An icy response to the collective need for winter walkability: Mobilities research and the *Surefoot* Winter Walking Conditions Bulletin

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The icy and snow-packed conditions of sidewalks in winter cities create inequitable access for pedestrians. Safe Communities Winnipeg’s *Surefoot* initiative was a unique endeavour to develop a winter walking advisory to address fall-related injuries. This article reports on a mobilities research approach to producing geographic knowledge concerning the shared meanings and experiences of physical movement in difficult walking conditions characterized by variable friction conditions of ice and snow. The research provided the basis for the creation of a rating scale accounting for the level of difficulty of walking on winter sidewalks. However, public, media, and municipal rejection of the winter walking conditions bulletin exposed profound societal hostility towards accessible pedestrian environments. These findings reveal the need for multi-method research incorporating human-centred approaches with physical analysis of winter conditions. It is imperative that further research provides a foundation for winter cities that are responsive not only to car drivers, but also to persons of all physical abilities who walk and cycle in extreme northern climates.

Keywords: Winter pedestrian conditions, mobile methods, sidewalk advisory system, accessible winter cities

**Introduction**

On the northern prairies of North America, winter conditions lasting up to six months present unique barriers to movement. The cold, wind, and precipitation typical of high continental latitudes leads to varying and unpredictable accumulations of ice and snow that contribute significantly to safety issues for pedestrians using walkways as a means of mobility. Despite the many impediments to winter walking, most research on winter conditions in cities overlooks how humans actually move and instead emphasizes the design of outdoor spaces to enhance comfort and engagement (Eliasson et al. 2007). The absence of a focus on pedestrian-friendly winter environments... raises the question of whether sustainable mobility approaches are a priority in northern climates.

While winter pedestrian planning processes have long developed in European spheres, they are of comparatively recent concern in North America. In addition, the region faces many challenges. There is a lack of strong transportation planning such as infrastructure development, while land-use patterns characterized by low-density design and separation of uses continue to be promoted supporting car-centric cities (Lo 2009). In planning discourses on winter pedestrianism, the domination of an automobile-based mentality leads to inequity and, ultimately, hierarchies of power based on accessibility to mobility. For example, Perrier et al. (2006) found that literature on snow clearing is...
exclusive to road maintenance. In places like Winnipeg, Canada, this observation may be verified: policy and budget concerns of both the municipal government and public on snow clearing are directed specifically for roads. Driving is assumed to be the main mode of transport and there is limited attention placed on sidewalk conditions and the distinct needs of pedestrians.

Winnipeg’s snow clearing policies are based on a system that treats roads and sidewalks equally (City of Winnipeg 2011). The emphasis on street clearing techniques without recognition of distinct sidewalk conditions is compounded by a myriad of factors including the packing of ice and snow by walkers, changing daily conditions such as the shift from freezing to thawing, and micro-environments resulting from sun coverage and blowing snow. Furthermore, the clearing of sidewalks is inconsistent and does not match the attention given to streets. A habitual practice of street clearing is to plow chunks of snow and ice onto sidewalks creating barriers for walkers. This unequal relationship between cars and pedestrians suggests the first step in formulating policy to enable more accessible winter walking should involve raising awareness of how humans experience icy and snow-covered sidewalks.

Most investigations of winter walking conditions are based on mechanical engineering measurements, such as levels of friction and degrees of slipperiness. However, a major shortcoming of these studies is their failure to account for the actual movement of winter walkers. In contrast, this article illustrates how a mobilities research approach allows for exploration of the actions, practices, and experiences of winter walkers and the meaning of walking in spaces with changing ice and snow conditions (Merriman 2014). The mobilities paradigm offers new ways of developing interconnected geographical knowledge regarding the shared meanings and embodied practice of physical movement (Cresswell 2010). Ultimately, consideration of mobilities theory facilitates understanding how disparate experiences emerge between drivers and walkers in winter cities.

This article explores the contribution of the mobilities approach to enhanced safety for winter walkers in three sections. It first evaluates the current contribution of research on ice and snow-covered pedestrian environments to emphasize the need for an enhanced understanding of the experience of winter walking through a mobilities approach. Second, it applies this analysis by reporting on a mobilities research strategy adopted to develop an advisory system for city winter walking conditions. In this section, the Surefoot: Winter Walking Conditions Bulletin case study illustrates the value of applying new methods to winter conditions in order to better understand the needs of winter walkers and also illustrates the dominance of a car-centric society. The third section of the article highlights how short-lived municipal support for the sidewalk advisory system and on-going public objection created friction indicative of the institutional constraints at the root of inequitable mobility for all citizens in a winter city.

