Environmental Studies Program

Boston College Ridesharing

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Purpose

This study aims to gain insight into the lack of vanpooling services used by Boston College faculty and staff. Although Boston College joined into a partnership with MassRides, a free program of Massachusetts Department of Transportation (MassDOT), only five staff members have begun using this program for their daily commute. Though a survey, we examine the current commuting habits and potential for vanpooling by BC faculty and staff. Additionally, we present research into the motivations behind a commute with automobiles, as well as the impacts on health and the environment. We perform a full cost analysis of various commuting methods on a daily, weekly, monthly, and yearly basis. We propose three solutions to improve the already-challenging parking situation at Boston College and increase the presence of ridesharing for BC faculty and staff including: a marketing campaign, a route matching program, and a BC shuttle that runs on the most populous commuting routes.

Methods

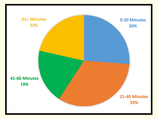
Using data of BC faculty and staff zip codes given to us by Mr. John Savino, Boston College Transportation and Parking Manager, we created a heat map with eSpatial's online software.

We sent out a survey to 400 G permit holders and 400 B permit holders to gather data about BC faulty and staff commuting habits. We recieved 202 responses.

To perform out cost comparison analysis for commuting to campus (UberPool, driving your own car, MBTA, and vanpooling), we used data from Boston College, Uber, MBTA, AAA, Department of Energy, and EZ Ride.

Results

Based on our survey, the travel time of commute is shown in Graph 1.



Graph 1: Commute lengths, sample size: 200

Among surveyed commuters, 59% feel that it is easy to find parking at Boston College, 32% feel that it is somewhat difficult, and 9% feel that it was difficult. Additionally, 75% of respondents feel that BC should take measures to improve parking, as opposed to 7% who think no action is necessary, and 18% that had no opinion on the matter.

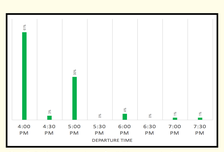
For 15% of respondents, their commutes are a financial burden for them. Of the 85% whose commutes were not a financial burden for them, 58% said that cost was still somewhat important, and 18% said it is very important.

In our cost analysis, our results are as follows and can be seen in Table 1: For a 50 mile commute, the annual cost for Brighton commuters is $6,541.50, $6,420.50 for Chestnut Hill commuters, $9,771.30 for UberPool riders, $760.50 for the MBTA, and $1,094.53 for vanpooling commuters.

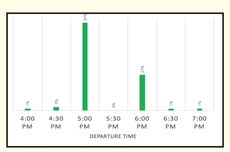
In evaluating their commuting decision, 20% of all respondents considered cost to be not important, 54% consider it somewhat important, and 25% consider cost to be very important. 1% of respondents consider convenience and flexibility to be not important, 15% consider it to be somewhat important and 84% consider it to be very important. Finally, 17% of respondents consider environmental concern to be not important, 66% consider it to somewhat important, and 16% consider it to be very important (Graph 4).

Approximately 53% of respondents were not aware of the BC partnership with MassRIDES. Among those who were unaware of the partnership, 32% were interested in using a vanpooling service, and 68% were not interested. Among the 47% of respondents that were aware of the partnership, 15% were interested in using a vanpooling service, and 85% were not interested (Graph 5).

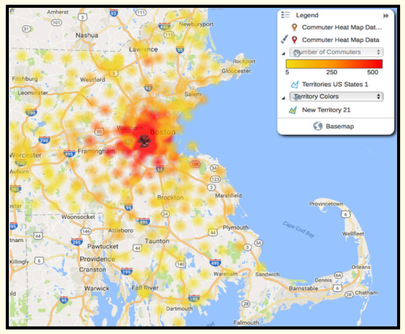
Finally, we looked at the arrival and departure times for commuters that arrived between 7:00 AM and 10:00 AM and left between 3:00 PM and 8:00 PM. 183, or 90.6% of surveyed commuters fell within these criteria. Among the 71 respondents who arrive to campus at 8:00 AM, 61% leave at 4:00 PM, and 30% leave at 5:00 PM (Graph 2). Among the 78 respondents who arrive to campus at 9:00 AM, 67% leave at 5:00 PM and 26% leave at 6:00 PM (Graph 3).



