Campus Carbon Footprint Survey

Jeanne Mekolichick, PhD, Karen Allen, AAS, Aysha Bodenhamer,
Alyson Brackin, & Alex Williams

Center for Social & Cultural Research

Department of Sociology, Radford University

6.10.2010

This report contains the results for the Campus Carbon Footprint Survey. The goals of this survey are: (1) to gather necessary information to complete the greenhouse gas emissions associated with campus commuting, (2) to gather information on types of commuting behaviors (3) to gather information on biking habits and needs on campus and (4) to assess interest in a car sharing program. Contained herein is the information gathered from an online survey administered through Qualtrics distributed in mid April 2010.

Introduction

The purpose of this survey was four fold: (1) to gather necessary information to complete the greenhouse gas emissions associated with campus commuting, (2) to gather information on types of commuting behaviors (3) to gather information on biking habits and needs on campus and (4) to assess interest in a car sharing program. Presented below is the information gathered from an online survey administered through *Qualtrics* distributed in mid April 2010. Specifically, data collection ran from April 15 to April 27th to all RU faculty, staff, and students. The survey link was featured in the April 15th edition of the *RU Today* online publication, in a ru-announce that came out on April 19th and April 22nd. Additionally, the research team members and Julio Stephens made announcements, included flyers in mailboxes, and sent personal emails to the SGA, Faculty Senate, Staff Senate, AEC, and various other community contacts. Finally, a computer bank was set up at the RU Earth Day celebration to publicize the survey and collect data; RU SustainABILITY water bottles were distributed at the site as an incentive. Additionally, we had a box to collect names for a $25.00 cash award for taking the survey there as well.

This report is divided into five sections: (1) sample highlights, (2) limitations, (3) commuting behaviors, (4) bicycling to and on campus, and (5) car sharing program. In each section data are presented for both the entire sample and broken down into subpopulations where appropriate. Summary statements and recommendations are included as fitting within each section.

Sample Highlights

This survey generated 903 responses. Students represent 56% of total respondents (N=482), faculty 24% (N=208), and staff 20% (N=174). The vast majority of the sample 71% (N=490) drive themselves to campus. During the academic year, the mode of the sample, 44% (N=306), makes 10 one way trips to and from campus. For those in the sample with varied schedules in the academic year and in the summer (N= 622), 37% (N=232) make 10 one way trips per week (the mode), with an average of 5.5 trips per week and a standard deviation of 4.5 trips per week. Notably, 26% of the sample (N=161) makes less than two one way trips to campus per month in the summer. For the sample as a whole, the average number of trips per year is 390 with a median of 440 (accounting for 29% of the sample) and a standard deviation of 138 trips. A minimum of 67 trips per year (3%, N=21) is made with a maximum of 704 trips per year (1%, N=8). When asked about the reasons why respondents do not bike to campus, 51% (N=349) indicated that they live too far away. This concern was repeated when asked about improvements RU could make to biking on campus, 50% (N=404). Respondents wanted more bike racks by academic buildings (91%, N=354), and leaned toward having short-term and long-term parking for bikes 54% (N=212) either agreed or strongly agreed. Fifty five percent (N=439) of the sample found the car sharing program either “very appealing” or “somewhat appealing.” However, 65% (N=523) stated that they would “probably never” use the car sharing program.

Student Sub-sample

Undergraduate students make up 47% (N=403) and graduate students make up 9% (N=79). Most student in the sample, 72% (N=347), live off campus and commute via personal vehicle 52% (N=170) with a mode of 5 minutes on the road. For students (N=325), the minimum commute is less than one mile for nearly half of the sample (N=152). It is important to point out that 85% of the students in the sample travel 20 miles or less to campus with the mode at ½ mile and the median at 2 miles. During the academic year students make an average of 10 trips per week with a minimum of 2 trips. The mode for

students trips per week is 16 at 27% (N=90). For students over the summer who have a different schedule than the academic year, 46% (N=145) make less than two one way trips *per month*; this was the mode. On average, these students are making 3.4 one way trips per week with a standard deviation of 4 trips per week. Students (N=325) make an average of 362 one way trips to campus per year, with a standard deviation of 154, a median of 367 and a mode of 487—accounting for 12% of the student sample. Trips ranged from a minimum of 67 (6%, N=19) to a maximum of 704 (.3%, N=1). For those living on campus only 7 indicated having a bicycle on campus. Nearly a third of students in the sample, 27% (N=129), do not own a bike and offered this as a reason why they do not bike to campus. Others indicated that they "live too far away" to bike (25%, N=119). However, most students live ½ mile from campus with a median distance of 2 miles. The majority of students, 68% (N=307), found the car sharing program appealing, yet 58% (N=268) indicated that they would "probably never" use the service.

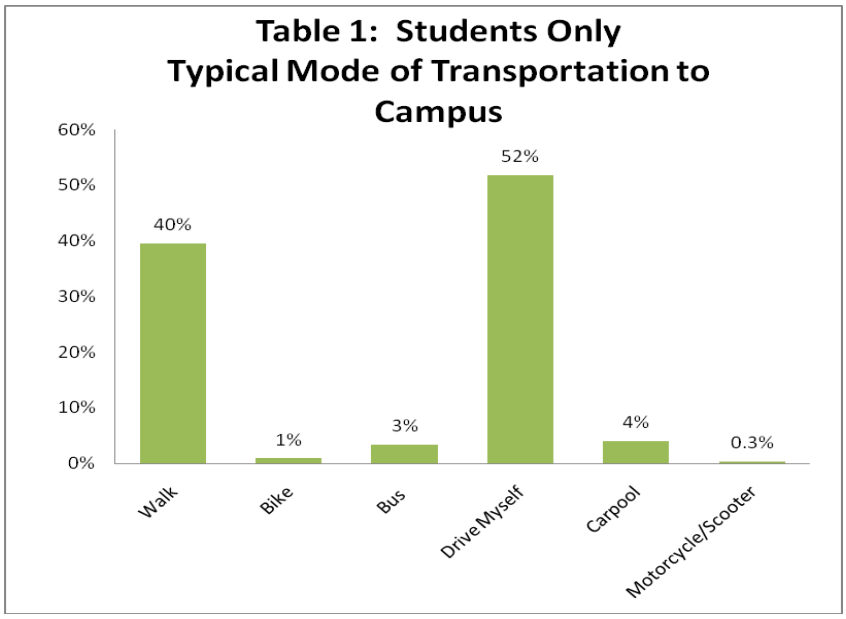
Limitations

As with all research there were problems, and notes of caution should be made when making conclusions with the data produced. First, the administration of the survey was not without problems. The first ru-announce was supposed to come out on April 15th instead of April 19th to allow for more visibility and a longer time to collect data. Additionally, the computer bank at Earth Day did not work as planned. We encountered several technical problems that were eventually resolved; however, the wireless connectivity at the site prohibited our ability to actually collect any data.

