

## Results & Broader Impacts

(Based on expected results) Based on the result of the area analysis, we can see that redlined districts and districts with lower average income have noticeably less access to the 30 minute window. It makes sense that districts further away from the city's center have longer commute times, but we can conclude from the dataset that some districts have disproportionately small access to the 30 minute window when compared to their distance from South Station. We can see that bicycles dock stations greatly increase a person's mobility within the 30 minute window. The suggested maximum speed for a bicycle so that it can brake within 30 feet is about 15 Mph(Massachusetts Government). As this speed is about 5 times the average adult's walking speed, it can increase the radius of the 30 minute window by upwards of a mile in places within 55 minutes by train to South Station(Medical News Today).

We believe it is important that, to achieve equity, that people have equal access to public transportation. One of the biggest problems in transportation access is the first and last mile problem, where the first and last miles of a commute are the most influential in a person's trip. We can address the first mile by increasing the area of the 30 minute window, as closing the gap between people's homes and the closest stations would increase the accessibility of public transportation, therefore increasing its use by being a cheaper and more convenient alternative than private transport, thus reducing emissions and providing all of the benefits of the 30 minute window.

One of the smartest, most modern cities in the world, Boston, has the second most extensive public transport networks in the US (Lenis, U.S. News). Even after that there isn't much literature on accessibility analysis or some sort of evaluation of coverage of subway stations combined with other forms of transportation such as biking. That is exactly what we set

out to do here. To put it plain and simple, who is getting access to transit more and who is suffering. Another objective is to provide solutions of increasing transit accessibility in those areas where travel time is more compared to well-connected area. For example, if an east boston subway station covers less area under the 30-minute window to south station boston, can we install more bike sharing stations and get people to south station faster?

What specific measurable variables might be improved, based on your research? (e.g. travel time, carbon emissions, travel convenience, cost efficiency, quality of life, etc...) Suhani

Once we have our results, we predict to end up with ranking of most accessible stations and least accessible stations. Least accessible stations will be provided business solutions through biking or other measures to increase accessibility thereby encouraging more people to use public transit. Expected increase in bikers seasonally will reduce carbon emissions but more importantly positively affects health. The first major cohort study reporting cycling-specific effect estimates was conducted in Copenhagen, Denmark (Andersen & Cooper, Andersen, Schnohr, Schroll, & Hein 2000). In a sample of approximately 20 000 study participants, almost 7000 reported commuting by bike. Adjusted for other physical activity and various risk factors, cycling to work was associated with a 28% decrease in all-cause mortality risk. These findings were later confirmed by Matthews et al. ([2007](#)) in a large cohort of Chinese women, which found a 21% reduction in all-cause mortality for 3.5 hour of cycling per week, compared to none. And to conclude, of course the main goal of the study was to reduce the commute time of maximum people.

The impact of these findings from the research conducted and the results produced, will allow for people living within low income communities in greater Boston to commute to work within 30 minutes. The people in these communities will be able to get to work within 30

minutes, which benefits their mental health. It can help them be more productive at work. (“Long Commutes Costing Firms a Week's Worth of Staff Productivity: Vitality.”) Cycling is a great physical activity, and if people are able to cycle for even a small amount of time each day can provide a benefit to their physical health. This can also help to lower the high pollution levels that occur in urban cities such as Boston, which benefits the people living there as well as the environment.

One of the benefits of working with a model such as the 30 minute window model is that it can be applied to the other stations in greater Boston, so that throughout the entire city there are enough bike stations available for people to incorporate cycling into their daily lives, and commutes. While there are other factors that need to be considered such as the stability of the roads that could be used for cycling, to increase cycling in Boston, and reduce emissions from driving and use the various public transit options that are available in Boston. Cycling fills the gap in accessing any of these options from a person's home. The next step would then be to broaden this idea to other urban areas, such as New York. Where even more people use public transit. Also the infrastructure for cycling is a bit better and that will make it much easier to implement this model into an urban area such as Boston. Overall by investigating this issue, and using this model can act as a guide to helping to reduce the emissions that are produced by transportation.

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