Winter Walkability

Photo Credit: Wexas Travel

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Walkability has been defined as "the quality of walking conditions, including factors such as the existence of walking facilities and the degree of walking safety, comfort, and convenience" (Litman, 2003, p. 5).

Incorporating aspects of good walkability in cities is important for many reasons. It encourages physical activity that benefits physical and mental health, increases opportunities for face-to-face social interaction, adds eyes on the street for improved neighbourhood safety, and makes for a more lively and vibrant community. Similarly, a lack of opportunities for walking can lead to reduced social interaction and exercise, negatively impacting mental and physical health, which can have financial implications for such things as government health spending.

Winter brings weather conditions that reduce walkability and can exacerbate the negative impacts associated with reduced walking. In extreme instances, this can even result in isolation and feelings of depression, especially for people with mobility issues. This is particularly relevant to older members of the population, which is why much of the research surrounding winter walkability focuses on age-friendly issues and the implications for older adults.

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Components of Good Year-Round Walkablility

There are a number of subjective characteristics that have been identified as conducive to a more walkable environment. These include characteristics that reinforce a sense of safety such as clean surroundings (free of litter and graffiti), higher pedestrian traffic, lower levels of vehicular traffic and noise, as well as pleasant aesthetics that include attractive natural and built environments. There are also many beneficial physical features such as well-maintained and level sidewalks or paths, the presence of retail amenities, good path connectivity including well-marked pedestrian crosswalks, and accessibility features like curb ramps and railings (Brown, Werner, Amburgey, & Szalay, 2007).

Photo Credit: Author

Figure 1: A dense, mixed-use environment is conducive to year-round walkability.

Multiple studies highlight how a dense, mixed-use built form has a positive impact on year-round walkability of an area (Brown, Werner, Amburgey, & Szalay, 2007; Meng & Setoguchi, 2010; Ripat, Redmond, & Grabowecky, 2010; Wennberg, Ståhl, & Hydén, 2009). One benefit of this, of particular relevance in winter, is the importance of having a convenient mix of indoor meeting places, such as coffee shops and libraries, within close proximity to each other and to housing.

Figure 2: Seating is an important consideration for older adults.

Figure 3: Walkability is reduced when a sidewalk is effectively narrowed by snow.

Seating is another important consideration as it provides opportunities for resting when walking long distances, waiting for transit, or simply enjoying a local park. This is particularly essential for older adults and people with mobility issues. An Edmonton study highlighted the importance of constructing seating out of materials that are not too hot in the summer or too cold in the winter, are positioned at a convenient height, and have handrails for assistance in sitting down and up (Garvin, Nykiforuk, & Johnson, 2012).

Barriers to Winter Walkability

Year-round physical impediments to walkability include narrow walkways, poor pedestrian crossing infrastructure, high curbs, uneven and slippery surfaces, a lack of handrails on stairs, and a lack of adequate lighting (Muraleetharan, Meguro, Adachi, Hagiwara, & Kagaya, 2005; Wennberg, Ståhl, & Hydén, 2009). While all of these are exacerbated with the snow, ice, and darkness that come with winter weather, these additional elements also bring their own unique set of barriers to the walkability of an environment.

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Studies show that cold temperatures alone do not significantly discourage people from walking outdoors in the winter, but rather it is the physical presence of snow and ice that have the largest impact. A Toronto study of individuals aged 18-85 found that 82% of subjects went outside at least once daily in winter weeks when there was no snow and/or ice on the ground, yet only 66% went outside at least once daily in weeks when there was snow and/or ice on the ground (Li, Hsu, & Fernie, 2012).

Figure 4: Snow accumulation hindering bus stop accessibilty is a common concern.

Commonly cited winter concerns include the potential for slipping on icy surfaces, snow accumulation hindering access at bus stops and pedestrian crossings, and obstructive puddles forming at street crossings and curb ramps (Li et al., 2012; Wennberg et al., 2009). A study from Sapporo, Japan, showed that the state of surface clearing even has an impact on people's walking route choice (Muraleetharan et al., 2005).

Other studies point to wind as a major source of discomfort that discourages winter walkability. A Montreal study concluded that daily on-street pedestrian flows were more negatively impacted by wind speed and precipitation than temperature during winter months (Miranda-Moreno & Lahti, 2013). A study in Shenyang, China, also acknowledges the significant impact that wind has on

Figure 5: Slipping on icy surfaces is a common concern.

Figure 6: Sidewalk plows are a useful tool for keeping public spaces clear of snow.

discouraging walking and the use of public space in winter (Meng & Setoguchi, 2010).

Solutions for Minimizing Winter Barriers

A more novel, yet effective, approach is the use of snowmelt systems...

The Shenyang study looked at the ways built form can influence street-level wind speed, particularly in areas with higher density building massing. Specifically, it looked at different configurations of podium form in wind tunnels, and found certain forms reduced street-level wind speed while others exacerbated it. The findings suggested that terraced podiums, or podiums with upper level setbacks, reduced wind as did podiums with mid-block "pockets spaces" cut out of the sides (p. 361).

Figure 7: A snowmelt system being installed in Reykjavik, Iceland.

A suggested set of snow-clearing techniques and practices resulted from a Winnipeg study on winter walkability involving primarily older adult participants. This set of suggestions included:

> …sanding sidewalks in conjunction with ploughing, lowering the blades on snow-clearing equipment, making snow clearing mandatory for private business owners, continuing to plough even later in the season, and removing the snow more promptly in areas where more seniors and pedestrians use the sidewalks. (Ripat, Redmond, & Grabowecky, 2010, p. 10)

A more novel, yet effective, approach is the use of snowmelt systems to heat sidewalks and pavement to keep them clear of snow and ice. There are a number of variations to these systems in terms of methods, materials, and energy sources. Systems supplied by geothermal energy are common around the world, including in the US, Argentina, Japan, and Europe (Lund, 2010). However, geothermal is not an option for all winter cities, and snowmelt systems may prove financially unfeasible for some. The city of Klamath Falls, Oregon, installed a snowmelt system in the 1990's and has found several benefits including reduced snow removal costs, reduced risk of injury from slips, less mess from sand, salt, and slush, and eliminated freeze-thaw damage to sidewalks and pavers (Brown, 1995).

Final Thoughts

Good walkability is a quality that all communities should work towards for the benefit of their citizens. There are a variety of physical and perceptual factors

that contribute to a walkable environment, and cities should strive to incorporate as many encouraging attributes as possible.

Winter weather brings many unique barriers in the form of snow and ice accumulation, reduced daylight, and chilling wind, but there are several strategies for reducing these. Implementing wind reduction techniques into the built form, comprehensive mechanical snow-clearing practices, and heated pavement snowmelt systems can go a long way to alleviate these barriers, but are by no means an exhaustive list of the measures that can be taken.

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Figure 5

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Figure 6

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Figure 7

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