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Student Commuters: Unpacking the Factors Influencing How High School Students Travel to School

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Student Commuters: Unpacking the Factors Influencing How High School Students Travel to School

Abstract

As environmental concerns grow, obesity rates rise, and people become further distanced from nature, some activists and public health advocates are encouraging the use of more physical modes of transportation over driving. The limited literature on commuters' transit decisions mainly focuses on adults living in urbanized environments while paying scant attention to driving-aged teenagers, despite the importance of their daily commutes to school. Because this group is at a pivotal point in the transition to adulthood, it is likely that their decisions and behavior at this stage of life will have long-term implications for their routines concerning exercise, diet, health, transportation, and regard for the environment. Using quantitative and qualitative data from questionnaires, focus groups, and public sources, as well as Levels of Traffic Stress mapping models, this study examines the factors that shape high school students' methods of transportation to and from school. The researcher found that infrastructure and perceptions of safety are highly associated with high school students' mode use, while environmental concern and self-esteem are not. The article concludes with other possible motivators of mode usage and ideas for future research.

Background

Seventeen years into the 21st Century, the citizens of the industrialized world experience the influence of technology in almost every sphere of their lives, including recreation, politics, home life, work life, and transportation. As we take new technological developments as commonplace, especially in the sphere of transportation, we may not think twice about how modernization affects our safety, our social lives, or the well-being of the environment. Some impacts of modern transportation systems include growing obesity rates, a rise in chronic illnesses, and alarm over "nature deficit disorder" (Louv 2008; Sandry 2013). Though most people in seacoast New Hampshire have some degree of choice about where they live, work, and go to school, much of modern American life is predicated on automobile-based transportation and related infrastructure.

Recent research suggests that Millennials may be shifting away from single-user automobile use. Sivak and Schoettle (2011) find that young people are less likely than their parents to have their license. From 1983 to 2010, licensure among people 30 years old and younger has decreased significantly (Sivak and Schoettle 2011). What influences some people to go against the norm of using cars to travel to their destination? To investigate this, I applied for a Summer Undergraduate Research Fellowship (SURF). My study provided insight into the relationships of student characteristics and transportation mode choices. I looked specifically at how environmental concern, self-esteem, peer influence, infrastructure, and perceptions of safety affect high school students' choices of transportation.

My study differentiates passive and active modes of transportation. Passive transportation includes modes that do not take physical effort, such as driving or riding the bus, while active modes of transportation are those that take direct personal energy from the traveler, such as walking or bicycling. Not surprisingly, most people depended heavily on passive modes in their day-to-day lives.

Study Approach

I approached data collection in two ways: (1) a questionnaire and (2) a series of focus groups. I sampled students from three semi-rural high schools in the seacoast New Hampshire region: Newmarket High School (NHS), Oyster River High School (ORHS), and Winnacunnet High School. These schools differed in student enrollment and geographic area. Juniors and seniors from each school took the questionnaire. Due to a low response rate (less than 20%), I omitted Winnacunnet from both the questionnaire and focus group analyses. I had to first seek the approval of the Institutional Review Board at the University of New Hampshire to ensure

minimal risk for human subjects during participation in the questionnaires and focus groups. As part of the approval process, I sent out waivers to inform parents and students of what the study would involve to obtain their agreement to participate.

The questionnaire included 44 questions total, some of which were formatted in matrices to find out students' commuting mode frequencies, perceived peer perceptions of each mode choice, and environmental concern. It also included Rosenberg's Self-Esteem Scale (Rosenberg 1965), which has been used as a reliable measure of an individual's self-esteem categorized in levels of low, normal, and high, based on responses to 10 questions.

The focus groups consisted of an activity-based discussion, modified from David Wulff's Faith-Q Set (Wulff 2009). Wulff's method uses a series of statements, which the interviewee places on a continuum ranging from strong negative association to strong positive association. After the interviewee finishes the activity, the interviewer asks open-ended questions based on the layout of the statements. For the focus groups in my study, I planned to ask the students, as a group, to arrange nine statements in order from strongly disagree to strongly agree. The statements were printed on slips of paper. Examples of these statements include "Our school is accessible by bike, foot, or skateboard" and "Students at our school are conscious of their impact on the environment." As the researcher, I remained hands-off during the statement sorting activity, but recorded the audio of the conversation, which I later transcribed. After the students organized the statements, I led a discussion based on their arrangement.

