RESIDENTIAL PREFERENCES AND PUBLIC HEALTH IN METRO VANCOUVER
Promoting Health and Well Being by Meeting the Demand for Walkable Urban Environments

A UBC Health & Community Design Lab Report
September 2014
Authors
Larry Frank, Suzanne Kershaw, Jim Chapman, and Kim Perrotta

Sponsors and Disclaimer
This summary report was funded by the Real Estate Foundation of British Columbia. The views expressed in this report represent the views of the authors and Healthy Canada by Design; they do not necessarily represent the views of the project funders.

Background Report
This report summarizes findings from the technical report, *City and Regional Residential Preference Survey Results for Toronto and Vancouver: A CLASP Final Report* that was prepared by Dr. Larry Frank, Jim Chapman, Suzanne Kershaw and Sarah Kavage of Urban Design 4 Health, Ltd (available here) for the Healthy Canada by Design CLASP Coalition with funding from the Canadian Partnership Against Cancer’s Coalitions Linking Action and Science for Prevention (CLASP) program. That report was supported by a Project Advisory Committee that included: Vancouver Coastal Health, Fraser Health, Toronto Public Health, and Peel Public Health.

Acknowledgements
The authors would like to thank the following people for offering valuable direction and advice on this project and report:

- Dr. John Carsley, Medical Health Officer, Vancouver Coastal Health
- Ms. Claire Gram, Policy Consultant & Healthy Built Environments Lead, Vancouver Coastal Health
- Dr. Helena Swinkels, Medical Health Officer, Fraser Health

Citing this Report
Residential preferences and public health in Metro Vancouver

Copies of this Report
Copies of this report can be downloaded from UBC’s Health and Community Design Lab website at: http://health-design.spph.ubc.ca/publications/reports

Contact Information
Lawrence Frank, PhD, CIP, ASLA
Director of the Health and Community Design Lab
Professor in Sustainable Transportation
University of British Columbia
larry.frank@mail.ubc.ca http://health-design.spph.ubc.ca/
604-822-5387 ph / 604-822-1628 fx

Cover Illustration: Adapted from the Atlanta Based SMARTRAQ Research Program
EXECUTIVE SUMMARY

About the Survey

This report highlights results focused on Metro Vancouver from a residential preferences survey that was conducted for the Healthy Canada by Design CLASP Coalition with funding provided by the Canadian Partnership Against Cancer’s Healthy Canada by Design Coalitions Linking Action and Science for Prevention (CLASP) program. This report is a companion piece to The Walkable City: Neighbourhood Design and Preferences, Travel Choices and Health, which was produced for the Greater Toronto Area by Toronto Public Health in 2012 from the same survey.

The goal of the survey was to understand: which neighbourhood features are desired by residents in Metro Vancouver and the Greater Toronto Area; and if those desires are being met by their current neighbourhoods. It also looked into how both preferences and the physical environment where people live predict their behaviour and health. Specific objectives were to:

- Determine what type of neighbourhood people would prefer to live in, and which neighbourhood features are most important to them;
- Quantify demand for walkable neighbourhood features among people of differing income levels, and among people currently living in walkable and auto-oriented environments;
- Understand the type of destinations people walk to, and how often they do so;
- Evaluate how people’s perceived versus actual community design features predict their travel and activity patterns and overall health;
- Explore associations between neighbourhood walkability, travel behaviours and health-related indicators, focusing on those who share the same preferences but live in neighbourhoods of contrasting walkability.

Surveys were collected from 1,223 participants in the Metro Vancouver area, and were drawn from the contrasting walkability and incomes levels across the region. Attitudes towards residential neighbourhoods were evaluated through the use of neighbourhood trade-off pairings that forced participants to choose between a series of walkable and auto-oriented neighbourhood design features while holding factors such as housing cost, job access, and school quality equal. Accessibility to retail, parks and open space, food stores, and home features such as lot size, interior living space, and dwelling mix, were contrasted in walkable or auto-oriented trade-off scenarios. Key findings from the residential preference survey for Metro Vancouver are summarized below.
There is strong support for living in walkable neighbourhoods that encourage non-motorized travel in Metro Vancouver.