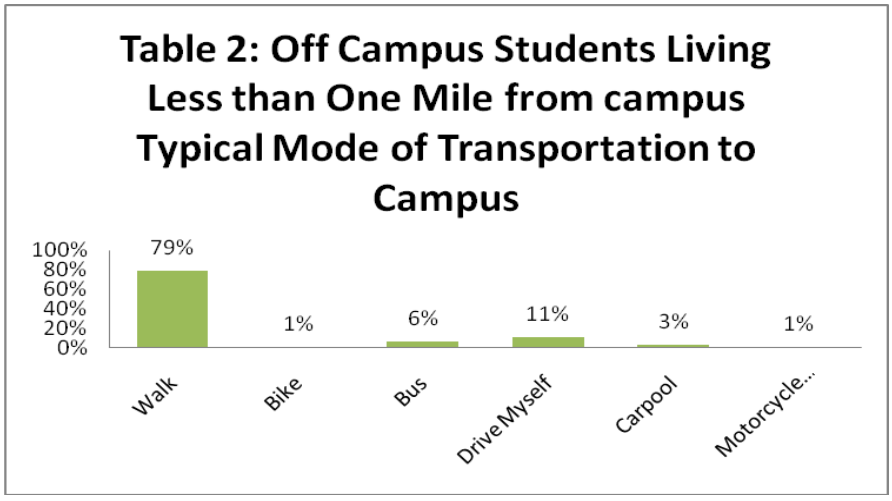
Second, the data represented here was gathered using a non-random sampling method and are only a small portion of the population of Radford University. As such, generalizations to the larger population should be made with caution.

Commuting Behaviors

Table 1 shows the typical mode of transportation for students, including both undergraduate and graduate students (N=482). As one can see, 52% (N=170) of students drive themselves and 40% (N=130) of students walk. Very small percentages bike, bus, carpool, or drive motorcycles or scooters. In conjunction with the Clean Air-Cool Planet Greenhouse Gas Emissions Calculator, noteworthy numbers include the percentages of those who drive a personal vehicle (52%) and those who carpool (4%).



To look a bit closer at the student population, we isolated those living close to campus. As depicted in Table 2, there are 152 students that live less than one mile from campus. Of these, the vast majority, 79% (N=120), walk to campus followed by 11% (N=16) who drive.



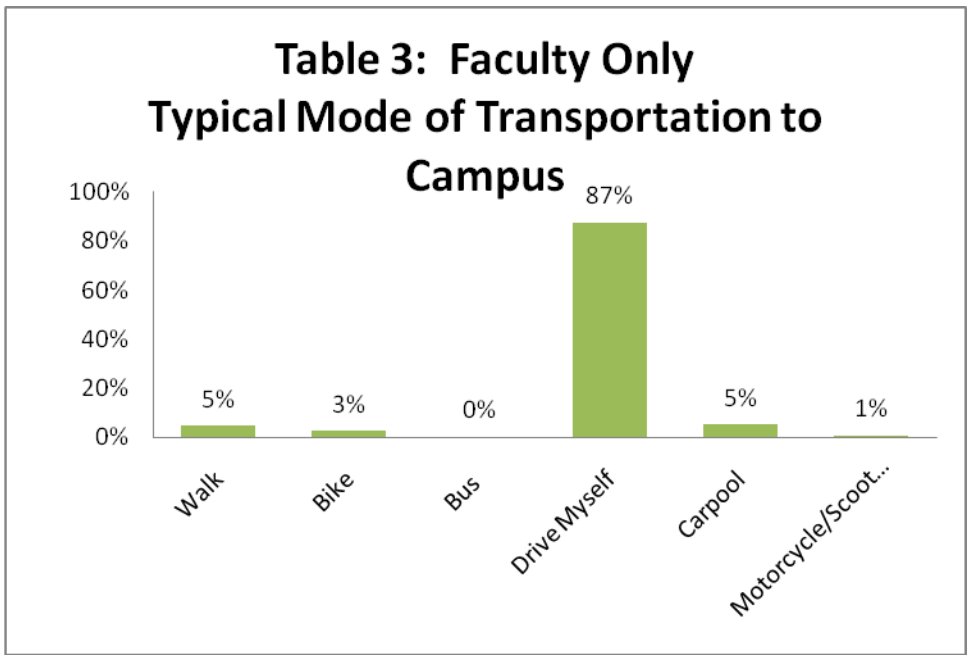


Table 3 portrays the typical commuting habits of faculty (N=197). Faculty who drive themselves represent an overwhelming 87% (N=172) of the population. All other categories fall short with carpooling and walking both 5% (N=10), biking 3% (N=5) and motorcycling, 1% (N=1). No one reported using the bus system. In accordance with the GHG emissions calculator, those who use a personal vehicle (87%) and those who carpool (5%) are significant for the purposes of percentage of those who use a personal vehicle and percentage that carpool.

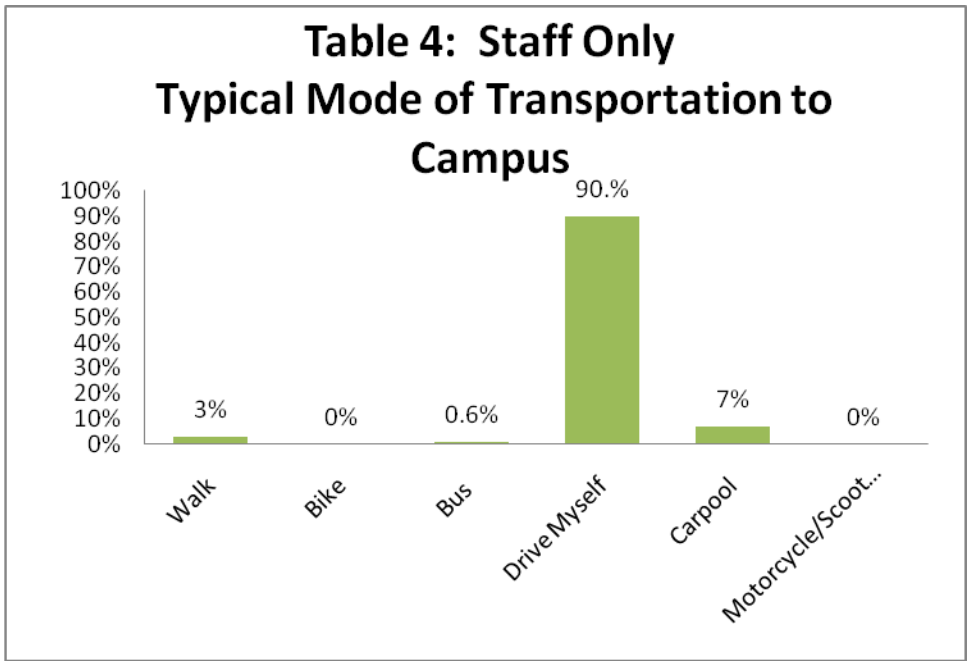


Table 4 represents staff commuting behaviors at Radford University (N=163). Again, most folks drive themselves to work 90.2% (N=147). Following behind are, carpooling at 7% (N=11), walking, 3% (N=4)

and taking the bus .6% (N=1). No one indicated that they biked or rode a motorcycle or scooter to campus. For the purposes of the GHG calculator, those who drive themselves (90%) and those who carpool (7%) should be noted for the calculator.

