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Walkability, complete streets, and gender: Who benefits most?

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ABSTRACT

Does street walkability and a new complete street renovation relate to street use and gender composition? We audited two mixed-walkability complete streets ("complete less-urban" and "complete-urban"), one low-walkable street, and one high-walkable street at pre-renovation and twice post-renovation. Complete street users increased, especially for the complete-less urban street. Typically, the high-walkable street attracted the most and the low-walkable street attracted the fewest total people, males, and females; complete streets were in between. On blocks with people, females were only 29% of users; females were much less common on low-walkable streets. Street improvements might enhance gender equity.

1. Introduction

Over 900 U.S. jurisdictions have adopted “complete street” policies that are intended to support active travel by pedestrians, cyclists, and transit riders by improving built environment and policy supports for walking, cycling, and using transit (Izenberg and Fullilove, 2016; Moreland-Russell et al., 2013; Smith et al., 2010). Several countries in Europe have also enacted policies to encourage active travel by improving streets, paths, and busways (Department of Health and Department for Transport, 2010; Goodman et al., 2013, 2014). As policies and designs for active travel become more popular, complete street renovations and walkable designs require evaluation of use, including assessments of gender equity. The current study evaluates a new complete street renovation along with more and less walkable streets and assesses use by gender.

Lively streets are valued by health researchers for inspiring more walking (Adlakha et al., 2015) and by urban designers for enhancing city livability. Jane Jacobs valued the “sidewalk ballet” among regular users that makes a street enjoyable and friendly and the “eyes on the street” that created safety (Jacobs, 1961). Jan Gehl pedestrianized streets to create “life between buildings” (Gehl, 2011). William Whyte argued that social and physical features of high-quality public spaces attract more people, and especially females, but without formally evaluating walkability as currently understood (Whyte, 1980). These concepts and studies suggest that complete and walkable streets may attract more people overall and more females in particular.

To date, most walkability studies have related overall neighborhood walkability to physical activity (Badland and Schofield, 2005; De Nazelle et al., 2011; Hajna et al., 2015). There are two limitations to this approach. First, the geographic area used to define neighborhood walkability is often different from the areas where a resident attains physical activity. Second, studies often assess walkability in a fairly large, macro-level area (e.g., census tracts or zip codes), defining walkability as higher levels of population density, land use diversity, and street connectivity (Cervero and Kockelman, 1997). While useful, these indicators of walkability are incomplete, ignoring many of the micro-level features that Jacobs, Gehl, and Whyte emphasized, such as shade from street trees or views of aesthetically pleasing features on the street. The current study overcomes these two limitations by having trained raters count people using particular streets chosen to differ in walkability, with initial walkability assessed by trained raters using comprehensive micro-level walkability audits. We examine whether streets that differ in walkability have different numbers of total users, females, and males.

In addition, two of the four streets observed in the study had complete street renovations after the baseline observations, allowing us to test whether the renovations are followed by greater use. To clarify terminology, walkability involves design qualities that support walking, such as better aesthetics, traffic safety, crime safety, dense and diverse locations, and pedestrian facilities, such as sidewalks and transit stops (Day et al., 2006). Complete street designs are a subset of walkable designs, those intended to support pedestrians (or other active users)

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in the presence of automobiles (Smith et al., 2010). Walkable designs more broadly would also include a school grounds or pedestrianized street that bans cars. The present paper examines four streets that vary in walkability in the context of streets with automotive traffic; two of the streets received complete street renovations to make those blocks more attractive to pedestrians, transit riders, and cyclists.

Few walkability studies have been conducted at this level of detail and the few relevant studies have yielded mixed results and contained important limitations. For instance, following a California complete street renovation there was no increase in cyclists, but a 37% increase in pedestrians (Shu et al., 2014); these mixed findings are difficult to interpret because no comparison street was included to control for potential shifting of transportation practices over time. Although street renovations are sometimes related to more self-reported walking (Pazin et al., 2016) or accelerometer-measured walking (Brown et al., 2016), other studies show no increased use after street renovations (Boarnet et al., 2013) or greenway construction (West and Shores, 2011, 2015). Past evaluations of the complete street reported in the current study showed more nearby residents used complete street transit than before (Brown et al., 2015), and more people were counted at transit stops than before (Werner et al., 2016). Some research has related more pedestrian counts in New York City to walkable features on the block such as street furniture and multiple windows facing the street (Ewing et al., 2016); however, other research in a Midwest city has shown higher pedestrian counts related to less walkable features, such as graffiti and litter (Suminski et al., 2008). In sum, few studies systematically assess walkability of streets or paths as related to the total number and gender composition of street users over time.