The survey revealed that depending on the neighbourhood design attribute, between 52% and 64% in the City of Vancouver (VAN) and between 29% to 40% of residents living in other areas of Metro Vancouver (OMV) strongly prefer a neighbourhood that supports walking and easy access to public transit, even if it means giving up desirable aspects of auto-oriented neighbourhoods. Conversely, strong preference for neighbourhoods where automobile travel is often required due to the disconnect between homes and commercial areas averaged just 8% in the City of Vancouver and 20% in other areas of Metro Vancouver.

The survey found that living in walking distance to shops and services (VAN: 64%; OMV: 38%) and a variety of small to medium-sized food stores (VAN: 62% OMV: 40%) were the most desired aspects of walkable neighbourhood design. Living near public recreation and green space was also highly valued, particularly by Metro Vancouver residents who live outside the City of Vancouver (37%), even if it meant having a less private backyard space.

A slightly higher proportion of participants aged 25-29 indicated strong preference for walkable neighbourhoods (47%) than their older counterparts; those aged 40-49 had the lowest percentage indicating a strong preference for a walkable neighbourhood (39%). Similar preferences for walkable neighbourhoods were observed across all levels of household income.

There is unmet demand for more walkable neighbourhoods in Metro Vancouver, with proximity to commercial areas and a wide range of food stores identified as the features most lacking in existing neighbourhoods.

Among City of Vancouver residents who considered their existing neighbourhood to be very auto-oriented, strong desire to live in a neighbourhood within walking distance to commercial areas, and within walking distance to a variety of small and medium-sized food stores was expressed by 30% and 20% respectively. Similarly, an unmet demand for these neighbourhood features was reported by about 25% of residents living in auto-oriented neighbourhoods in other areas of Metro Vancouver. These findings suggest that there is unmet demand for more walkable residential neighbourhoods in both the City of Vancouver, and other areas of Metro Vancouver.
Demand for auto-oriented neighbourhoods among those who perceived their current neighbourhood as very pedestrian friendly was substantially less, averaging 4% in the City of Vancouver and 9% in other areas of Metro Vancouver. Trade-offs people indicated they were willing to make for living in more walkable communities included living in smaller homes and having less backyard space and living on streets with more people on them.

Many City of Vancouver participants indicated that they consider their current neighbourhoods to be pedestrian-friendly, while fewer living on other areas of Metro Vancouver felt this way.

On average, about 60% of participants in the City of Vancouver indicated that their neighbourhoods are very walkable; 31% of participants in other areas of Metro Vancouver felt this way. Living within walking distance to a variety of food stores was the aspect of neighbourhood design that people said was least pedestrian-friendly where they live, with just 55% in the City of Vancouver and 22% other areas of Metro Vancouver indicating that they live in neighbourhoods where it is easy to walk to a wide range of small and medium-sized food stores.

The ability to walk to destinations and access public transit is a very important consideration in the residential selection process.

Resident of both the City of Vancouver and other areas of Metro Vancouver ranked ease of walking as the most important factor influencing residential location after affordability/value. Convenient access to work and other important destinations on public transit was also considered very important by City of Vancouver residents.

People who live in walkable neighbourhoods use active modes of transportation and public transit more frequently, drive less, and have lower body weights.

The survey also showed that people who live in the most walkable areas of Metro Vancouver engage in utilitarian walking significantly more often (4-5 days/week) than those living in the least walkable areas (1-2 days/week). Residents living in the most walkable neighbourhoods also reported taking public transit more frequently, driving less often, and having lower body weights than those living in low walkable neighbourhoods. Recreational walking did not vary among people living in walkable versus auto-oriented neighbourhoods in Metro Vancouver, averaging about 3 days per week.
Metro Vancouver residents who prefer and live in a walkable neighbourhood are more active than those who prefer a walkable neighbourhood, but do not live in one.