Respondents were asked about the **number of miles they travel one way to campus**. For **all students** (N=325), the minimum commute is less than one mile for nearly half of the sample (N=152). The maximum commute is 150 miles with an average commute of 9.8 miles and a standard deviation of 18.1miles. Several outliers influenced the data here. It is important to point out that 85% of the students in the sample travel 20 miles or less to campus with the mode at ½ mile and the median at 2 miles.

We also examined the commute of **graduate students** living off campus (N=73). The average commute was 16 miles, with a minimum of less than one mile (N=12, 16%) and a maximum of 150 miles (N=1, 1%). The median for graduate students is 5 miles and the mode is 2 miles capturing 38% (N=16) of the population. Not surprisingly, graduate students live a bit farther from campus than undergraduates.

For **faculty** (N=198), the minimum commute is one-half mile, and the maximum commute is 138 miles, with an average commute of 13.6 miles and a standard deviation of 16.7 miles. Once again, several outliers have pulled the mean upward. It should be noted that the most common commute is 2 miles (23%, N=45) with a median of 11 miles. Further, 90% of the faculty sample travel 30 miles or less to campus.

For **staff** (N=163), the minimum commute is less than one mile with a maximum commute of 68 miles—much less of a range than both faculty and students. The average commute is 15.7 miles with a standard deviation of 14.5 miles. Again here, several outliers at the top end of the scale pull the mean upward. Most staff travel 2 miles to campus. The median is 14 miles, and 90% of the staff sample travels 40 miles or less to campus.

In addition to the mode of transportation and number of miles traveled, we also gathered information on the amount of **time spent on the road** for a one way trip. For **students** (N=112), the minimum commute is one minute, the maximum is 135 minutes and the average is 23.7 minutes with a standard deviation of 23.4 minutes. The mode for student commuting is 5 minutes with a median of 15 minutes. For **faculty** (N=105), the minimum commute is five minutes, the maximum is 135 minutes and the average is 24.5 minutes with a standard deviation of 21.6 minutes. The mode for faculty commuting is 15 minutes with a median of 18 minutes. For **staff** (N=70), the minimum commute is three minutes, the maximum is 90 minutes and the average is 25.1 minutes with a standard deviation of 16.9 minutes. The mode for staff commuting is 25 minutes with a median of 21.3 minutes.

To satisfy the Greenhouse Gas Emissions Calculator, we also calculated the number of one way trips per year. **During the academic year**, the mode of the sample, 44% (N=306), makes 10 one way trips to and from campus. Students make an average of 10 trips per week with a minimum of 2 trips. The mode for students trips per week is 16 at 27% (N=90). Faculty travel to campus an average of 10 trips per week with a standard deviation of 2.8 trips. The mode for faculty trips per week is 10 (N=100). Similar to faculty, staff travel to campus an average of 10 trips per week during the academic year with a standard deviation of 2. The mode for staff is 10 trips per week (N=129).

Only a small percentage of the sample (7.5% N=68) indicated making the **same number of trips during the academic year and over the summer.** Of these, 24% are students (N=16), 25% are faculty (N=17), and the remainder, 52% (N=25) are staff.

For the rest of the sample who offered information about **commuting habits to campus over the summer** (N= 622), 37% (N=232) make 10 one way trips per week (the mode), with an average of 5.5 trips per week and a standard deviation of 4.5 trips per week. Notably, 26% of the sample (N=161) makes less than two one way trips to campus per month. For students over the summer who have a different schedule than the academic year, 46% (N=145) make less than two one way trips *per month*; this was the mode. On average, these students are making 3.4 one way trips per week with a standard deviation of 4 trips per week. **Faculty** with different schedules over the summer are making an average of 6 one way trips per week with a mode of 10 trips at 39% (N=70) and a median of 4 trips per week at 28% (N=51). Staff with varied summer schedules (N=128) made an average of 10 one way trips to campus per week (N=107). This accounts for 84% of this subsample and is also the median and the mode.

To calculate the **number of trips per year** (N=679), we multiplied the number of one way trips traveled during the academic year by 30 weeks (this accounts for the 14 week semester and two weeks extra for additional trips just before and just after the academic year) and added it to the number of one way trips traveled during the summer by 14 weeks (this is the number of weeks in between the academic years). For the sample as a whole, the average number of trips per year is 390 with a median of 440 (accounting for 29% of the sample) and a standard deviation of 138 trips. A minimum of 67 trips per year (3%, N=21) is made with a maximum of 704 trips per year (1%, N=8).

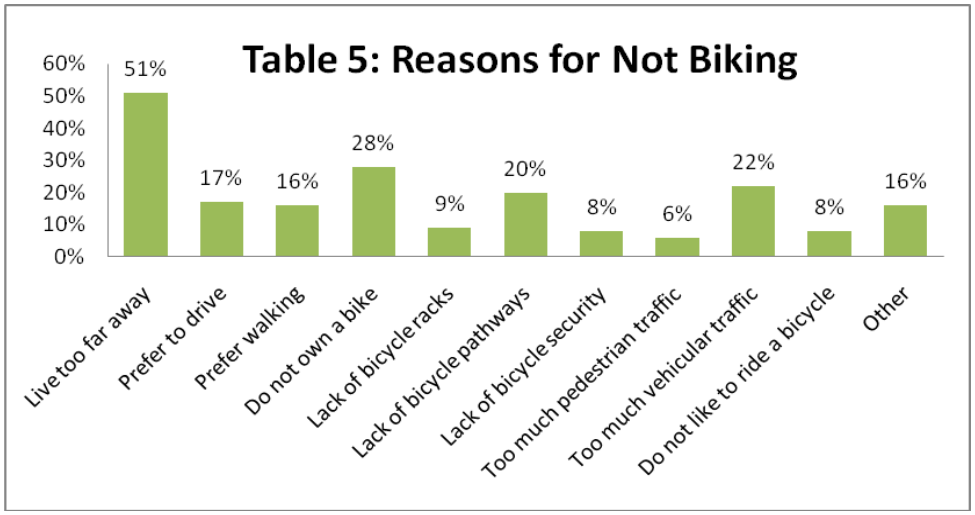
Students (N=325) make an average of 362 one way trips to and from campus per year, with a standard deviation of 154, a median of 367 and a mode of 487—accounting for 12% of the student sample. Trips ranged from a minimum of 67 (6%, N=19) to a maximum of 704 (3%, N=1).

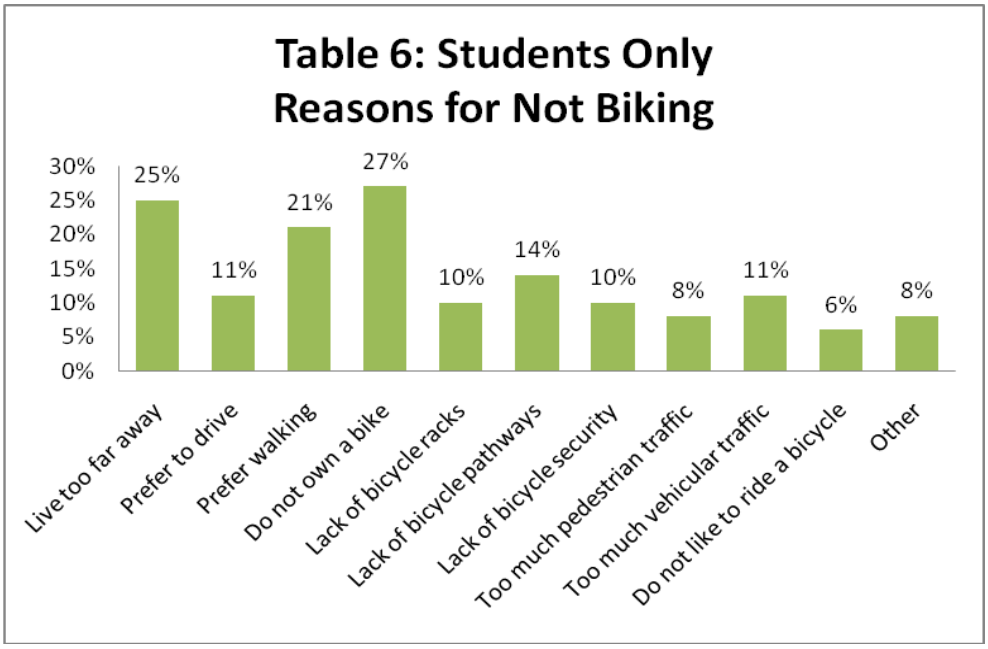
Faculty (N=197) make an average of 388 one way trips to campus and from per year, with a standard deviation of 128, a median of 416 and a mode of 440—accounting for 31% of the faculty sample. Trips ranged from a minimum of 67 (1%, N=2) to a maximum of 704 (2%, N=3).

Staff (N=156) make an average of 450 one way trips to campus per year, with a standard deviation of 85, a median of 440 and a mode of 440—accounting for 74% of the staff sample. Trips ranged from a minimum of 88(1%, N=1) to a maximum of 704 (2%, N=3).

Bicycling To and On Campus

One of the goals of this study was to gather information about biking to and on campus by students, faculty and staff. As indicated above, only a small portion of this sample rides a bicycle to campus. As seen in Table 5, respondents were asked to share some of their reasons for not riding a bicycle to campus. They were given the option to select more than one answer for not riding a bicycle to campus. There were four possible choices which held the highest selection rates. Of the 681 responses, 51% (N=349) indicated that they "live too far away"; 28% (N=190) indicate "Do not own a bike"; 22% (N=150) indicate "too much vehicular traffic"; and 20% (N=136) indicate "lack of bicycle pathway." It should also be noted here that 16% (N=109) selected the "other" category. Of these, 4% (N=29) indicated that the roads to campus are too dangerous or insufficient for biking, which appears to be an elaboration of "lack of bicycle pathways," an additional 2% (N=15) indicated that they needed to bring children to school and therefore could not ride a bike.

