline. Even if you have never used a bike before, your input will be extremely useful.

This message contains the link to an online survey. The survey is confidential and it does not ask for personal identification. As soon as the survey is completed, it is automatically transferred to an online account in Survey Monkey where no IP address can be traceable. The survey is very short. It contains an informed consent and a series of 4-8 multiple-choice questions. Overall, the whole process will not take more than 5 minutes.

Please follow the link:

[http://www.surveymonkey.com/s.aspx?sm=nPrqEoiut\\_2f0pN6eRWNuLKg\\_3d\\_3d](http://www.surveymonkey.com/s.aspx?sm=nPrqEoiut_2f0pN6eRWNuLKg_3d_3d)

As your schedule allows, please complete this survey. If you have questions before taking the survey or any follow-up questions please contact me via e-mail at [bschmok1@bigred.unl.edu](mailto:bschmok1@bigred.unl.edu).

Thanks so much for your time and participation. Good luck the rest of the semester!

Brent Schmoker, Undergraduate  
Environmental Studies Program  
University of Nebraska-Lincoln



IRB# 2008109316EP  
Date Approved: 10/14/08  
Valid Until 10/13/09

## INFORMED CONSENT – STUDENTS

Identification of Project:  
Survey of Bike Use by UNL Students

### Purpose of Research:

This study is being conducted in order to fulfill the requirements for an undergraduate thesis in the Environmental Student Program. The purpose of this research is to analyze bicycle use by students enrolled at UNL during the fall semester of 2008. In particular, I'm interested in determining what encourages and prevents students from using bicycles for transportation.

### Procedure:

This survey asks demographic questions for the purpose of data analysis. Participant identification is not collected. The survey includes a series of short multiple-choice questions and provides space for the participant to comment/elaborate on his or her answers.

The entire process should not take longer than 5 minutes. None of the data collected will be used in a way that will allow identification of any participant.

### Risks and/or Discomfort:

There are no known risks or discomforts associated with this research.

### Benefits:

Although there are no direct benefits associated with participating in this study, the information that you provide may help improve transportation planning in Lincoln and encourage the university to take a more proactive role in facilitating alternative forms of student transportation.

### Confidentiality:

Individual participant identity is not collected. Your participation is strictly confidential. Any information collected during this study will be stored in a secure location and will only be used by the investigator for the purpose of this study. All information will be deleted at the end of the semester.

### Compensation:

Compensation is not available for participating in this research study.

### Opportunity to Ask Questions:

You are encouraged to ask questions regarding this research before, during, or after participating in the study. You may contact the investigator at any time at

[bschmok1@bigred.unl.edu](mailto:bschmok1@bigred.unl.edu). If you have questions concerning your rights as a research subject that have not been answered by the investigator, or to report concerns about the study, you may contact the University of Nebraska-Lincoln Institutional Review Board at (402) 472-6965.

**Freedom to Withdraw:**

You are free to decide not to participate in this study or to withdraw at any time without adversely affecting your relationship with the investigator of the University of Nebraska-Lincoln. Your decision will not result in any loss of benefits to which you are otherwise entitled.

**Consent/Right to Receive a Copy:**

You are voluntarily making a decision whether or not to participate in this research survey. Completion and return of the survey certifies that, having read and understood the information presented, you have decided to participate. You will be given a copy of this consent form to keep.

**Name and Contact Information of Investigators:**

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1. Do you agree to participate?
  - Yes, I agree to participate.
  - No, I don't wish to participate.