Participants who prefer and live in a walkable neighbourhood reported walking about 50% more frequently for utilitarian purposes, driving significantly less often, and about half the distance compared to those who prefer a walkable neighbourhood, but do not live in one. These findings lend support for creating neighbourhoods where residents are able to walk to neighbourhood amenities such as shopping, work, and school, which would enable people to match their activity levels with their preferences.

Metro Vancouver residents who prefer an auto-oriented neighbourhood are more active if their neighbourhood allows them to walk to shops and services, than those who share this preference but live in a low walkable place.

Those who prefer an auto-oriented neighbourhood, but live in a walkable one reported walking about twice as often for utilitarian purposes, taking public transit twice as frequently, and driving nearly two days less per week than those who prefer and live in an auto-oriented neighbourhood. These findings suggest that providing daily opportunities for walking and taking public transit has the potential to increase physical activity levels even among those who prefer an auto-oriented residential environment.

Conclusions

The residential preference survey provides evidence that strong preferences exist in the Metro Vancouver region for walkable residential environments where important destinations such as jobs, schools, food retail, services, and parks are located in close proximity to participants’ homes. Participant responses revealed that people are willing to make trade-offs to live in these types of neighbourhoods, such as living in smaller houses, having less yard space, or living on streets with more people on them. The survey also documented that there is unmet demand for more walkable neighbourhoods compared to where people currently reside, particularly with respect to the location of commercial areas and food stores. Providing people with a range of affordable housing options in the type of walkable neighbourhoods they desire has the potential to improve physical, economic, and social well-being at both the individual and community level through increased physical activity and social interaction, improved health, reduced travel costs, and lower levels of greenhouse gas emissions.
**Table of Contents**

Executive Summary.................................................................................................................. 4  
List of Tables and Figures........................................................................................................ 9  
Introduction ............................................................................................................................. 10  
  Study Objectives .................................................................................................................. 13  
About the Residential Preference Survey.............................................................................. 14  
  Data Collection .................................................................................................................... 14  
  Sampling Stratification ........................................................................................................ 14  
  Survey Design ..................................................................................................................... 15  
  Measuring Neighbourhood Walkability ............................................................................ 17  
About the Participants ............................................................................................................ 20  
Survey Results ....................................................................................................................... 23  
  Neighbourhood Selection Factors ..................................................................................... 23  
  Which Destinations do People Walk to? ........................................................................... 24  
  Mode of Transportation to Work and School ................................................................ 26  
  Travel Behaviour and Health Characteristics .................................................................. 28  
  Neighbourhood Preferences ............................................................................................ 31  
  Perceived Neighbourhood Walkability .......................................................................... 36  
  Evaluating Unmet Demand for Walkable versus Auto-oriented Neighbourhoods .......... 38  
  The Influence of Neighbourhood Walkability on Travel Behaviour and Health ............... 41  
Conclusions ............................................................................................................................ 49  
References .............................................................................................................................. 52
List of Tables and Figures

TABLE 1. NEIGHBOURHOOD TRADE-OFF DESCRIPTIONS ........................................................................ 16