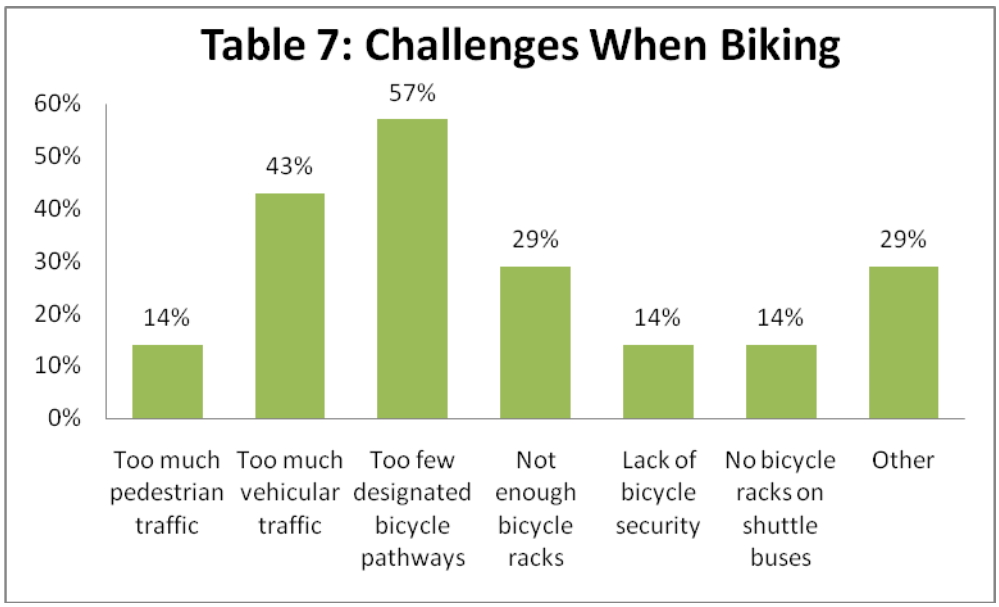




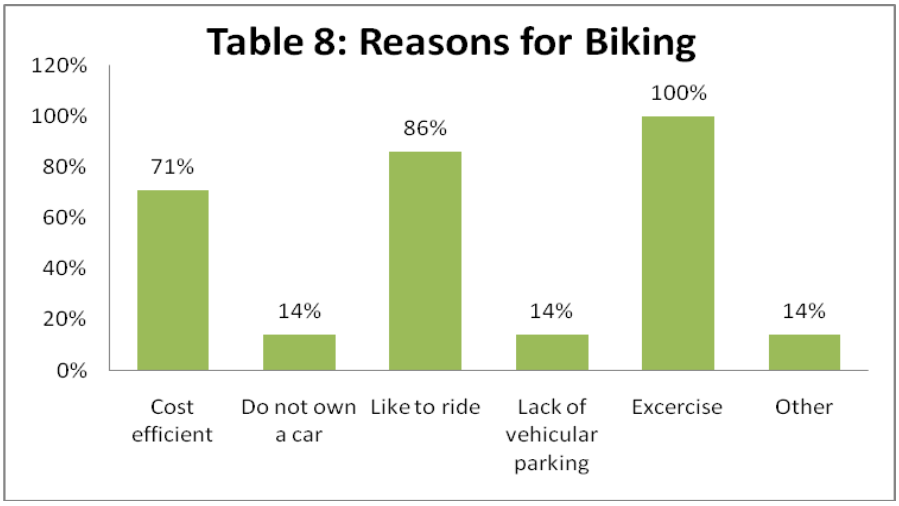
Focusing on students only in Table 6, the most common response for not riding a bike to campus was "don't own a bike" at 27% (N=129) followed by "live too far away 25% (N=119) with "prefer walking" coming in third at 21% (N=100). It should be noted that "live too far away" is relative given that the data above indicates most students live ½ mile from campus with a median of 2 miles.

On campus students were then asked several questions about bicycles on campus. Only 5% (N=7) of the on-campus students reported having a bicycle on campus. Of these, 6 indicated where they keep their bike, with 5 storing their bicycle in a rack outside their dormitory and 1 keeping their bicycle in their room. When asked how often they ride their bike (N=9), 22% (N=2) indicate that they ride their bicycles "very often"; 33% (N=3) state that they ride "somewhat often"; 22% (N=2) indicate that they ride "occasionally"; and another 22% (N=2) state that they ride "almost never." Clearly, the data on bicycles for on-campus students is very scant.

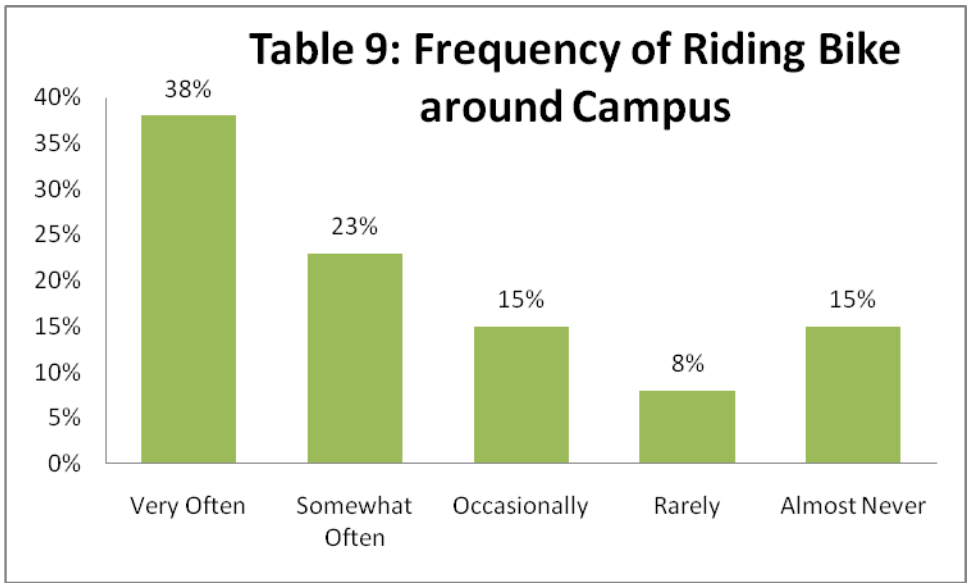
For those in the sample indicating that they **typically bike to campus**, several follow-up questions were asked. First, respondents were questioned about the greatest challenges when biking to campus. As was indicted above, only 8 respondents indicated biking to campus. Of those, 7 offered information on their **greatest challenges** displayed in Table 7. The greatest challenge was "too few designated bicycle pathways" (57%, N=4) followed by "too much vehicular traffic" (43%, N=3), and "not enough bicycle racks" (29%, N=2). Two responses were recorded as "other." One respondent indicated weather as a challenge and the other remarked "vehicles don't yield at crosswalks."



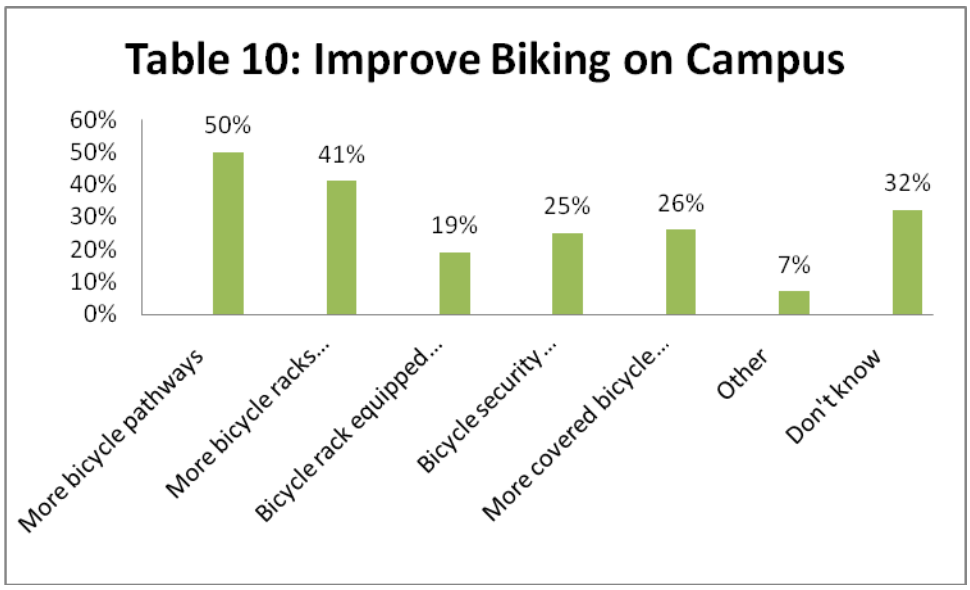
Next, bicycle riders were asked to offer their reasons for biking to campus and directed to select all that apply. Table 8 indicates that "exercise" is the top reason for biking to campus with all 7 riders selecting this response. Coming in a close second at 86% (N=6), respondents indicated that they just "like to ride" followed by 71% (N=5) of respondents indicating that biking is "cost efficient." The respondent selecting "other" indicated "reduction of personal carbon footprint" as an additional reason for riding a bike to campus.



