Abstract

Bikesharing is a relatively new form of bicycle infrastructure in North America that is theorized to encourage more bicycling trips. However, planning bikeshare systems requires determining exactly where to place stations to maximize ridership. This exploratory study analyzes determinants of bikeshare usage of the Capital Bikeshare system in Washington, DC, with a special focus on bicycle lanes and frequency of bikesharing checkouts. It is hypothesized that placing bikesharing stations near bike lanes will increase ridership.

GIS analysis links each bikeshare station with bike lane supply and bikeshare usage. The multiple regression analysis finds a statistically significant relationship between number of bikesharing trips and frequency of bikesharing checkouts and length of bike lanes within the buffer area.

This study finds a significant correlation between the presence of bicycle lanes and Capital Bikeshare usage, and also highlights the importance of population density and mixed-uses in encouraging ridership. The study also reveals opportunities for further research into car-free households that seem to not use Capital Bikeshare.

Buffer Bike Lane Analysis

A half-mile (804m) buffer was drawn around each operating Capital Bikeshare station in Washington, DC. The total length of bike lane segments within each buffer area was calculated with a ‘spatial join’. Only segments identified as existing bike lanes in the DDOT GIS data were used, along with a limited number of bike lanes identified as “proposed” in the DDOT GIS data that opened subsequent to DDOT posting the data.

Population and Intersections

A ‘union’ between the Capital Bikeshare station buffer shape files, and the US Census block group shape files. Block group data for independent variables was then associated with each of the shapes created, within the station buffers.

Single Variable Regression

Multiple Regression Results

The result of the multiple regression show a correlation between Capital Bikeshare usage and three of the independent variables — total length of bike lanes within the buffer area (p=.001), population density within the buffer area (p=.001), and the number of liquor license holders within the buffer area (p=.001). A stepwise regression added the percentage of households with no access to a car within the buffer area (p=.007).

The resulting multiple regression equation predicts that one additional kilometer (0.62 miles) of bike lane within a ½ mile buffer of a bike sharing station is related to 0.855 additional Capital Bikeshare check-outs per day.

Multiple regression reveals that only bike lane length and three other variables are statistically significant: bicycle lane supply and control variables within a ½ mile area; bikesharer age; and bikesharer household income. For expanding the system, Capital Bikeshare operating agencies may get a higher ridership “return” on their station investment by siting those additional stations in locations with a higher density of population, retail destinations, and bike lanes.

Conclusions

The results of this analysis suggest that Capital Bikeshare operating agencies can encourage ridership at their existing underperforming stations by installing more bike lanes in their immediate vicinity. For expanding the system, Capital Bikeshare operating agencies may get a higher ridership “return” on their station investment by siting those additional stations in locations with a higher density of population, retail destinations, and bike lanes.

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