The Oyster River focus group took place during a short advisory period of 20 minutes, leading me to omit the statement sorting activity. While avoiding leading questions, I asked students to elaborate on themes that arose in my preliminary analysis of the questionnaire data.

Both questionnaires and focus groups took place in the spring of 2016 at NHS, while the questionnaires were in the spring and focus groups were in the fall of 2016 at ORHS. This gap between the questionnaires and focus groups at Oyster River allowed me to analyze some of the survey data before facilitating the focus group.

I faced a series of challenges with the data that I collected. A set of questions regarding the frequency that students use certain modes of transportation (bike, walk, drive, etc.) left room for interpretation on how to answer. Instead of circling “never” if a student never biked, respondents often left the question blank. I did not know if I could interpret this lack of response as the student not using that mode, or just not wanting to answer the question. To address this, I assumed the student meant that they “never” used that mode choice if they circled “daily” for another mode choice. I consulted my faculty advisor as an experienced resource to find ways to make up for setbacks such as these. In the future, I would ask students to report what percentage of the time they used each mode choice to have more precise results and to avoid ambiguity.

Findings

Through analysis of the questionnaires, I can conclude that neither a student’s environmental concern nor self-esteem were correlated to mode of transportation. In the sample of Newmarket and Oyster River students, 44.48% had high environmental concern, yet only 19.93% of students took an active mode of transportation at least weekly. I also found no relationship between Rosenberg’s measure of self-esteem and use of active or passive modes of transportation. This disconnect suggests that factors other than environmental concern and self-esteem must have had a stronger influence on how students decided to commute to school.

The data showed that factors of infrastructure and safety were correlated to students' mode choice. Distance, school accessibility, perceived parental concern, and perception of the safety of driving all have a significant relationship to whether or not students took an active or passive mode of transportation. Though 76.3% of students report that they did not choose their mode of transportation based on safety, their parents, directly or indirectly, may have made this decision for them. When a student disagrees that their school is accessible by bike, foot, or skateboard, they are over twice as likely (2.6 times) to report that their parents would be worried about them taking an active mode of transportation to school. Additionally, when students agree that their parents would be worried about them taking an active mode to school, they are 2.5 times less likely to take an active mode of transportation than if they disagreed that their parents would be worried. This implies that with improved infrastructure, parents might be less worried, and in turn, students might commute to school by bike, foot, or skateboard more often.

To understand my findings more fully, I asked ORHS students what it meant for their school to be accessible by bike, foot, or skateboard:

STUDENT (OR): *I feel like it depends where you live. If you live, like, a mile out or something, sure you could walk. It wouldn't be too far. But if you live in, like, Barrington or something, it might take a little bit.*

STUDENT (OR): *I mean... if you are talking about accessible, some people can bike further ways than others, so it really depends on certain people—on what is accessible to them, I guess.*

FACILITATOR: *So, it's mainly distance?*

STUDENT (OR): *Yeah, and safety on where they are going. Say someone lived, like, three miles away, but to get there they had to go, like, all back roads, then that is pretty safe. But if someone lived the same distance away, but had to go on the highway, that is way less safe and less accessible.*

Both safety and distance played a role in accessibility and mode choice. As distance increased, students were less likely to take active modes. For students who took active modes, 53.7% lived

within 1 mile of school, 20% live between 1 and 3 miles, 15.1% live between 3 and 6 miles from school and 11.3% live over 6 miles from school.

For some students, biking or walking was not plausible because they lived close to 10 miles away. Students in this situation would need to travel on a busy road, implicating the effects of how sprawling their community is, with much of the population living far from the town center. Figure 1 shows characteristics of real students and how these attributes affect their mode choice.