The data in Table 9 includes respondents who typically ride their bike to campus as well as students who have a bike on campus. Of this small group, 13 responded to this item. Most, 61% (N=8), ride their bike either "very often" or "somewhat often" around campus.

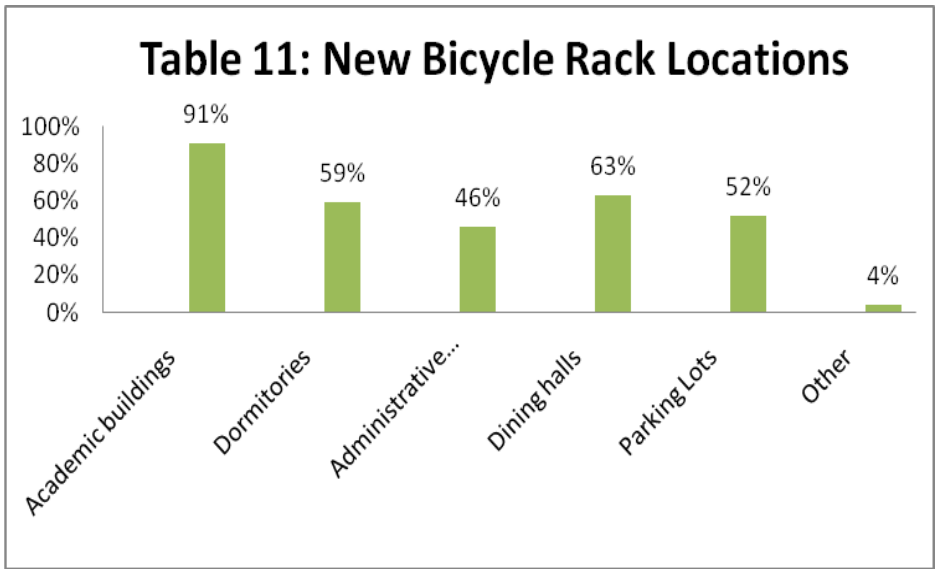


All survey respondents were asked to offer input on what RU could do to **improve biking on campus**, as seen in Table 10 (N=806). Half of the responses (N=404) indicated that there should be "more bicycle pathways." Following pathways, 41% (N=331) of responses indicated "more bicycle racks available" on campus, followed by 32% (N=255) indicating "don't know." Of the 7% (N=55) who selected "other," 38% (N=21) spoke about a need for improved biking routes *to* campus. Given this information, it is logical to suggest that respondents selecting "more bicycle pathways" might have interpreted the response category as " more bicycle pathways *to* campus" as opposed to "*around* campus" given that the rest of the survey was directed toward community.

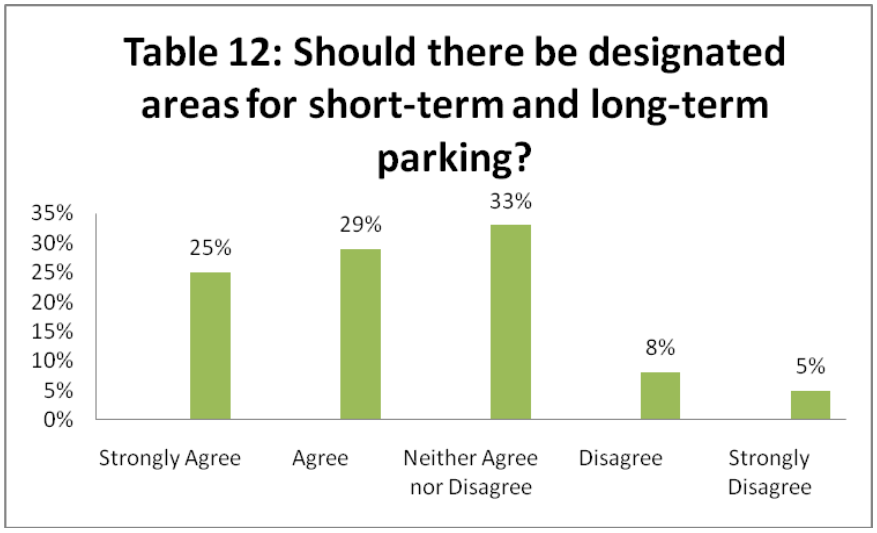


For respondents who indicated bicycle racks as either a "greatest challenge," a "main reason for not riding a bicycle to campus," or sought improvements by RU relative to bicycle racks were asked to indicate where new bicycle racks should be placed on campus and if there should be designated areas for short and long-term bicycle parking.

Table 11 includes the responses regarding bike rack location (N=387). As indicated in the table, the most requested location is "academic buildings" at 91%, (N=354) followed by "dining halls" at 63% (N=242), "dormitories" at 59% (N=227), and "parking lots" at 52% (N=202). Respondents were also able to write in additional locations. As indicated below in the "other" category, a few respondents offered further locations for new bike racks (4%, N=15). These include the library (N=4), athletic facilities (N=4) and additional comments such as "the bicycle racks need to be near the entrances of the buildings," "there are plenty of racks just relocate some of them," and "various/central locations."



As seen in Table 12, when asking the question about different designated parking areas for long term and short term biking , the majority of respondents either “agreed” or “strongly agreed” (54%, N=212) with this idea. However, 33% (N=129) felt neutral.



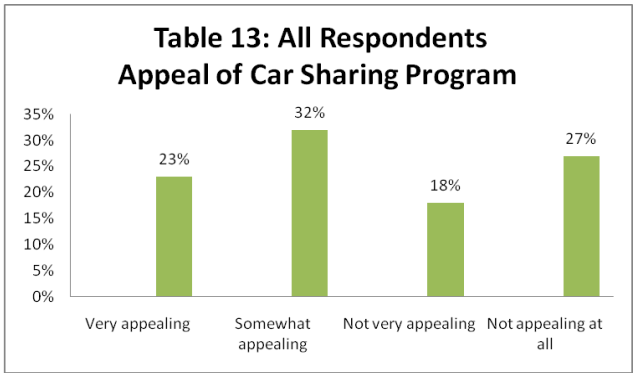
Car Sharing Program

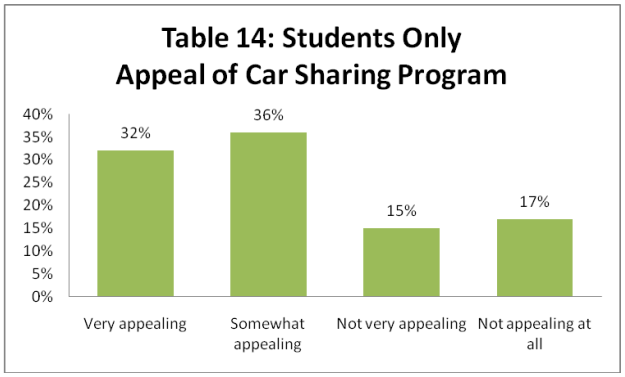
Respondents were presented with the following description of a proposed car sharing program:

Radford University is considering implementing a car sharing program available to all RU students, faculty, and staff (18 years of age or older). This service will be located on campus. Car sharing is a car rental program where you can rent a car for a short period of time, usually from one hour, up to several days. This program would help you to make occasional trips off campus and out of town.
The program RU is considering has the following features:

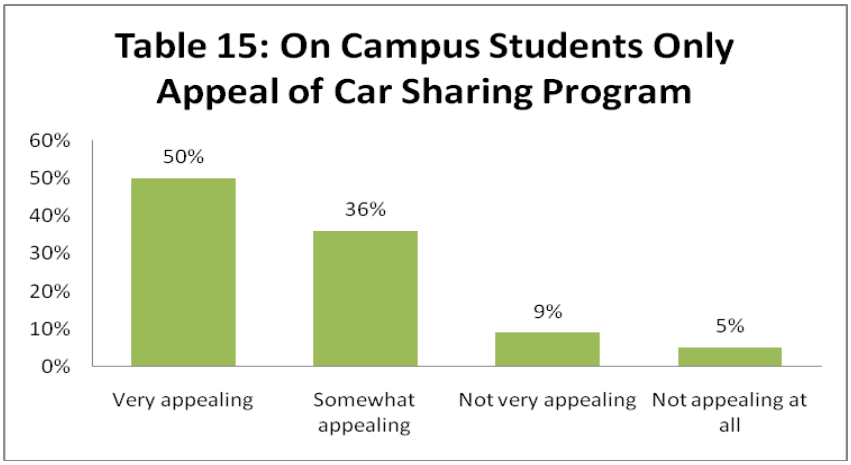
- *Small fee*
- *Easy online registration and reservation system*
- *Gas card included*
- *Insurance included*
- *Available 24 hours a day*

After reading the explanation, respondents were prompted to identify how appealing they found this program. As seen in Table 13, out of 798 total responses, 55% (N=439) found the program to be either



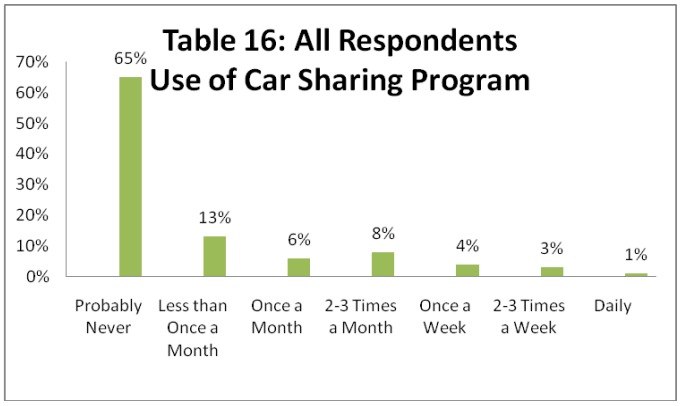


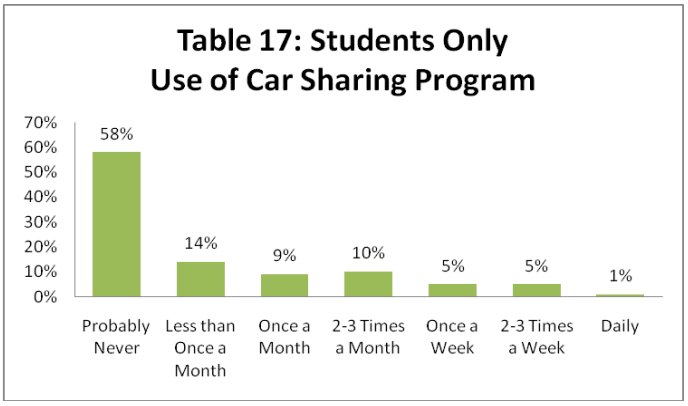
"very appealing" or "somewhat appealing." When focusing **only on students** (N=454), 68% (N=307) found the program either "very appealing" or "somewhat appealing." See Table 14. When focusing only on students who live on campus, 86% (N=114) found the car sharing program either "very appealing" or "somewhat appealing" as seen in Table 15. This data demonstrates an appeal of the program.

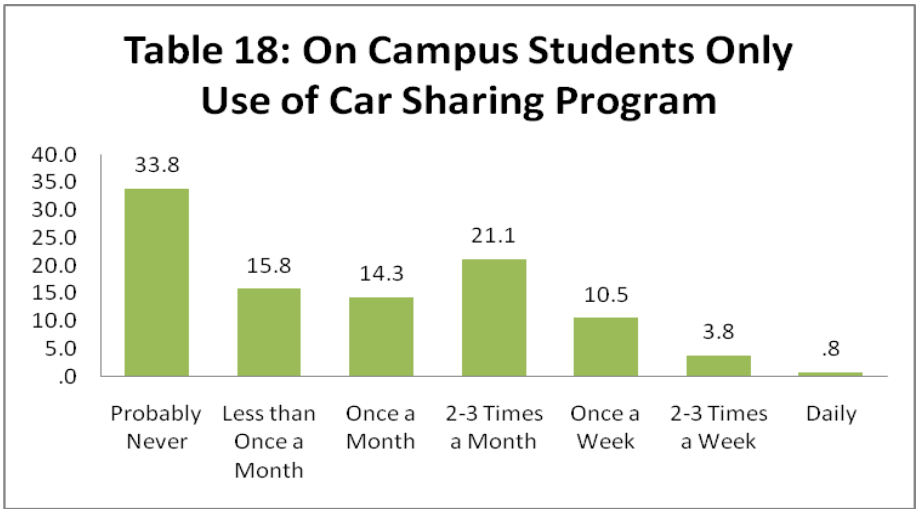


However, as seen in Table 16, out of 802 total respondents, 65% (N=523) stated that they would "probably never" use the car sharing program. A distant second (13%, N=103) were respondents who indicated they would use the program "less than once a month." "2-3 times a month" came in next at 8% (N=3). Only 8% (N=62) indicated that they would use the program "once a week" to "daily". Fewer still, 6% (N=51), indicated that they would use the program "once a month."

