

**Bike Share and Health:
Evidence Review**

**Submitted by:
WRHA Population and Public Health Program
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Bike Share Systems and Health

A healthy city includes safe and accessible transportation systems that incorporate a variety of transportation modes and place priority on active transport over the use of private vehicles. Bike share systems have existed for almost 50 years, with a sharp increase in prevalence and popularity worldwide in recent years (Shaheen, Guzman, & Zhang, 2010). Bike sharing systems position bicycles throughout an urban environment, among a network of docking stations, for short-term rental (Shaheen, Martin, & Cohen, 2013).

Bike share systems can benefit communities in a number of ways:

- increased cycling and walking
- improved access to public transit
- reduced reliance on private vehicles
- improved air quality (Kelly et al., 2014; Hosford et al., 2019; Babagoli et al., 2019)

In implementing a bike share system, there are also considerations required to address safety of the users and supporting social equity.

Physical Activity

Regular cycle commuting makes a major contribution to adult population levels of physical activity (Bauman et. al., 2017). There is strong evidence that regular moderate- to vigorous-intensity physical activity contribute to population health, including improved physical health and reduced preventable deaths (Bauman et. al., 2017). Cycling for transportation is typically performed at sufficient intensity to be classified as moderate- to vigorous (Bauman et. al., 2017). Several studies have demonstrated physiological responses to cycling that reduce chronic disease risk in adults and children; one was a population-based intervention study (Oja et al., 1991), which showed that a 10-week intervention of 3–4 days/week of cycle commuting for about 60 min/day showed improvements in cardiorespiratory fitness and HDL cholesterol (Bauman et. al., 2017).

Considerations for Action

- Promote continued expansion of our active transportation network in order to support building physical activity into our daily lives.
- Consider implementing an e-bike share system to contribute towards expanding cycling's mode share in Winnipeg and as part of an overall strategy to promote bicycle use as a healthy, sustainable mode of transportation.

Air quality and Other Environmental Impacts

The health benefits of walking and cycling outweigh the negative effects on health of air pollution, even in cities with high levels of air pollution (Tainio et al., 2016). This strengthens the case that cycling has a net benefit even in polluted cities - an effort that in turn can help reduce vehicle emissions (Bauman et. al., 2017). Motor vehicle air pollution is estimated to cause a similar number of premature deaths as

traffic crashes (Murray et al., 1996). Poor air quality can impact everyone, but people with pre-existing respiratory conditions such as asthma or chronic lung disease are most affected. Integrating bike share systems with public transport system can reduce reliance on private vehicles, reducing traffic congestion. Public transit tends to produce less pollution per passenger-mile compared to private motorized transport, particularly electric-powered and newer diesel buses (ICF, 2008). Using the U.S. Environmental Protection Agency's average CO2 emissions per vehicle mile, it was estimated during a recent pilot study that e-scooters prevented automobiles from emitting approximately 122 metric tons of CO2, equivalent to removing nearly 27 average passenger vehicles from the road for a year (Portland Bureau of Transportation, 2018).

Ensuring that the bike share and public transit system are well integrated is an important consideration. Sustainable travel infrastructure, including micromobility and public transit, is a climate change mitigation opportunity that has been shown to decrease air pollution and greenhouse gas emissions (Maizlish et al., 2013).

Considerations for Action

- Integrate bike share systems with public transport systems to support an equitable and sustainable city (e.g., mobility hubs, where a wide range of shared and sustainable mobility infrastructure is co-located for ease of integration).
- Require bike share companies to monitor and report environmental impacts of bike share system and redistribution.

Safety

Injury is the leading cause of death for Canadians from 1-44 years of age, and from 2000 to 2010, 3,610 Winnipeg residents died, and 51,236 were hospitalized due to injury ([Winnipeg Health Region Injury Report, 2014](#)). Several studies have shown increases in ridership after the introduction of city bike share programs (Pucher et. al., 2010). However, these programs may lead to increased use among mainly inexperienced riders, which may result in overall increases in bicycle accidents and injuries. One recent study assessed this issue and evaluated numbers of total injuries before and after the introduction of a bike share program in a major city; the results of that study showed a significant reduction in the overall number of injuries after the program's introduction (Fishman et al., 2016). In another study, Graves et al. found that the percentage of head injuries among bicycle-related injuries as a whole increased from 42.3% to 50.1% after implementation of bike share programs, which the authors attributed to the programs' lack of helmet availability (Graves et. al., 2014). Bike helmets provide proven protection against head injuries. Generally, helmet use among bike share users is low, and interventions to increase helmet use should target both personal and bike share use (Friedman et al., 2016).

Injuries, both unintentional and intentional, are heavily influenced by environment-related factors. Dedicated walking, cycling and recreational spaces have been associated with lower risks of pedestrian and cycling-related injury (Schuurman, Cinnamon, Crooks, & Hameed, 2009). As bike share systems are implemented, safe and accessible transportation infrastructure, such as protected bike lanes, must be a

priority to reduce risks of road injuries. Before and after implementation of a bike share program pilot or roll-out, it is important to have a public education strategy around safe cycling and bike helmets aimed at new cyclists and car drivers (The Bike-Share Planning Guide (n.d.)).

Considerations for Action

- Monitor the nature and burden of significant injuries. This will require new methods to capture bike share deaths and injuries and impacts on health/police/EMS services and insurance claims.
- Prioritize investment in active transportation networks, including separated bike lanes.
- Require bike share companies to ensure riders are informed of local regulations and safety recommendations.
- Require bike share companies to provide a helmet for each bike rented by attaching a helmet to the bike so there is a 1:1 ratio, this way the helmet is always present, and optional to use.

Social equity

Ensuring equitable access to active transportation opportunities, and designing for all ages and abilities, is foundational to supporting healthy built environments. To support increased cycling, bike share systems must be convenient (Bachand-Marleau et. al., 2012).

Consideration of the population that a bike sharing system serves is an important factor in assessing the system's impact on health (Babagoli et al., 2019). Research has shown that bike share utilization is influenced by spatial access, namely living or working within the geography of the bike share system (Bachand-Marleau et al., 2012). Lower income neighbourhoods may require higher density bike sharing stations to provide a tangible transportation option. Cost will also be a barrier to accessing bike share systems. A National Association of City Transportation Officials review (2015) of approaches to addressing access for low-income populations suggests that successful systems should include a variety of membership options to allow people to spread out the cost over time, simple application processes, and data collection that includes measures of access in low-income neighbourhoods.

Considerations for Action

- Develop strategies to address and monitor access for people with lower incomes (through distribution requirements, discounted rates, ability to pay cash, etc.).
- Ensure the bike share company provides cycling safety equipment and accessories on all their bikes (e.g. helmets, lights/reflectors) (WRHA, 2017).

Summary

Bike shares support a healthy transportation system when they are integrated with other modes of transportation, provide access regardless of income, and are supported by safe cycling infrastructure. As a sustainable transportation mode, they are also an opportunity to support increased physical activity and climate change action, and may lead to improved air quality.

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