FIGURE 1. NEIGHBOURHOOD TRADE-OFF ILLUSTRATION .................................................................. 15
FIGURE 2. MEASURING UTILITARIAN WALKABILITY IN METRO VANCOUVER ........................................ 18
FIGURE 3. UTILITARIAN WALKABILITY IN THE METRO VANCOUVER AREA ........................................ 19
FIGURE 4. SURVEY PARTICIPANTS BY HOME POSTAL CODE .............................................................. 20
FIGURE 5. NEIGHBOURHOOD ATTRIBUTES INFLUENCING CHOICE OF RESIDENTIAL LOCATION .... 23
FIGURE 6. WALKING FREQUENCY TO DESTINATIONS ......................................................................... 24
FIGURE 7. MOST COMMON PLACES PEOPLE WALK TO .................................................................. 25
FIGURE 8. USUAL MODE OF TRANSPORTATION TO WORK ............................................................... 26
FIGURE 9. USUAL MODE OF TRANSPORTATION BY CHILD TO SCHOOL OR WORK ......................... 27
FIGURE 10. NEIGHBOURHOOD PREFERENCES IN METRO VANCOUVER ........................................... 32
FIGURE 11. NEIGHBOURHOOD PREFERENCE BY HOUSEHOLD INCOME LEVEL ............................... 34
FIGURE 12. NEIGHBOURHOOD PREFERENCE BY AGE GROUP .......................................................... 34
FIGURE 13. NEIGHBOURHOOD PREFERENCE BY PRESENCE OF CHILDREN .................................... 35
FIGURE 14. CURRENT NEIGHBOURHOOD ASSESSMENT ................................................................ 37
FIGURE 15. DEMAND FOR WALKABLE URBAN ENVIRONMENTS .................................................... 40
INTRODUCTION

This report summarizes results for Metro Vancouver from the study, *City and Regional Residential Preferences Survey Results for Toronto and Vancouver: A CLASP Final Report*, which was prepared by Urban Design 4 Health (www.urbandesign4health.com) for the Healthy Canada by Design CLASP Coalition with funding from the Canadian Partnership Against Cancer’s *Coalitions Linking Action and Science for Prevention* (CLASP) Program.

Funding to prepare this summary report was provided by The Real Estate Foundation of British Columbia. This report is a companion piece to the 2012 report, *The Walkable City: Neighbourhood Design and Preferences, Travel Choices and Health*, that was prepared by Toronto Public Health on the study results for the Greater Toronto Area. The background study, the companion report, and this new report can be found on the Healthy Canada by Design CLASP website at: http://hcbd-clasp.com/.

Neighbourhood Design, Physical Activity, and Health

Physical inactivity and obesity among Canadians is a growing problem

The health benefits of regular physical activity are well documented (Canadian Fitness and Lifestyle Research Institute, 2010a; Warburton et al. 2006), yet there is mounting evidence that Canadian youth and adults are not achieving the recommended levels of physical activity:

- Only just over half of Canadians reported being “moderately active” during their leisure time in 2011, with walking being the most common leisure-time activity (Statistics Canada, 2013);
- Just 15% of Canadian adults meet the recommended amount of 150 minutes per week of moderate-to-vigorous physical activity (Colley et al. 2011);
- The 2012 Active Healthy Kids Report Card indicated that only 7% of children and youth are meeting Canada’s guidelines of 60 minutes of physical activity a day (Active Healthy Kids Canada, 2012);
Residential preferences and public health in Metro Vancouver

- 85% of British Columbia’s children and youth aged 5 to 19 do not achieve the recommended 16,500 daily steps associated with the guidelines set out in Canada’s Physical Activity Guide, according to the 2009 Canadian Physical Activity Levels Among Youth CAN PLAY report (Canadian Fitness and Lifestyle Research Institute, 2010b).

The number of Canadians classified as overweight or obese continues to increase (Gotay et al. 2013; Tjepkema, 2006). Obesity has been linked increased risk of developing chronic diseases, including hypertension, type 2 diabetes, cardiovascular disease, osteoarthritis and certain types of cancer (Eckel et al. 1998; Leiter et al. 1999; Mokdad et al. 2003), presenting significant concerns for the Canadian healthcare system, economy, and quality of life.