When **focusing only on students** (N=482) in Table 17, still more than half (58%, N=264) of respondents indicated that they would "probably never" use the program. With another 14% (N=62) indicating "less than once a month" for usage and 10% (N=47) indicating that they would use the program "2-3 times per month."



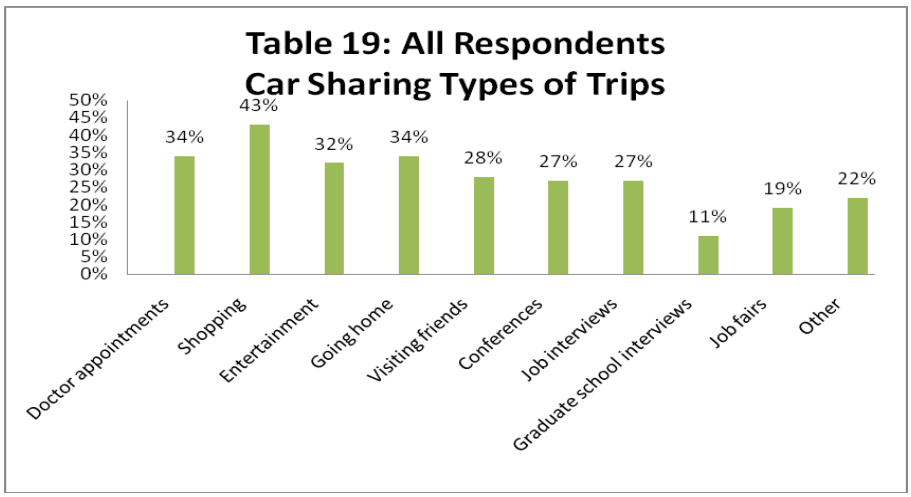




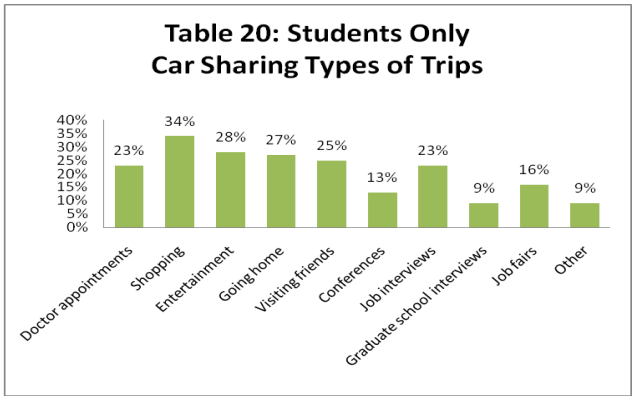
While we did not collect class standing information from students in the sample, we did ask if students lived on or off campus, and have used this as a proxy for freshman and sophomore level students who are the target audience for the car sharing program. While just over a third, 34% (N=45) indicated that they would "probably never" use the service, 21% (N=28) indicated that they would use the service "2-3 times a month" followed by "less than once a month" at 15% (N=21) and "once a month" at 14% (N=19). Looking at respondents who indicated that they would use the program between "once a month" and "every day," 50% of respondents (N=67) indicated such frequent use.

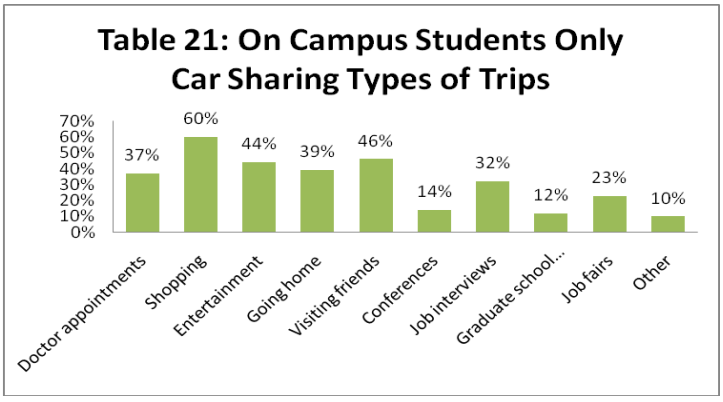
As seen below in Table 19, out of 446 responses to the types of trips that the car sharing program would be used for, the number one option was shopping at 43% (N=193), followed by doctor appointments

and going home at 34% each (N=151) and entertainment purposes at 32% (N=144). Following these choices were visiting friends at 28% (N=126), attending conferences and interviews at 27% (N=120). The least chosen options were attendance at job fairs at 19% (N=86) and graduate school interviews at 11% (N=48). In addition to these options, respondents were also given an "other" option with a text box. Ninety six responses were recorded for this option. Of these, 8% (N=37) indicated that they would not use the program for anything, or that they already had a car. The other responses included school related activities, such as internships, practicum's and nursing clinical. Followed by a few who stated "entertainment."



When **focusing only on students** (N=482), Table 20 shows the most popular response once again was shopping 34% (N=166), entertainment 28% (N=135), going home 27% (N=130), visiting friends 25% (N=119), and doctor appointments 23% (N=109) rounded out the top five responses. As is demonstrated in Table 21, on campus students' reporting of types of trips intended for the car sharing program mirror those of the rest of the sample, with 60% (N=82) indicating shopping, and fairly equal distributions of visiting friends (46%, N=64), entertainment (44%, N=61), going home (39%, N=54), doctor appointments (37%, N=51), and job interviews (23%, N=44) generating interest.





In short, while the data demonstrate a universal "appeal" of the car sharing program, actual use of the program appears to be limited to only on campus students. While these data are a promising show of support for the program, the sample of students living on campus is quite small and non-random, and therefore should be used with caution.

Concluding Remarks

There is clearly a “car culture” among the RU community that is supported by the local infrastructure. The vast majority of students, faculty, and staff drive themselves to campus. While attempts have been made to make biking a more palatable option by the surrounding area, these efforts fall short. The respondents in this sample perceive living too far away and having to travel on roads that are not bicycle-friendly as hurdles to biking to campus. Bus service in the area is equally limited; virtually no one in the sample took the bus to campus. Other than driving, walking appears to be the second most popular mode of transportation to campus—yet this is quite a distant second. This affinity for one’s own car was also possibly apparent in the information gathered for the car sharing program. While the sample perceived the idea as quite appealing, the majority indicated that they would never use the service. However, when focusing only on on-campus students, interest in the car sharing program was quite a bit higher, generating support from the most likely target audience of the program. As such, the hurdles toward decreasing the carbon footprint of RU via commuting behaviors are great. Cultural shifts in attachment to personal vehicles as well as infrastructure changes to the surrounding localities need to be met in order for real change to be made. We suggest continued exploration of community-university collaborations in bus transportation and infrastructure improvements such as sidewalk expansion and street lights to encourage walking.