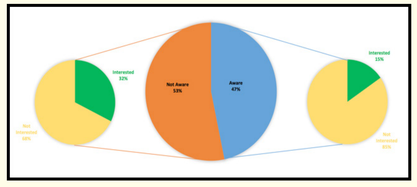
Graph 2: Departure times for 8:00 a.m. arrivals, sample size: 71



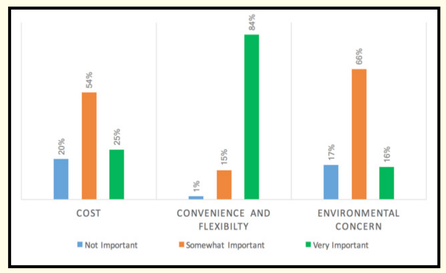
Graph 3: Departure times for 9:00 a.m. arrivals, sample size: 78



Map 1: Population density of Boston College commuters within a 3-mile radius



Graph 5: Awareness and interest of Boston College's partnership with MassRIDES vanpooling program, sample size: 199



Graph 4: Survey results of important commuting factors, sample size: 201

	Commute Method:	Driving Own Car (Brighton)	Driving Own Car (Chestnut Hill)	Uber Pool	MBTA	Vanpooling
10 Miles	Daily Cost	$9.49	$8.75	$15.06	$4.23	$6.14
	Weekly Cost	$47.43	$43.76	$75.30	$21.13	$30.68
	Monthly Cost	$189.71	$175.04	$301.20	$84.50	$122.72
	Yearly Cost	$1,565.10	$1,444.10	$2,484.90	$760.50	$1,012.45
25 Miles	Daily Cost	$20.80	$20.06	$31.62	$4.23	$6.32
	Weekly Cost	$103.98	$100.31	$158.10	$21.13	$31.61
	Monthly Cost	$415.91	$401.24	$632.40	$84.50	$126.45
	Yearly Cost	$3,431.25	$3,310.25	$5,217.30	$760.50	$1,043.23
50 Miles	Daily Cost	$39.65	$38.91	$59.22	$4.23	$6.63
	Weekly Cost	$198.23	$194.56	$296.10	$21.13	$33.17
	Monthly Cost	$792.91	$778.24	$1,184.40	$84.50	$132.67
	Yearly Cost	$6,541.50	$6,420.50	$9,771.30	$760.50	$1,094.53

Table 1: Cost analysis of various round trip commuting methods

Discussion

Environmental & Health Impact

Ultrafine particles (UFPs, < 100 nm) are produced in large quantities by vehicular combustion and can cause severe health impacts (Knibbs, et al., 2011). Vehicular fossil fuel combustion has been shown to be the dominant source of UFPs in urban areas (Knibbs, et al., 2011). Because of their content of reactive oxygen species and large surface area, UFS can damage pulmonary cells, leading to cardiovascular and respiratory diseases (Knibbs, et al., 2011). The more cars commuting on a daily basis, the greater risk for UFPs to be released into the atmosphere. While ridesharing does not eliminate the presence of UFPs, it reduces the vehicles on the road daily, which will decrease the presence of UFPs, making vanpooling a healthier option than personal car usage.

Successful Vanpooling Initatives

Santa Clara University is located in a suburb of San Jose, California, similar to Boston College's proximity to downtown Boston. Santa Clara University encourages ridesharing by offering free parking passes for carpools that arrive on campus with two or more participants. (Transportation at SCU, n.d.) Princeton University in New Jersey is another university that has successfully initiated a ridesharing program by offering incentives. Employees, who commute via a carpool, independently or through the Zimride Rideshare service, are eligible to receive a $50 gas card for every three months the carpool remains in operation. New participants will also receive a $25 additional gas card for signing up for the program (Transportation & Parking, n.d.).

Analysis of Survey Results

While only 9% of respondents felt it was difficult to park on campus at BC, 75% believed that BC should take measures to improve parking. One way to feasibly improve parking is to reduce the number of parking permits issued, which can be in part accomplished through vanpooling programs.

Next, while 85% said that their commute is not a financial burden, 76% of those respondents said that cost is either somewhat important or very important. Through our cost analysis of various commuting options, we see that vanpooling saves $5,446.97 in comparison to driving your own car over the course of a year for a 50 mile round trip commute (Table 1).

Convenience and flexibility proved to be a critical factor in commutes. 84% said that it is very important and another 15% said it is somewhat important (Graph 4). This underscores the importance of being able to find vanpooling groups that have very similar arrival and departure times, and live close together. In analyzing arrival and departure times, we found periods of high overlap. Also, there are many places, especially east of the Interstate 495 corridor, that have high concentrations of Boston College employees within a 3-mile radius of one another (Map 1).

