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Understanding bike share reach, use, access and function: An exploratory study

Emily Hentz Leister, Nicole Vairo, Dangaia Sims, Melissa Bopp*

Department of Kinesiology, Pennsylvania State University, University Park, PA, 16802, United States

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ABSTRACT

Background: Bike shares have been shown to increase physical activity among users by replacing sedentary modes of travel.
Objective: To examine factors affecting the operation of bike share systems.
Method: Representatives from bike shares around the world were recruited to participate in an online survey. Questions addressed information about the bike share, efforts reach to different populations, goals of the bike share, and perceived barriers/motivators to bike share use. Differences between high- and low-use bike shares were examined.
Results: Respondents (n = 23) were predominately from the USA (n = 20). The mean number of bikes in the bike share was 591.22 ± 777.26 and the mean number of stations was 73.26 ± 85.07. Bike share operators estimated that 44.13% of trips were made by women, 8.81% by children, 10.40% by older adults, 18.13% by ethnic minorities, and 12.67% by persons of low income. Bike shares revealed low reach among minorities and those of lower income. Popular short-term goals of the bike shares included increasing users and trips. The top motivator was ease of access to stations.
Conclusion: These findings may assist bike shares in increasing ridership and reach, facilitating in the primary goal of increasing rates of active travel among all populations.

1. Introduction

Participation in bicycling has a numberof potential outcomes, including increased rates physical activity, decreased pollution and economic benefits. A lack of physical activity is associated with many of the leading causes of death, chronic diseases and disability (Physical Activity Guidelines Advisory Committee, 2008). A goal of the U.S. Department of Health and Human Services Healthy People 2020 initiative is to increase the proportion of trips made by bicycle in both adults and children, indicating the importance of biking in improving the health of all Americans (USDHHS (2010)). In terms of pollution, a mode share shift to more active modes of travel could save 4–23 million tons of carbon a year for trips of less than 3 miles (4.83 km), considerably decreasing pollution and improving overall air quality (Rails to Trails Conservancy, 2008). The economic impact of bicycling can be calculated considering both direct (healthcare savings, time saved, recreational benefits) and indirect costs (real estate values, fuel savings, return on infrastructure investment)and are significant (Flusche, 2009; Suh, 2015). In the US biking rates are low compared with Western European countries, with less than 1% of trips taken via bicycle (Bassett, Pucher, Buehler, Thompson, & Crouter, 2008; Pucher, Buehler, Bassett, & Dannenberg, 2010). Encouraging active travel may provide a realistic approach to yielding a multitude of benefits and improving overall health outcomes (de Nazelle et al., 2011).

Access to biking is not equitably distributed among all groups. Qualitative research with ethnic minority groups in Portland, Oregon conducted by Community Cycling Center found that the cost associated with the purchase of a bicycle and the expense associated with bike maintenance are seen as a significant barrier to many individuals of low income (Community Cycling Center, 2012). Many African American participants expressed concerns about drivers being hostile towards them, while others did not have access to a safe area to store their a bike, representing yet another barrier to bike ownership. Ethnic minorities are not the only group excluded from benefits of biking, there is also a significant gender gap in rates of bicycling, with 76% of trips made up by men and only 24% made up by women (Alliance for Biking & Walking, 2016).

Community support can play a large role in making a community bicycle-friendly. Due to the widespread health, environmental and economic benefits, many communities seek to increase biking. Bicycle-

* Corresponding author at: Dept. Kinesiology, Pennsylvania State University, University Park, 266 Recreation Building, PA 16802, United States.
E-mail address: Mjb73@psu.edu (M. Bopp).

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friendly communities are shown to have lower levels of obesity, high blood pressure, diabetes, asthma, and roadway fatalities (Alliance for Biking & Walking, 2016). Some aspects of bicycle-friendly communities include supportive infrastructure, education, and encouragement for participation in biking. Bike infrastructure is important for both the safety of those riding bikes and for encouraging bike use, helping bikers to feel confident and safe riding on and off streets (Alliance for Biking & Walking, 2016). Education is vital in teaching people about safety, laws for the safe sharing of the roadways, information on the benefits of biking and also may aid in encouragement of new riders. Communities can encourage biking in a number of different ways including the formation of bicycle advocacy groups and support of bike shares. Bike shares are a way to increase access to biking without the expense and responsibility of bike ownership.