Figure 1: Student Profiles		
	Oyster River	
	Student One	Student Two
Mode Choice	Bus	Ride from friend (carpool)
Reasoning	Doesn't have license, wouldn't be able to afford a car, car not family's priority	Convenience, neighbor is going anyway, saves time
Distance from School	8 miles	2 miles
Environmental Concern	8	7.5
Effects of: (1-10, weak-strong)		
Distance from School	10	5
Safety	1	1
	Newmarket	
	Student Three	Student Four
Mode Choice	Walk	Drive
Reasoning	Lived within twenty minutes walking from school, taking less time than driving	Laziness, parents probably wouldn't be okay with walking or biking
Distance from School	1.5 miles	2 miles
Environmental Concern	3, not concerned about climate change, though aware of causes and effects	7
Effects of: (1-10, weak-strong)		
Distance from School	6.5	8
Safety	3, has had no safety issues walking	4

Students talked at length in focus groups about how they have sports practices and homework, and how the extra time that it takes to bike or walk to school is more effectively used to gain another half hour of sleep. As an Oyster River student described in a focus group, “You don’t really have that much time if you are always doing other homework, or trying to sleep or doing sports, to actually fit in that extra 30 minutes of biking or walking every day.” Other students stated that if they had had friends to walk to school with, they would have been more likely to do it. This points to a social factor influencing transportation mode choice. When looking at these findings it is important to keep community differences in mind, including the town’s geographic size, traffic stress levels, and school accessibility, as well as the population’s environmental concern and income levels.

DISTRICT AND COMMUNITY DIFFERENCES

Through the analysis of how the data related to my original research questions, it became clear that I needed to consider the many differences between the two groups of students from NHS and ORHS. Almost all variables varied significantly by district. To understand this, the objective community differences had to be explored.

Oyster River School District includes three towns (Durham, Lee, and Madbury). Some students from the town of Barrington also attend ORHS. When Barrington’s square mileage is included, the geographic area of the district as a whole nearly doubles. Meanwhile, Newmarket School District includes only residents of Newmarket. The geographic area of the Newmarket School District is about one quarter of Oyster River’s (not including Barrington), resulting in much longer commutes for students in the Oyster River district. In terms of class size, there are

approximately 320 students in the Junior and Senior classes at ORHS, compared to Newmarket's 122 students in the two classes combined (NHDOE 2016).

Another difference between the districts is that Newmarket's median household income is \$63,298 (Census 2016) compared to Oyster River's \$111,440 median (Census 2016; Durham Master Plan 2015). These numbers show that Newmarket students are less affluent, which means that they may have more pressing concerns than climate change. This could explain why Newmarket students cited overall lower environmental concern than their Oyster River counterparts. Interestingly, though Oyster River students have higher environmental concern, Newmarket students use active modes of transportation more frequently, which release no pollutants and are more environmentally friendly (Frank et al. 2006). For a more complete analysis, we can look at where specific students live, and the safety of the roads between their homes and the school.

Student Profiles and Levels of Traffic Stress (LTS) Maps

Researchers in sociology have found that adults commute by bicycle less when it is raining, in hilly areas, or when they live further away from their work location (Heinen, Van Wee, and Maat 2009). Mekuria, Furth, and Nixon (2012) found evidence of higher rates of bicycle commuting in low stress traffic environments. Blagden (2016) argues that the main reason that people do not commute by bicycle is because of a perception of danger. My research reflects these findings.

In the maps below, color coordination based on a model described by Makuria, Furth and Nixon (2012) can show us the level of stress that traffic places on a cyclist or pedestrian. The students described in Figure 1 are placed on the maps according to where they live.

At first glance, it appears that the roads near ORHS seem to be more bike friendly and walkable than those near NHS, where the high school is located on a road with moderately high traffic stress. (See Figures 2, 3, and 4) However, outside of downtown Durham, many of the roads are rated with moderately high to high stress. Because many ORHS students live 3-6 miles from school, they likely would need to travel on these higher stress roads to get to school. Similarly, although many of the neighborhoods in Newmarket are conducive to bicycling, they are connected to the school by more highly travelled? roads. Therefore, the poor bicycle infrastructure in both towns is one way of explaining why there is a low rate of students who cycle to school.