- About one-quarter of Canadian adults are obese, according to estimates derived from the Canadian Community Health Survey; only Quebec and British Columbia have obesity rates lower than the national average (Gotay et al. 2013; Statistics Canada, 2011);
- In 2011, 60% of Canadian adults reported height and weight that classified them as either obese or overweight, up from 49% in 2003 (Statistics Canada, 2011);
- The estimated cost of obesity to the Canadian economy was $4.6 billion/year in 2008 (PHAC, 2011);
- Prevalence of chronic diseases among Canadians continues to increase on an annual basis, costing the economy $190 billion annually – $68 billion is attributed to treatment and the remainder to lost productivity (PHAC, 2011).

Why Does Neighbourhood Design Matter?

Neighbourhood design matters because it has a substantial impact on the levels of physical activity and health of the people who live in them.

Given that Canadians are not achieving the recommended amounts of physical activity, combined with escalating rates of obesity and chronic diseases, the role of the built environment has become an increasingly important focus among public health officials and planners. People’s ability to regularly engage in physical activity and develop healthy lifestyles is largely shaped by the environment in which they live, work, and play. Designing neighbourhoods that are supportive of walking and other modes of active transport reduce the need for vehicle travel by putting important destinations such as commercial areas, jobs, and schools near to where people live. Over the last decade, research has consistently shown positive associations between the walkability of neighbourhoods and engagement in non-motorized modes of travel. For example:
Residents living in high walkable neighbourhoods in Calgary were more likely to engage in ≥150 minutes of transportation-based walking in a usual week compared to those living in low walkable neighbourhoods (McCormack et al. 2012);

A 2007 study conducted in Atlanta found that 34% of those who preferred and lived in a walkable neighborhood made at least one walking trip per day while only 3% those who preferred and lived in automobile-oriented neighbourhoods made at least one walking trip per day (Frank et al. 2007);

Saelens et al. (2003) found that people living in highly walkable neighbourhoods engaged in about 52 more minutes of moderate-intensity exercise per week and walked for errands significantly more often over the course of a week, compared to those living in neighbourhoods rated low for walkability.

Walkable neighbourhoods offer a wide range of potential health benefits ranging from increased physical activity, lower obesity levels, and reduced incidence of chronic conditions such as cardio-vascular disease and type 2 diabetes:

- A nation-wide U.S. study found that students living in neighbourhoods with higher walkability index scores had lower odds of being overweight or obese (Slater et al. 2013);
- Adults who commuted to work by car showed significant weight gain over a 4 year period compared to those who did not commute by car, even when they were physically active during leisure time (Sugiyama et al. 2013);
- A study in Toronto found increased risk of diabetes for both recent immigrants and long-term residents living in low walkability areas (Booth et al. 2013);
- Commuting distance was found to be negatively associated with cardiorespiratory fitness in a U.S. study (Hoehner et al 2012).

In addition to improving rates of physical activity and health, walkable neighbourhoods have also shown that reductions in greenhouse gas emissions may be realized by providing environmentally-friendly transport choices (Frank & Chapman, 2004; Friedman et al, 2001).
How do people choose where to live?

Choosing where to live is a complex consumer decision, and is based on the convergence of many factors including cost, job location, school quality, transportation options, and neighbourhood design features (Kim et al. 2005a; Kim et al. 2005b). The importance of these factors may vary substantially according to socio-demographic factors including age, income, and family status. While studies in the United States have shown there is support for alternatives to auto-oriented suburban development (Handy et al. 2008; Levine et al. 2005; Levine & Frank, 2007; Myers & Gerin, 2001), little has been documented about consumer preferences for different types of residential locations in metropolitan areas in Canada, the trade-offs people are willing to make when choosing where to live, and how one’s residential environment influences travel behaviour and health-related outcomes.

Study Objectives

The goal of the residential preference survey was to understand which neighbourhood features are desired by residents in Metro Vancouver and whether those desires are being met by their current neighbourhoods.

Specific objectives of the survey were to:

- Determine what type of neighbourhood people would prefer to live in, and which neighbourhood features are most important to them;
- Quantify demand for walkable neighbourhood features among people of differing income levels, and among people currently living in walkable and auto-oriented environments;
- Understand the type of destinations people walk to, and how often they do so;
- Evaluate how people’s perceived versus actual community design features predict their travel and activity patterns and overall health;
- Explore associations between neighbourhood walkability, travel behaviours and health-related indicators, focusing on those who share the same preferences but live in neighbourhoods of contrasting walkability.
About the Residential Preference Survey

The purpose of the residential preference survey was to document the demand for different types of residential community environments ranging from walkable to auto-oriented settings in the Greater Toronto Area and Metro Vancouver regions. Individual demand for specific community types through a measure of residential preference were elicited from a series of paired trade-off questions. The result was a profile of demand for different types of community environments in each region, versus participant satisfaction with their current community design. Findings helped to assess whether walkable neighbourhood environments are undersupplied relative to where people prefer to live and provide direction for future housing and neighbourhood supply.

Data Collection

A residential preference survey was conducted online by Urban Design 4 Health Ltd. in 2011, in partnership with Ipsos-Reid Public Affairs. Participants who opted into the Ipsos-Reid consumer panel who were 25 years or older and lived in eligible areas of Metro Vancouver or the Greater Toronto Area were randomly recruited to participate in the residential preference survey.

Sampling Stratification

Survey respondents were drawn from the range of walkability and incomes present in each region by stratifying recruitment of the sample using objectively calculated built environment measures and median household income at the Forward Sortation Area (FSA) level. Walkability values were calculated for each FSA based on the following built environment measures: residential density, intersection density, and walk scores from www.walkscore.com. FSA level income was based on Statistics Canada 2005 Census household median income data.
Each FSA was categorized into one of 12 categories (four walkability categories by three income categories <$50k, $50k - $70k, >$70k). The distribution of potential recruits (from the survey firm Ipsos-Reid Public Affairs’ “i-Say” panel) was not equal across the 12 possible cells, and not all cells contained potential recruits. A minimum of 30 surveys were collected from 8 of 10 walkability/income cells in Metro Vancouver with potential recruits.

Survey Design

The survey was developed so that respondents were forced to choose between two scenarios in a series of neighbourhood “trade-offs”. Seven questions each described two contrasting neighbourhoods – one more walkable, and one more auto-oriented (TABLE 1). Detailed, location-based attributes (e.g. lot and house size, accessibility and commute distance) were used to describe the two different neighbourhoods rather than more abstract descriptions (e.g. “suburb” or “smart growth”) or architectural design attributes.

Each comparison presented common real-world trade-offs – for example, easy access to commercial areas on foot in Neighbourhood A versus larger home sizes where driving is necessary for all trips in Neighbourhood B. It would not be common for both features to be present in the same neighbourhood. By forcing a trade-off, the pairings help to understand which attribute is more valued by the participant. Factors such as housing cost, school quality, and public safety were all assumed to be the same for each scenario. All of the trade-offs were accompanied by illustrations (e.g., FIGURE 1).

FIGURE 1. NEIGHBOURHOOD TRADE-OFF ILLUSTRATION

Where commercial areas are kept separate (over 2 km or more than 30 min walk away) from the houses, even if this means I cannot walk to stores, libraries, or restaurants

Where houses and commercial areas are within a 1 km or 10 min walk of each other so that I can walk to stores, libraries or restaurants
For each neighbourhood trade-off pairing, an 11-point Likert scale was used to elicit which of the two neighbourhoods the participant identified most with for three questions:

- **Question A:** Preferred neighbourhood;
- **Question B:** Current neighbourhood;
- **Question C:** Desired neighbourhood, relative to current one.