In summary, there is potential to establish a successful vanpooling program at Boston College. The necessary interest and desire currently exists. Additionally, there is likely enough overlapping of individual's logistics to establish vanpooling routes. However, all of these factors existed before this research was conducted, but there has yet to be any vanpooling at Boston College. Action must be taken in order to bridge the gap between potential and action. Through the following recommendations, we believe that this challenge can be overcome.

Recommendations

Marketing Campaign - According to our survey, over 53% of BC faculty and staff were unaware that BC offered a partnership with MassRIDES. This suggests that it was not initially promoted in a successful way. Our first recommendation is to launch a marketing campaign to bring awareness to Boston College's vanpooling programs.

Route Matching - Our second recommendation, which coincides with our first recommendation, is for Boston College to develop a program to facilitate the process of helping BC staff/faculty find others with a similar commute. Boston College staff and faculty interested in either vanpooling or carpooling can submit their home address, and typical commute hours. This will allow Boston College to try to match them with other employees with similar commutes so that they can either start carpooling or vanpooling if they desire.

Boston College Bus System - Our third recommendation is an alternative to vanpooling. Boston College could add a bus system that services surrounding neighborhoods, such as Newton Center, Brookline, and Allston. There are 19 surrounding neighborhoods with over 500 commuters, and 5 with over 1,000 commuters.

References

AAA Association Communication. (n.d.). Your Driving Costs(Rep.). Retrieved April 20, 2017, from AAA website: http://exchange.aaa.com/wp-content/uploads/2016/04/2016-YDC-Brochure.pdf
Boston College. (n.d.). Retrieved April 20, 2017, from http://www.bc.edu/offices/transportation/parking/facstaff.html
Boston College Commuting & Rideshare. (n.d.). Retrieved April 27, 2017, from http://www.bc.edu/offices/transportation/commuting.html
EZ Ride. (n.d.). What Does it Cost? Retrieved May 01, 2017, from http://www.ezride.org/2-2-2-cost.asp
Gardner, B., & Abraham, C. (2008). Psychological correlates of car use: A meta-analysis. ScienceDirect,300-311. Retrieved March 21, 2017.
Joireman, J. A., Van Lange, P. A., & Van Vugt, M. (2004). Who cares about the environmental impact of cars? Environment and Behavior, 36(2), 187-205. Retrieved March 15, 2017.
Knibbs, L. D., Cole-Hunter, T., & Morawska, L. (2011). A review of commuter exposure to ultrafine particles and its health effects. Atmospheric Environment, (45), 2611-2622. Retrieved March 20, 2017.
Levofsky, A., & Greensberg, A. (2001). Organized dynamic ride sharing: the potential environmental benefits and the opportunity for advancing the concept (United States, U.S. Environmental Protection Agency & U.S. Department of Transportation, Transportation Research Board). Washington D.C.
Massachusetts Bay Transportation Authority. (n.d.). Subway Fares and Passes. Retrieved April 20, 2017, from http://mbta.com/fares_and_passes/subway/
Rogers, E. M. (2005). Diffusion of Innovations(5th ed.). New York, NY: Free Press.
Transportation at SCU. (n.d.). Retrieved April 4, 2017, from https://www.scu.edu/sustainability/operations/transportation/
Transportation & Parking. (n.d.). Retrieved April 27, 2017, from http://www.princeton.edu/parking/rideshare.html
Transportation Research, 14, 111-116. Retrieved March 25, 2017.
Uber Technologies Inc. (n.d.). UberPOOL: Share the ride, split the cost. Retrieved April 20, 2017, from https://get.uber.com/p/uber pool-boston/
U.S., Department of Energy, Energy Efficiency and Renewable Energy. (2015, June 17). Alternative Fuels Data Center. Retrieved April 20, 2017, from http://www.afdc.energy.gov/data/
Van der Waerden, P., Lem, A., & Schaefer, W. (2015). Investigation of factors that stimulate car drivers to change from car to car pooling in city center oriented work trips. Elsevier, 10, 335-344. Retrieved March 14, 2017.
Vanpooling. (n.d.). Retrieved April 20, 2017, from https://commute.com/commuter-options/vanpool#vanpool-information
Wener, R. E., & Evans, G. W. (2011). Comparing stress of car and train commuters.
Wikimedia Commons. (2012, February 28). File:Diffusion of ideas.svg. Retrieved April 29, 2017, from https://commons.wikimedia.org/wiki/File%3ADiffusion_of_ideas.svg Based on Rogers, E. (1962) Diffusion of innovations. Free Press, London, NY, USA

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