Bike shares have been shown to benefit communities in a number of ways including health, economic, and environmental outcomes (Bauman, Crane, Drayton, & Titze, 2017; Fishman, Washington, & Haworth, 2013). Research on the bike share in Montreal, Canada found that the launch of the bike share program was associated with an increase in mode share for biking, and linked with the noted health benefits of cycling (Fuller, Gauvin, Kestens, Morency, & Drouin, 2013). A number of studies in larger cities (Washington DC, Lyons, France, Dublin, Ireland, London, Minneapolis) noted a small but significant positive environmental impact of the installation and use of a bike share program from this mode share shift (Fishman et al., 2013; Fishman, Washington, & Haworth, 2015). The number of systems in the U.S. has increased rapidly, expanding from just four systems in 2010 to 55 in 2016 (National Association of City Transportation Officials, 2017), and continues to grow rapidly worldwide. Although the benefits of the increased access to bicycling bike shares provide have been widely researched, not much was known about the reach, access, goals, and perceived motivators and barriers from the perspective of bike share representatives. Therefore the purpose of this study is to examine these factors in order to identify areas of concern, strength and opportunity for initiatives to increase ridership, and facilitate active travel among all populations.

2. Methods

2.1. Design

This was a cross sectional online survey (Qualtrics, Provo, UT) with a volunteer convenience sample representing 23 bike shares from four countries and was approved by the BLINDED Institutional Review Board.

2.2. Recruitment and participants

Bike shares in English speaking countries were identified from complied lists online (Meddin & DeMaio, 2017). Websites of bike shares were searched to identify contact information for a representative who could complete the survey (e.g. president, CEO). Email invitations (n = 79) were sent to representatives to participate in an online survey. Reminder emails were sent one and two weeks after the first invite. Non-responders were then contacted with a follow-up phone call to invite participation. The survey had a final response rate of 29.5%.

2.3. Survey

2.3.1. Descriptive details

In order to obtain a description of the bike shares represented in this survey, participants were asked what country, what state/province their bike share was in, and the population of the city it was in. Representatives were asked to report if the League of American Bicyclists recognized the region of their bike share as a Bicycle Friendly Community (League of American Bicyclists, 2013) and if so, at what level (bronze-platinum). They were also asked to rate how much political support they perceived the bike share had on a scale of 1 (none at all) to 5 (a great deal). Participants were asked to report the year their bike share was created, the number of bikes and stations as a part of their bike share, typical number of trips during a weekday and weekend day, and the average number of minutes bikes were checked out per trip. The number of trips during a weekday and weekend day were summed and the median was calculated, then the bike shares were dichotomized as high- or low-use bike shares.

2.3.2. Income and partners

Sources of income for the bike shares was reported, broken up by percent from a list of the following: user fees, subsidies from local government, sponsorships, subsidies from employers, subsidies from universities/colleges and other. Representatives were asked if users were offered a subscription/membership and if so, what percent of users had one. Additionally, they were asked to describe special pricing or programs for individuals of lower income levels. Participants were asked to indicate if their bike share had any key partners from a list of possible partners, including local public transit agencies, local government, public health departments, employers, health care organizations, health insurance companies, schools/school district, and universities/colleges. Representatives were asked to rank a list of possible reasons their communities supported the bike share from most important (1), to least important (5). The list included improve traffic congestion, decrease air pollution, promote health in the community, decrease transportation costs, and to decrease bike theft crime, and abandonment.

2.3.3. Reach

In order to assess bike share reach, participants were asked to estimate the percentage of trips taken by women, older adults, children/youth, racial/ethnic minorities, and persons of low income. They were also asked to report their perceptions of how well a job they did at reaching these groups on a scale from 1 (not at all) to 5 (extremely). They were also asked to describe any special programs offered to these groups and whether or not they had bikes accessible to those with disabilities.

2.3.4. Motivators and barriers

In order to assess perceived barriers, participants were asked to respond to 10 potential barriers for community residents and visitors separately on a scale of 1 (not really a barrier) to 5 (very much a barrier). Barriers included: cost of use, awareness of the bike share, knowledge about how to use the bike share, lack of confidence in their biking skills, biking is not a normal transit option for them, placement of the bike share stations, lack of infrastructure in the community to support biking (e.g. bike lanes), lack of maintenance of bike infrastructure in poor weather (e.g. snow, rain), difficult terrain, and poor weather. To assess perceived motivators, participants responded to five possible motivators for community residents and visitors from 1 (not at all motivating) to 5 (very motivating). Motivators included, economical method of travel, traffic congestion in the community, easy access to stations, easy to use check outs and returns, and more interaction with the environment/neighborhood.

In order to assess weather as a possible barrier, representatives were also asked “about how many month of the year is your average daily temperature above 20 degrees C/below 0 degrees C.” Participants were also asked of all the barriers given, which would be the most easily targeted for change.

2.3.5. Goals

To better understand bike share goals, participants were asked to group 10 possible goals of the bike share into categories of: short-term goals, long-term goals, and not a priority. Some participants opted to not categorize the goals into one of the three categories. Goals included: