Transport Policy 35 (2014) 154–161

Contents lists available at ScienceDirect

Transport Policy

journal homepage: www.elsevier.com/locate/tranpol

Changes in access to public transportation for cycle–transit users in response to service reductions

Bradley J. Flamm [a,*], Kay M. Sutula [b], Mahbubur R. Meenar [c]

[a] Department of Community and Regional Planning, Temple University, 580 Meetinghouse Road, Ambler, PA 19002, USA
[b] Greater Cleveland RTA, 1240 West 6th Street, 4th Floor, 409, Cleveland, OH 44113, USA
[c] Center for Sustainable Communities, Temple University, 580 Meetinghouse Road, Ambler, PA 19002, USA

ARTICLE INFO

Available online 6 June 2014

Keywords:
Bicycle
Public transit
Bicycle–transit coordination
Transit catchment area
Bicycle-on-bus boarding

ABSTRACT

North American transit agencies have made large investments since the late 1990s in the coordination of bicycling and public transit services. A key goal in doing so has been to increase transit ridership by extending the geographic area from which riders can easily and quickly reach transit stops and stations. While it is widely hypothesized that being able to travel on transit vehicles with bicycles allows riders to access transit stops and stations from a larger geographic area, the empirical evidence of this is scanty. Information available for Northeast Ohio, where the Greater Cleveland Regional Transit Authority (GCRTA) operates rail, bus and demand response transit, presents an opportunity to address an important aspect of this issue. The availability of detailed long-term bicycle-on-bus boardings (BoBBs) data and the implementation of a series of service reductions in 2008, 2009 and 2010 offer an opportunity to ask the question: Do significant changes in geographic access to transit services result in significant changes to the numbers of cycle–transit users accessing transit buses? The evidence from GCRTA's service area provides some support for this conclusion, with the rates of utilization of bus bicycle racks increasing significantly over time and in slightly higher numbers for routes that saw the largest reductions in bus transit service.

1. Introduction

In the space of little more than a decade—since the late 1990s—professionals responsible for managing and operating public transit systems in North America have successfully made travel by transit bus and rail systems easier and more convenient for bicyclists. They have done this through capital improvements that facilitate cycle–transit coordination (such as the installation of bicycle parking at transit stations and bicycle racks on the front of transit buses) and with the widespread adoption of policies to allow bicycles to be brought on board rail cars. By helping bicyclists become what Krizek et al. (2011) term "cyclist-transit users" (CTUs, the term used in this article) and Hagelin (2005) identifies as "bikes-on-bus users," transit agencies have welcomed a broader range of riders onto buses, trains and trolleys.

The objective of improved bicycle–transit coordination is to derive both direct and indirect benefits for riders, transit agencies, and communities. These benefits include higher ridership on transit vehicles that could coincide with fewer motor vehicle trips, less pollutant emissions and traffic congestion, and public health benefits from increased numbers of travelers using an active transportation mode.

The expectation of benefits is based in large part on the assumption that bicycle–transit coordination enlarges public transit catchment areas. If bicycling is just twice as fast as walking, then the geographic area accessible to a transit trip origin (a bus stop, train station, or transit center) is roughly four times greater than the area accessible by walking (assuming a radius around a transit stop that is two times as long: the actual road and path network in which a transit stop is located affects this calculation, of course). If this is so, transit users with bicycles can live or work a mile or more from an access point to transit and still reach it within an acceptably short amount of time.

The extent to which transit catchment areas are actually larger for CTUs is unclear. While some researchers have calculated bicycle–transit catchment areas of one to two miles or more, the association between the distances transit users travel to access a transit stop and bicycle-on-bus boarding (BoBB) rates has not been effectively assessed.

Opportunities to explore this relationship present themselves in circumstances where access to transit stops has changed in significant ways, such as when a network of transit routes shrinks due to service cuts. In recent years, given the economic downturn

* Corresponding author. Tel.: +1 267 468 8305; fax: +1 267 468 8315.
E-mail addresses: bflamm@temple.edu (B.J. Flamm), ksutula@gcrta.org (K.M. Sutula), meenar@temple.edu (M.R. Meenar).

http://dx.doi.org/10.1016/j.tranpol.2014.05.013
0967-070X/

in the United States and much of the rest of the world, transit authorities have had to reduce services, both in terms of the geographic areas covered by bus routes and rail lines and the timing and frequency of transit trips.

The Greater Cleveland Regional Transit Authority (GCRTA) in Northeast Ohio has had not one, but three major service reductions since 2008. Throughout this time period, the agency kept detailed records of the dates, times, and routes of bicycle-on-bus boardings (BoBBs), providing an important opportunity to assess how CTU access to transit services has changed from the time period before transit service reductions to the time period following such cuts. In this paper two principal questions are addressed: Do bus transit routes that have been reduced in length or that, after service cuts, are more distant from other nearby bus transit routes experience increases in numbers and rates of BoBBs? If so, what does this tell transit planners and researchers about the relationship between bicycle–transit catchment areas and bicycle-on-bus boardings?