Key

Green = Low Stress

Blue = Moderately Low Stress

Yellow = Moderately High Stress

Red = High Stress

Figure 2:



Figure 3:

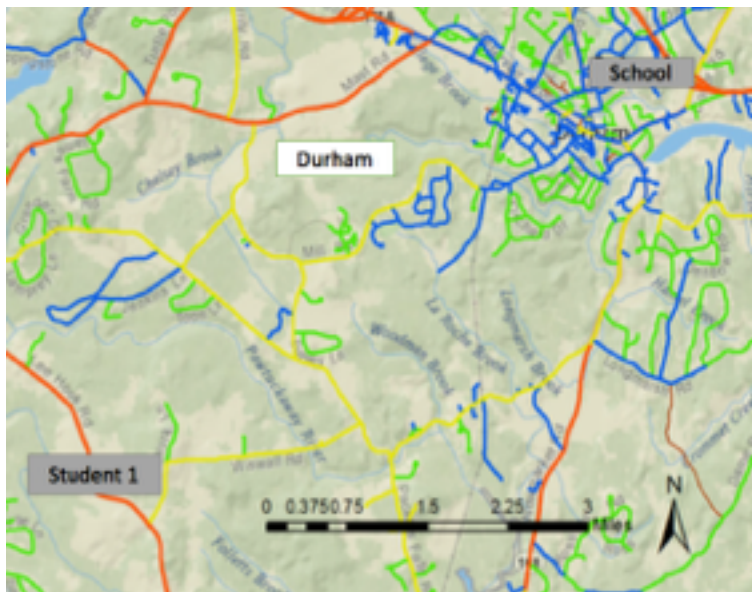


Figure 4:



However, traffic stress levels alone do not fully explain why so few Newmarket students walk to school. Looking at the maps, it becomes apparent that sidewalks might be a relevant factor. Even though the high school is located on a busy road, there are sidewalks connecting some neighborhoods and the downtown area to the school and creating greater pedestrian safety. Student Three (one student) took advantage, walking to school because it is more time efficient. However, many students live on or near Grant Road, which does not have sidewalks connecting it to school.

When looking at the relationship of distance and traffic stress, Student One lives 8 miles from ORHS, and must travel on high and moderately high stress level streets (See Figure 3). This is also a hilly route. Student Two commutes only about 2 miles to ORHS, with mainly low or moderately low stress level streets on the route. (See Figure 4) Despite better route quality and shorter distance for Student Two, both students took passive modes of transportation.

Even when students shared a similar level of environmental concern, they still didn't choose active modes of transportation. Student One would have had more difficulty biking or

walking to school and thus took the bus because of lack of access to a car. The school is more accessible to Student Two via active modes of transportation, but this student has a convenient ride to school and chooses to take that instead. Student Four lives only 2 miles from Newmarket High School but on a road that is dangerous for biking. Student Four is not willing to dismiss safety and convenience for environmental wellbeing, so this student drives to school. The examples shown here exemplify how environmental concern has little impact on mode choice.

From looking at the maps, it is clear that infrastructure and distance have a large effect on students' mode of transportation, but social factors may have been involved as well. Furness (2010) would look to social pressures, likely from media sources and Hollywood. Characters such as Pee-Wee Herman or the "40-Year-Old Virgin" create connections between bicycle riders and "childishness and social ineptitude" (Furness 2010: 111). As measured quantitatively in the questionnaire, bicycling, walking, and skateboarding to school are perceived as much less socially acceptable than using a car. This emphasizes the importance of social pressures to conform to the rest of society and peer groups, especially in times of youth development. Yet, this claim is not reflected in the questionnaire data when comparing perceptions of peer acceptance and mode choice, providing opportunity for further investigation.

Moving Forward

Advocacy groups and public campaigns could use the results of my research to make informed decisions about the distribution of government and private resources for school programs and infrastructure development. These initiatives can encourage more people to look away from car dependency and toward cycling and walking for transportation. Based on my

research, there are several steps that communities could take to encourage students to bike or walk to school for the health of themselves and the planet. One step would be to facilitate discussion among students to determine what neighborhoods people live in and whom they could walk with. Another step would be to have a day where class starts 30 minutes later, giving students the opportunity to try an active mode of transportation without needing to wake up earlier. This might raise awareness and make people realize they could enjoy starting their day this way. When barriers regarding time and convenience are removed, students might be more likely to act in ways benefitting themselves and the planet, reducing the split between moral claims and actual behavior.

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