**Slippery winter sidewalks: The measurement or experience of friction?**

The traditional approach in mobility research is to focus on how places are connected by transportation (Cresswell 2011). More recently however, studies are less inclined to take movement between places as a given. Mobilities researchers have grown concerned with embodied movement and the meaning and experiences shared while moving from one place to another (Cresswell 2010). The present study seeks to explore the value of the mobilities perspective by emphasizing the investigation of walking as a form of mobility and by studying the spaces in which it occurs. Doing so reveals how traditional research on winter sidewalks is limited by its narrow focus, and demonstrates how the adoption of a more holistic understanding of mobility could potentially contribute to safer winter pedestrianism.

Most research on the safety risks of winter walking conditions is mechanically oriented, emphasizing friction-based measurements of slipperiness based on the biomechanics of walking. While this is an important starting point, there are significant gaps in knowledge regarding how pedestrians perceive and respond to varying conditions such as loose snow and ice. New research underscores how a human-centred perspective can help understand the context of place for winter pedestrians. For instance, the measurement of slipperiness is based primarily on mechanical slip test methods with friction-based criteria (Gronqvist et al. 2001). It explains that slipping occurs “when the coefficient of friction (COF) between footwear and a walkway surface provides insufficient resistance to counteract the resulting force” (Gao and Abeysekera 2004, 573). While this and various methodologies and mechanical equipment have been developed, there is no universal acceptance of slip resistance measurements and few measure icy surfaces (Gao and Abeysekera 2004). But at a deeper level these biomechanical methods fail to bring mobility into the research process and explore the interconnections of action, practices, and experiences. Exploring these elements can produce important new understandings about the microenvironments of winter walking.

The inadequacies of mechanical measurement of risk conditions on winter pavement are revealed by the problems encountered with a predictive model developed by the Finnish Meteorological Institute (Ruotsalainen et al. 2004). As a special version of their road weather model, an instrument was used to monitor the slipperiness of walkways based on surface thickness of water, snow, and ice in order to estimate the prevailing friction. However, the complex weather and environmental factors that cause slippery winter sidewalks limited the model’s effectiveness. Estimation of friction slip values was low in the winters of 2011 and 2012 because high snow accumulations caused technical problems with the monitoring instruments (Hippi 2012). The insufficiencies of the Finnish predictive model illustrate the failure of mechanical tests on snow and ice, and highlight the need for innovative methodologies to address the risks to pedestrians in winter conditions.

The friction of ice is a complex problem requiring systematic study of the multitude of factors that contribute to slips and
falls. However, the study of the effect of winter weather on pedestrian accessibility remains limited and the focus of mechanical measurement continues to be on indoor-falls of the elderly or work-related accidents caused by slippery floor surfaces (Li et al. 2006). Yet as Gao et al. (2004) point out, icy and snowy surfaces near melting temperature are more slippery than indoor floors. Overall, the limited investigation of icy surfaces suggests the need for a broadened understanding that could inform policies addressing the risk of slips and falls on winter sidewalks. This need is amplified since the safety of sidewalks in winter is extremely variable due to changing conditions throughout the entire season and the inconsistency of snow clearing. Winnipeg’s winters are characterized by extreme cold, Arctic winds, and high snowfall accumulation for an extended period of the season. The cumulative effects of weather and inadequate snow removal create a range of conditions that complicate techniques to measure slipperiness on sidewalks. The city is also characterized by low population densities with a widespread network of sidewalks and varying environmental and infrastructure conditions that result in a wide range of microclimates. Mobilities research shows how the essence of this variability can be captured.

The new mobilities paradigm provides a foundation for developing qualitative methodologies to make richer accounts of perceptions and subjective interpretations of people’s experiences of movement (Sheller and Urry 2006). Yet while there has been theoretical advancement, innovations in methods employing mobile practice are only beginning to emerge. Strategies have included both video ethnography and observational fieldwork, but D’Andrea et al. (2011) suggest that more innovative approaches are required that emphasize techniques in mobile situations and that elicit the experiential, embodied, and phenomenological aspects of movement. Here, ‘mobile methods’ have been proposed as a solution. The key to mobile methods lies in accessing the act of movement that allows the environment to be experienced. Mobile research strategies make less tangible aspects more visible, allowing more accurate tracking, understanding, and representation of the embodied nature of movement (Merriman 2014). In the case of winter sidewalks, physical movement can only be understood through exploring the meanings, narratives, and embodied practice of moving that walkers experience on routes that are uneven and unpredictable.

This article reports on how a mobile methods approach was employed in developing a walking conditions bulletin for residents of Winnipeg. To carry this out, a group called the Safe Communities Winnipeg Falls Prevention (SCWFP) Committee was organized with the purpose of exploring whether a summary evaluation of walking conditions would be adequate for winter walkers and if it could reflect their experiences of various levels of friction on winter sidewalks. To this end, a five-point rating scale reflecting the level of difficulty of winter sidewalks was developed by the research team. Its testing required winter walkers to employ mobile practices through the human-based rating system and, most importantly, included making the field observations for more in-depth understandings of the experience. Mobile methods were instrumental in building this rating system and were seen to provide awareness and perception of slippery conditions that may occur in a winter city. The focus on field observations became an important part of the final advisory bulletin that was developed for reporting winter sidewalk conditions.

Surefoot: Winter Walking Conditions Bulletin

The walkability study in Winnipeg was initiated to explore the value of an advisory system for informing the public about potentially hazardous winter walking conditions. It was based upon the World Health Organization’s Safe Communities concept, a widely accepted intervention model for safety promotion and injury prevention (Lindqvist et al. 2001). Initial community consultation in 2008 identified outdoor falls as a key priority area, and a falls prevention committee was subsequently established. In February 2009, emergency departments and family doctors reported an increase in fractures and other fall-related injuries after an unusual and severe ice storm occurred in Winnipeg. The rain and ice resulting from the storm were also the impetus behind the SCWFP Committee’s development of an intervention tool for disseminating information to the public about the condition and safety of daily winter weather-related walkways.

As discussed above, a gap in the research literature exists regarding appropriate methods to examine the experience of winter walking conditions. Therefore, the project to develop a winter sidewalk condition bulletin had no parameters or protocol to follow in designing a safety reporting system. It was envisioned that a winter walkway rating system would integrate both a description of the range of sidewalk conditions that occur during a typical winter as well as assess the relative ease of travel on these sidewalks. To this end, the research team developed a preliminary instrument comprising a five-point scale which rated winter walking safety as either very easy, easy, moderate, difficult, or hazardous. The label assigned to each level of difficulty was related to the concept of accessibility: very easy portrayed conditions that all walkers would be capable of traversing while hazardous imparted that conditions were so difficult as to be impassable. The rating system also captured the condition of the walking surface in relation to snow ploughing and sanding, along with descriptors such as ‘foot-packed,’ ‘icy with loose snow on top,’ or ‘slushy.’

Besides establishing levels of difficulty, a mobilities approach suggested it was equally vital to physically explore these ratings and descriptors to approximate understanding them from the perspective of the winter pedestrian. During the winter of 2008–2010, 20 older volunteers reported walking conditions using the sidewalk condition ratings instrument at random locations throughout Winnipeg. The observations of this group were essential to determine if a shared understanding existed of the categories of the five-point scale which could reflect experiences of walking on winter sidewalks in various locations and in changing conditions. As mobilities research notes, the inclusion of the experiences and perspectives of older adults reveals that a range of different mobilities exists which are often constrained by institutional assumptions about the meaning of ‘normal’
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To ensure consistency and adequate spatial coverage of the city, one student research assistant took multiple observations along predetermined routes throughout all parts of the city. Walking conditions were also rated on a range of streets that had different levels of snow clearing priority (P1, P2, and P3). The research assistant carried out winter sidewalk observations two days per week for approximately five months. On these days, the researcher would typically spend from four to six hours collecting data on sidewalk conditions along two of the six data collection circuits located on major bus routes covering all parts of Winnipeg. For each planned route, between three and five data collection stops were completed along high priority (P1) sidewalks with closely proximate lower priority sidewalks (P2 and P3) being rated at the same time.

The mobile methodology employed by the field researcher ensured both precision in data collection and approximation of the embodied experience of movement. Indeed, the difficulty levels of the ratings instrument would have had little meaning without the mobile methods employed to expand the researcher’s understanding of the experience of walking in winter. Field notes about sensory cues showed how winter walkers respond to slip hazards by adapting their walking speed. The level of difficulty of sidewalks representing the three snow-clearing priorities was noted. Walking conditions and weather patterns were also observed. Being immersed in pedestrianism throughout the winter, the researcher became increasingly aware of these conditions. The framework (Figure 1) that evolved was more informative than merely a five-point rating system would have been. This immersion as a winter walker confirmed that the ascribed level of difficulty was a reflection of predominant weather and surface conditions and the level of precaution a walker must take to avoid the risks of slips and falls.

Using the ratings instrument and general descriptors, a total of 516 observations were completed by both the volunteers (n=204) and the research assistant (n=312) through the winter of 2009–2010. Ratings of sidewalks were recorded on 63 out of 94 potential days during this winter season. The data observations provided important geographic knowledge concerning the human experience of movement in winter conditions. These were evaluated using statistical methods to determine if the observed difficulty of travel was associated with weather-related factors. A weak positive relationship ($R^2 = 0.2335$) was noted between precipitation and observed level of difficulty of sidewalk travel indicating that respondents generally rated travel as more difficult on days when snowfall was reported. In one instance the average difficulty level of sidewalks after a January snowfall remained above previous levels for the remainder of the winter illustrating how accumulations of snow created increasingly difficult conditions. In contrast, there was virtually no correlation between daily temperature extremes and observed sidewalk difficulty ($R^2 = 0.0007$, daily maximum temperature; $R^2 = 0.0003$, daily minimum temperature).

<table>
<thead>
<tr>
<th>DIFFICULTY</th>
<th>DESCRIPTOR</th>
<th>CAUSAL FACTORS</th>
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<tbody>
<tr>
<td>EASY</td>
<td>Bare pavement, no ice</td>
<td>i.e. First wet snowfall of season</td>
</tr>
<tr>
<td></td>
<td>Mostly bare pavement, some isolated slippery sections</td>
<td></td>
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<tr>
<td></td>
<td>Compacted snow, isolated slippery sections (not plowed?)</td>
<td></td>
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<tr>
<td></td>
<td>Compacted snow, recently plowed (can be very slippery if below -20°C)</td>
<td></td>
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<tr>
<td></td>
<td>Compacted snow, isolated minor drifts</td>
<td>i.e. During or immediately following strong winds</td>
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<td></td>
<td>Loose snow, 0 to 5 cm accumulation</td>
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<tr>
<td>MODERATE</td>
<td>Fresh snowfall, exceeding 5 cm accumulation</td>
<td>i.e. During or immediately following strong winds</td>
</tr>
<tr>
<td></td>
<td>Compacted snow, frequent major drifts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose snow, slushy</td>
<td>Temp approaches 0°C</td>
</tr>
<tr>
<td></td>
<td>Compacted snow, uneven icy sections</td>
<td>Cold period following temporary melting</td>
</tr>
<tr>
<td></td>
<td>Ponded water, icy sections</td>
<td>Temp remains near 0°C during night</td>
</tr>
<tr>
<td>DIFFICULT</td>
<td>Freezing rain</td>
<td>Freezing rain</td>
</tr>
<tr>
<td></td>
<td>Icy spots in morning melting through the day</td>
<td>Temp approaches 0°C during day, drops well below freezing at night</td>
</tr>
<tr>
<td>HAZARDOUS</td>
<td></td>
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Figure 1
Winter walkway condition rating tool: Framework
A further analysis of the multiple observations recorded by the volunteers and field researcher encompassing the extensive network of Winnipeg sidewalks confirmed that the ratings were consistent overall throughout the city. No significant difference ($\chi^2 = 0.421$) was found in the level of difficulty with which P1, P2, and P3 sidewalks were rated. Accordingly, it was concluded by the SCWFP Committee that a general winter sidewalk condition report would be relevant as an advisory system to inform pedestrians of potentially hazardous winter environments. Other mobility research on Winnipeg winter sidewalks also confirms the validity of the five-point rating scale. Photographs of winter sidewalks were used for older participants to consider the meaning of walking on these varying surfaces and to rate level of difficulty. Based on two data sets consisting of 91 respondents, the internal consistency of the winter sidewalk difficulty scale was tested using Cronbach’s alpha (Lyubomirsky and Lepper 1999). In both samples, the items of the scale demonstrated excellent internal consistency with alpha’s of 0.84 (2012–2013 sample) and 0.83 (2013–2014 sample) respectively.

The winter walkway reporting system was based on the development of a framework of five levels of difficulty linked with a set of condition descriptors and causal weather factors. The winter sidewalk condition bulletin was finalized to include both the five levels of difficulty and the related sidewalk conditions. It was anticipated that this information would be a basis for winter walkers to make informed decisions about walking particularly in hazardous conditions. Community support for the initiative was illustrated through collaborative resources including sponsorship by local businesses and the identification of a marketing approach for a walking bulletin concept. A branding company provided free expertise creating a label, designing marketing material, and developing an effective website for the bulletin. The participation of this company was the final phase of developing Surefoot: Winter Walking Conditions Bulletin. Surefoot was promoted as a sidewalk condition rating system with five levels of difficulty to identify the perceived level of risk for slips and falls on winter sidewalks (Figure 2).

Public support for the winter sidewalk advisory was also demonstrated through several focus groups hosted in 2012 that included older adults and persons with physical disabilities (n=46). These focus groups confirmed that an advisory system was helpful for those who experienced difficulties physically negotiating winter sidewalks. For example, 54% of focus group participants indicated in a survey that the advisory bulletin would be either ‘useful’ or ‘very useful’ in making decisions about footwear, taking extra care in walking, and avoiding travel during periods of hazardous pedestrian conditions.

The intended goal was to have the daily condition bulletin reported via local media outlets. It was proposed that Surefoot would create greater awareness about potentially hazardous conditions and raise understanding in the community about the difficulty in maintaining adequate sidewalk conditions for all potential users in a winter city. The bulletin was launched in February 2012 to raise public familiarity about the winter conditions that could contribute to falls-related injuries. The launch consisted of a formal announcement by a Winnipeg city council-
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Ultimately, the end of Surefoot reflected larger societal sentiment that winter walking safety was far less important than the needs of the driving public—suggesting a hierarchy of mobility echoed by several writers (Cresswell 2010; Vannini 2010; D’Andrea et al. 2011). Despite community collaboration and support, the SCWF Committee decided in late 2013 to withdraw the winter sidewalk advisory initiative. The committee had been directed by the necessity of the bulletin as a public health intervention tool to reduce the number of falls-related injuries in winter, but the ongoing negative response of both the public and media led to the end of the initiative. It was determined that acceptance of this approach would require evaluation of its impact. However, since the City withdrew its support in the symbolic action of essentially burying the Surefoot rating bulletin, such an evaluation was not possible.

Throughout the research phase of the project several media outlets garnered interviews with the author as lead investigator of the study. The reporting was generally supportive and emphasized that greater awareness was essential to improve pedestrian safety in winter. While the media appeared to understand the goals of an advisory system, the public’s response to the media reports foreshadowed the demise of Surefoot. For example, after an interview on a local radio program, postings on the broadcaster’s website included many comments that questioned the utility of a winter sidewalk advisory bulletin (CBC 2011). One commenter suggested users could simply “look out the window” to ascertain walking conditions, thus demonstrating that those without mobility challenges are not aware of the existence of barriers to winter walking, such as visual impairments. Such responses ultimately highlighted that increased awareness of the needs of winter walkers was imperative to address improved conditions for all pedestrians in all weather conditions.

After the launch of Surefoot, Bartley Kives (2012) of the Winnipeg Free Press wrote a persuasive article on the bulletin stressing its efficacy. He emphasized that the cost of developing the winter walking conditions bulletin was minimal, and that the daily rating update would not incur additional expenses to the City. Moreover, Kives wrote that the sidewalk rating was an important prevention tool in reducing the number of falls-related injuries in winter. “SureFoot, a daily measure of winter-walking conditions created in an effort to cut down on the number of falls, fractures and hospital stays that result from icy streets and sidewalks” (Kives 2012). He also indicated to readers that the initiative could significantly decrease health care costs and improve the quality of life of Winnipeg residents:

But SureFoot may nonetheless cut down on the $164-million annual cost of treating Manitobans who are injured as a result of falls, said Dr. Lynne Warda of the Winnipeg Regional Health Authority. Approximately 2,000 Manitobans are admitted to hospitals each year because of falls and spend an average of 33 days in a hospital, Warda said. Some elderly people do not fully recover from bone fractures suffered in falls and wind up in long-term care facilities as a result, she added (Kives 2012).

Unfortunately, the media promotion of Surefoot was short-lived, as illustrated by an incendiary article in the Winnipeg Sun after the first snowfall of winter 2012–2013:

It’s a website aimed at keeping the public informed on winter sidewalk conditions, to prevent slips and falls. But it has stumbled somewhere along the way. And questions have arisen as to whether SureFoot.org has fallen, and can’t get up. While Winnipeg endured its first significant snowfall of the season on Saturday, SureFoot.org highlighted a forecast of temperatures between 23 C and 28 C with sunny conditions and a “chance of rain” (Romaniuk 2012).

The comment was representative of other attempts to condemn the value of the winter walking conditions bulletin based on first-time operational difficulties. Soon after, an opinion column was published in the Winnipeg Sun that further dampened public perceptions of the need for a winter sidewalk advisory bulletin:

City hall paid out $5,000 to help create a website that tells people whether city sidewalks are slippery in the winter. We kid you not. Even though the real solution to helping reduce slip and falls would be to clear sidewalks properly, including the use of more salt and sand—as well as taking your own precautions like wearing spiked shoe covers or using a cane if necessary—the city saw fit to blow $5,000 on a website that will achieve nothing (Brodbeck 2012).

The theme of ill-spent government funds in relation to the winter walking conditions bulletin took hold at the national level during the winter of 2012–2013. First, the Canadian Taxpayers Federation awarded Surefoot a prize for poorly spent public money. This was soon followed by Maclean’s Magazine on the front page of their January 14, 2013 issue, with the title “99 stupid things the government did with your money last year” signifying the final blow for Surefoot (Kirby et al. 2013). While many of the items listed in the article represented millions of dollars in government-funded projects, it was difficult to understand the inclusion of Surefoot, which operated at a cost of approximately $3000. As Figure 3 illustrates, the magazine made no attempt to understand the goal of the winter walking conditions bulletin, but rather dismissed any value of the initiative to address the need for winter cities to be responsive to all citizens. The obvious message from the public and media was that pedestrian safety in winter is not worth even a few thousand dollars.

Conclusion

Mobility is considered fundamental by many to equal participation in modern society, yet a hierarchy exists where car travel is considered more valuable than walking (Cresswell 2010). The overall interpretation of the attempts by the SCWF Committee to establish a winter walking advisory represented a lack of understanding about the needs of winter pedestrians. The insensitive response of the public and media to Surefoot and the de-
mise of the initiative effectively illustrate what Cresswell (2010) refers to as the politics of movement, wherein domination is by those who move the fastest and furthest. Moreover, it signals the need for greater awareness by the public and governments about the need for snow clearing policies that view pedestrians equally in the sharing of urban space and are responsive to unique sidewalk environments.

While Winnipeg’s Surefoot garnered negative impressions of the utility of an advisory system for winter walking, the research developed for the initiative still represents the value of advisory systems for winter walking. With the depth of understanding achieved by focusing on movement in winter space, the winter walkway advisory bulletin was informed by both measures related to conditions and surface friction, as well as the perceptual experience of pedestrians. Moreover, the use of exploratory mobile methodologies in this study has broadened understandings of a multi-method approach when investigating winter walking conditions. With the depth of understanding achieved by focusing on movement in winter space, the winter walkway advisory bulletin was informed by these textured and in-depth accounts of weather effects and sidewalk surface conditions related to potential slip hazards. There are important opportunities in geography to effect further theoretical development incorporating the subjective experience of body movement that will highlight the value of the intersections between health geography and the study of movement, particularly by introducing new dimensions to the multi-disciplinary study of the hazards of winter pedestrianism.

Overall, this study demonstrates the contribution that mobile practice can make in informing the development of systematic strategies to ensure pedestrian safety in winter. In North America, this research is in its infancy and the design of winter cities has not yet embraced a focus on pedestrianism. Looking to the example of northern Europe and further collaboration amongst northern countries in general is imperative to extending our comprehension of the intrinsic and extrinsic factors that are crucial in creating safe walking conditions in winter. By embracing mobile methodologies, researchers are able to expand their understanding of pedestrian movements while providing the public health sector, community organizations, and planners with the necessary capacities to promote the development of safe urban environments for pedestrians (Hein et al. 2008; Miaux et al. 2010).

References


Lindqvist, K., T. Timpka, and L. Schelp. 2001. Evaluation of an inter-organizational prevention program against injuries among the el-

Figure 3
Stupid things the government did with your money last year. Originally published in Maclean’s™ magazine on January 14, 2013. Used with permission of Rogers Media Inc. All rights reserved.
Smith, H. 2012. Introductory comments: Surefoot launch. February 12, Winnipeg, MB.