This paper is organized in the following way: First is a brief discussion of the history of bicycle–transit coordination in the United States, with a specific emphasis on GCRTA's bicycle and transit investments and policies. Second, the data sets and methodologies used to explore the research questions are described, followed by descriptions of the findings of the analysis. Finally, the paper concludes with a discussion of the implications of the findings and recommendations for further analysis.

2. Background

Researchers have devoted attention to the coordination of cycling and transit in recent years, documenting important changes to transit vehicles, facilities, and policies in order to accommodate riders who are also cyclists (Pucher and Buehler, 2009). A study for the Transit Cooperative Research Program of the Transportation Research Board (Schneider, 2005) categorized dozens of capital investments and policy changes transit agencies in North America have implemented during the past decade. The most widely adopted of these include mounting bicycle racks on buses, installing bicycle racks and lockers at transit stops and stations, building and staffing bicycle kiosks, and developing policies that grant bicycle access to rail vehicles. Other analysts, including Krizek and Stonebraker (2010, 2011) and Bachand-Marleau et al. (2011), have examined these same investments and policies, seeing in them evidence of a happy and productive "marriage" of transit and bicycling.

While cycle–transit coordination efforts create the potential to expand the geographic range of access to transit services, little empirical evidence exists of the extent to which transit service areas are extended by bicycle-friendly policies. Several researchers have studied the use of bicycles as a "feedering" mode to transit, as Martens (2004) calls it. Hagelin (2005) determined that most CTUs rode a mile or more to access transit. Adjei (2010) used a generalized distance of three kilometers (slightly less than two miles) when modeling bicycle access to transit. Hochmair (2013) concluded that median distances traveled to transit within buffer radii around stops and stations were from one to two miles. And Flamm and Rivasplata (2014) found that the bicycle segments of bicycle–transit trips have median values of 2.0 and 3.3 miles in the Philadelphia and San Francisco metropolitan regions.

Most of these researchers specify that CTUs fall into two groups: (a) those who access transit by bicycle, but park and lock their bicycles at transit stops or stations and (b) those who bicycle to bus stops and rail stations then travel with their bicycles on transit vehicles. Not all bike-transit improvements are equally useful to each group, but a coordinated and comprehensive strategy provides useful opportunities to both. In this study, because data were limited to bicycle-on-bus boardings (no bicycle-on-train boarding data or bicycle parking at transit stops data were available), the analysis focuses on those members of the second group who travel by bus transit.

2.1. Transit, bicycles and efforts to coordinate them

Beginning in the late 1990s, the Greater Cleveland Regional Transit Authority has collaborated with several partner organizations on a commitment to provide useful amenities, policies and services to CTUs. In 2003, with the assistance of NOACA, the Northeast Ohio Areawide Coordinating Agency (greater Cleveland, Ohio's Metropolitan Planning Organization), GCRTA completed a three-year effort to mount bicycle racks on all of the agency's buses. Called "Rack & Roll," the program had been supported by local environmental organizations (Alt-Trans Cleveland, 2000) and financed with local and federal funding. NOACA has published bicycle maps of off-road paths, bike lanes, and bike repair shops and has initiated a Bicycle Friendly Community campaign recognizing municipalities that promote bicycle friendly environments. Area cycling clubs have participated in and supported these efforts, including the Cleveland Bike Rack, the region's first full-service bicycle center established as a collective effort between the Downtown Cleveland Alliance and the City of Cleveland.

GCRTA's efforts have occurred at the same time that bicycling in the Cleveland metropolitan region has risen in visibility and importance. Data from the American Community Survey (ACS) analyzed by the League of American Cyclists (2013) indicates that the percentage of Cleveland commuters using bicycles increased significantly in the recent past from 0.4% in 2005 to 0.6% in 2011 and 2012 (the national average in 2012 was also 0.6%). Margins of error are high in ACS bicycling data sets and the precise numbers of bike commuters and, more generally, travelers who use bicycles for any trip purpose, are unknown. But the existence of dozens of bicycle advocacy organizations in Northeast Ohio and the high level of governmental and foundation support for improving the safety and convenience of bicyclists in the region support the conclusion that bicycles have grown in importance as a travel mode in the Cleveland metropolitan area.

2.2. A natural experiment due to transit service reductions

The availability of bicycle racks on all GCRTA buses and the existence of a comprehensive multi-year database of all BoBBs present an interesting opportunity to evaluate patterns of CTU behavior, particularly in light of the service cuts occasioned by the economic downturn that began in 2008. GCRTA, like many public transit agencies, was obliged to make substantial cuts in service, first in November, 2008, then in September, 2009, and again in April, 2010. The recession affected both regional employment (and, thus, demand for commuting by transit), as well as levels of public sector financial support. The results could have been worse; GCRTA's management had earlier initiated money-saving efforts, including the implementation of TransitStat (a performance management program) and the consolidation of garages for greater efficiencies, which helped keep the service reductions smaller than they might have been (communication with Joel Freilich, GCRTA Assistant Director of Service Management).

Nevertheless, the cuts were significant. In 2008, three routes were eliminated and overall bus system service miles were reduced by 6%. In 2009, four more routes and twelve neighborhood circulator buses were eliminated and service miles were reduced by another 13%. April, 2010 saw the largest cuts of all, with thirteen bus routes eliminated and service miles cut by