The current study addresses these limitations and additionally fills a gap by counting females and males on streets that vary in walkability. It is important that females feel safe and comfortable on city streets as these locations provide opportunities to engage in physical activity through commutes, chores (e.g., trips to stores or banks), and recreational activities. Both a recent meta-analysis (Murtagh et al., 2015) and a U.S. national study using objective health measures (Furie and Desai, 2012) confirm that walking is beneficial for many health outcomes, such as body mass and diabetes risk. However, women generally achieve less physical activity than men (Furie and Desai, 2012; Troiano et al., 2008). Ensuring that women have access to environments that are supportive of their physical activity helps to promote gender equity for physical activity and health outcomes.

Unfortunately, street avoidance or unease continues to be a concern, especially for women (Pelclová et al., 2014; Van Dyck et al., 2015, 2013). Indeed women have reported that they are especially likely to experience public hassles or incivilities (Bastomski and Smith, 2016) and consequently avoid public spaces (Koskela and Pain, 2000; Valentine, 1990), or certain streets (Pain, 1997). Although female employment has increased in past decades thereby increasing their presence outside the home (Hampton et al., 2015), females still may spend more time at home and less time outside the home than males (Drummond, 2000; Scraton and Watson, 1998; Spalt et al., 2016). Few studies have tracked the gender equity in the use of public spaces such as streets and sidewalks.

Of the few studies that assess street use by gender, females are often not quite half the users. In the small town of Wilkes-Barre Pennsylvania (population 40,000), 46% of downtown pedestrians were female (Schasberger et al., 2012). A replication of Whyte's famous 1979–1980 street use studies showed that, in 2008–2010, the proportion of females across four eastern city sites (New York City, Philadelphia, and Boston) was 40%, 43%, 47%, and 59%, with only the Metropolitan Museum steps having more women than men (Hampton et al., 2015). Thus, we also examined block-level proportions of females.

In sum, we test the following aims:

1. Compared to less walkable streets, do more walkable streets have more total people and females?
2. Does street use increase following complete street renovations, and is the increase sustained?
3. Are proportionately fewer females than males using streets and does this vary by walkability?

2. Methods

2.1. Sites

We counted people using four street sections—contiguous linear parts of a street—in Salt Lake City, Utah during October/November in time 1 (2011), time 2 (2013), and time 3 (2015). By April 2013, a complete street renovation had added a light rail line with five new stops, bike lanes, and improved sidewalks to two of the street sections; the other two street sections were not renovated. Each street section was divided into street segments—the length of one side of the street between two intersections. The four street sections had some businesses that might be more appealing to females (e.g., a yoga studio) but these were often balanced by those appealing more to males (e.g., a fly-fishing store), thus we did not detect any overall gender bias in the land uses across the streets.

The complete street renovation took place on North Temple Street, with east and west ends treated as distinct street sections. The ten eastern street segments (1.6 km, from 600 West to 1200 West), border the central business district and are more urban, and thus called the “complete-urban” street. Walkable features include multistory apartments and condominiums, a mobile home park, offices, druggists, and grocery stores. Less walkable features include undeveloped fields, drive-through businesses, and light industrial complexes. Budgetary constraints limited some landscaping and aesthetic improvements to the complete-urban street. The nine western street segments (1.7 km, from 1200 West to 2200 West) are less urban and thus called the “complete less-urban” street. It has some low-rise residential units, small businesses, government buildings, and industrial land uses. Both streets offer mixed walkability conditions and vary between 2 and 4 lanes of traffic with speeds between 30 and 35 mph. Although some sections of the road were closed at times in 2011 for complete street construction, major construction occurred in short stretches and pedestrian access was maintained throughout.

Two comparison street sections, without complete street renovations, represented both low-walkable and high-walkable streets; both started 10 blocks south of the complete street. Low-walkable Redwood Road (starting from 900 South to 1700 South) has eight street segments (2 km). Low-walkable features include 4 lanes of traffic, 40 mph speed limit, commercial uses mixed with empty fields and long street segments with some missing sidewalks. Many sites were automobile-oriented, such as gas stations, a car wash, and businesses with drive-through windows, while others might attract automobiles and pedestrians, such as small strip malls.

High-walkable 900 South (from State Street to 1100 East) has 20 street segments (2.4 km). Walkable features include many short street segments, 25–30 mph speed limits, complete sidewalks, several small businesses, restaurants and bars, mostly single-family detached homes, street trees, and a large public park.

2.2. Site walkability audits

To confirm that the sampled routes represent high, mixed, and low walkability, trained raters audited time 1 walkability. Over 160 items on the Irvine Minnesota Inventory (IMI) (Boarnet et al., 2006) were dichotomized (either 1 = presence of a good walkability feature and 0 = neutral walkability feature, or − 1 = poor walkability feature and 0 = neutral or 1 = good; scoring details available from the corresponding author). Resulting variables were then summed into six subscales. The subscales had acceptable levels of inter-observer reliability according to

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