



Reducing Greenhouse Gas Emissions from Student Commuting

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Project Objective

This research aimed to improve the estimates of greenhouse gas (GHG) emissions from university student commuting, better understand the determinants of students' transportation choices, and explore students' intentions and willingness to change their transportation behavior to reduce carbon emissions.

Problem Statement

Universities across the U.S. are trying to reduce carbon emissions from various sources related to their activities. A substantial source of carbon emissions is student commuting by single occupancy cars. This project analyzed the carbon emissions by students at the University of Southern California and explored ways to reduce these emissions by encouraging students to use modes of transportation that are more environmentally friendly.

Research Methodology

The project consisted of three main tasks:

1. Survey of student commuting at USC
2. Literature review of methods to reduce student commuting by car
3. Focus groups to explore students' motivations to use cars or alternative modes of transportation and to identify incentives for USC to encourage the use of public transportation

Results

Survey

We invited all undergraduate students, graduate students, and postdoctoral fellows at USC in the spring of 2022 to participate in an online survey. The survey included several general questions about sustainability knowledge and attitudes and specific questions about commuting behavior. 2,899 students responded to the commuting questions, split roughly between undergraduate and graduate students. The response rate was about 7 percent. The most interesting findings, shown in Figure 1, were that very few undergraduate students commute by car (7.2%), while graduate students are over four times more likely to commute by car (32.4%). Student commuting contributes 17,969 metric tons of carbon emissions or about 10% of all emissions from USC.

Pacific Southwest Region UTC Research Brief

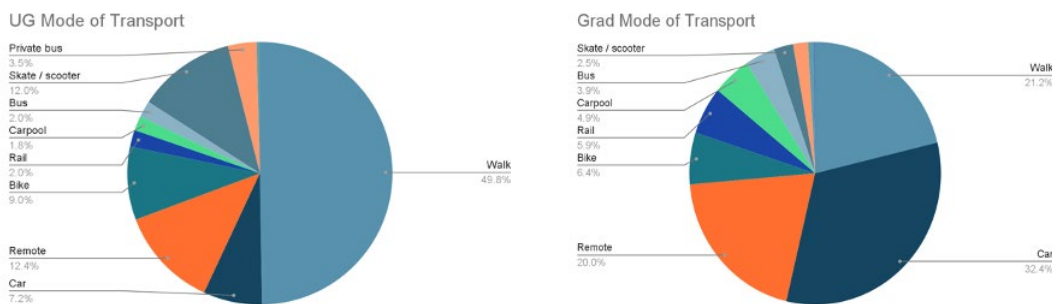


Figure 1. Modes of Transportation for Undergraduate and Graduate Students at the University of Southern California

Literature Review

We conducted a broad literature review related to student commuting. The most interesting part of the review highlighted the effectiveness (or lack thereof) of incentives to encourage student commuting by public transportation. Some studies indicate that economic reasons are the primary driver of using public transportation, especially for those with a low annual income. This finding suggests that free travel passes for public transit may provide a strong incentive to shift from cars to buses or trains. Providing information about pollution and other environmental consequences for SOVs also reduces the frequency of car travel, as can information about fuel consumption and associated expenses. Nudging to shift from using an SOV to ridesharing, public transportation, bicycling, or walking has also been tested with mixed success. In a meta-analysis of nine experiments using nudges, we found four studies with a positive effect of nudging and five with no effect.

Many universities have developed programs to shift students’ modes of transportation to environmentally sustainable ones. Figure 2 below shows our findings from a review of the websites of 34 universities.

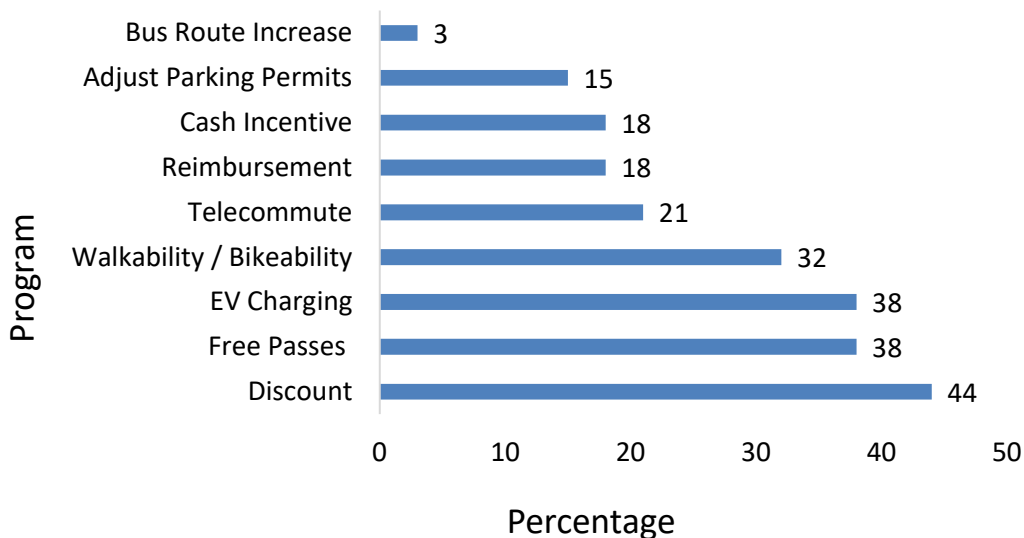


Figure 2. Percentage of 34 Highest-ranked National Universities That Utilize Each Program to Encourage Sustainable Transportation

Focus Groups

In the summer and fall of 2023, we conducted four focus groups with a total of 17 students to explore student concerns, values, and criteria when making commuting mode choices and to investigate student preferences for alternative ways in which USC could encourage them to shift to more environmentally friendly modes of transportation. In addition, we conducted a class exercise in the 2024 spring semester.

The most common forms of transportation among graduate students were SOVs, buses, light rail, and biking. When asked to identify important factors that affected decisions on commuting, both SOV users and non-users stated that the top factors were safety, cost, control of timing, and convenience. Even those who do not use SOVs indicated that the environmental benefits were a coincidental positive outcome instead of a motivating factor.

To encourage graduate students to use alternative transportation, the students suggested that USC invest in crime countermeasures, affordable graduate housing near campus, convenient and frequent USC transportation on and near campus, and incentives for environmentally friendly vehicles. The recommendations are summarized in Table 1

Table 1. USC’s Potential Options Based on Focus Group Feedback

Student Concern	Potential Solutions
Free Lyft (Fryft)	Due to the limited Fryft zones, not all graduate students can take full advantage of the program. Extending the Fryft zone to encompass more graduate housing regions could reduce graduate student emissions in the long term.
Housing	Building affordable Graduate Housing near USC could reduce car usage among graduate students since proximity to campus would allow them to walk or bike to get to campus.
Reliability	Due to the sprawling nature of Los Angeles, students found it more convenient to have a car for daily transportation needs. A consolidated and updated alternative transportation resource list with consistent, flexible routes and times could alleviate the issue. This way, students can rely on public transportation and use it as opposed to driving.
Cost of Eco-Friendly Cars	For students who do not currently have a car but are considering buying, students mentioned that if USC had specific incentives for electric vehicles, such as charging stations or reduced parking pass rates, that would motivate them to consider spending more for an electric car.
Facilities	Students suggested installing brighter lights for all USC entrances to promote walking or biking to campus. Better lighting would allow USC students to see their environment when walking at night and contribute to students feeling safer around USC.