### Neighbourhood Design Features Assessed in Residential Preference Survey
- Walkability and proximity of commercial services
- Level of activity and mix of housing
- Home size and travel options
- Lot size and commute distance
- Street design and travel options
- Public recreation opportunities and lot size
- Access to and size of food stores

### TABLE 1. NEIGHBOURHOOD TRADE-OFF DESCRIPTIONS

<table>
<thead>
<tr>
<th></th>
<th>Walkable Neighbourhood</th>
<th>Auto-Oriented Neighbourhood</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Walkability and proximity of commercial services</td>
<td>Where houses and commercial areas are within a 1 km/half mile or 10 min walk of each other so that I can walk to stores, libraries or restaurants.</td>
<td>Where commercial areas are kept separate (over 2 km/1.5 miles or more than 30 min walk away) from the houses, even if this means I cannot walk to stores, libraries, or restaurants.</td>
</tr>
<tr>
<td>2. Level of activity and mix of housing</td>
<td>With lots of services and activities nearby, even if this means it has a mixture of single family houses, townhouses, and apartment buildings that are close together on various sized lots with less private backyard space.</td>
<td>With single family houses farther apart on lots 10 metres (35 feet) wide or more with more private backyard space, even if this means it is not an area with services or activities nearby.</td>
</tr>
<tr>
<td>3. Home size and travel options</td>
<td>Where I can walk, cycle, or take public transit for some of my trips because commercial areas are nearby (within a 1 km/half mile or 10 min walk), even if this means the homes are smaller with less interior living space.</td>
<td>With larger homes with more interior living space, where the commercial areas are distant (over 5 km/3 miles or more than a 45 min walk away) from the houses, even if this means I have to drive for all my trips.</td>
</tr>
<tr>
<td>4. Lot size and commute distance</td>
<td>Within 5 km or 3 miles (10-15 min drive) of work, school or my other important destinations, even if this means that houses are close together - on smaller lots approximately 6 metres (20 feet) wide.</td>
<td>With houses farther apart - on large lots 15 metres (50 or more feet) wide - even if this means traveling more than 25 km or 15 miles (over 30 min) to work, school or my other important destinations.</td>
</tr>
<tr>
<td>5. Street design and travel options</td>
<td>Where I can walk, cycle or take public transit for some of my trips, even it has through streets and people from other neighbourhoods walking or driving on them.</td>
<td>With cul-de-sacs and few people from other neighbourhoods walking or driving on them, even if this means I must drive for all my trips.</td>
</tr>
<tr>
<td>6. Public recreation opportunities and lot size</td>
<td>Where within a short walk there is lots of public recreation and green space for swimming, walking, jogging, running trails, social interaction, sports and playgrounds even though there is little space for recreational activities on my own property.</td>
<td>Where there is lots of space on my own property for recreational activities, but there is little public recreation and green space for swimming, walking, jogging, running trails, social interaction, sports and playgrounds within a short walk.</td>
</tr>
<tr>
<td>7. Access to and size of food stores</td>
<td>Where I could easily walk to a wide range of small to medium-sized grocery stores, fruit and vegetable stands, butchers, bakers, and specialty food stores.</td>
<td>With few food stores within walking distance but several very large supermarkets within a 10 minute drive.</td>
</tr>
</tbody>
</table>

Note: The seven trade-off pairings refer to specific neighbourhood design attributes and the comprises that may be necessary to live in a neighbourhood with such features; an eighth question describing many aspects of neighbourhood walkability without the “trade-off” element was also included in the survey but is not shown in the above table.
The survey also captured information about:

- **Important factors in neighbourhood selection** such as affordability, ease of walking, and access to schools and public transit;
- **The types of destinations people walk to most often**, such as grocery stores, parks, and public transit;
- **Travel behaviour** including mode of transportation taken to work and school, and frequency of utilitarian walking, recreational walking, cycling, public transit, and vehicle usage in a usual week;
- **Health-related indicators** including self-reported height and weight, high blood pressure, and diabetes;
- **Demographic and socio-economic characteristics** including age, sex, income, ethnicity, and household composition.

**Measuring Neighbourhood Walkability**

Walkability is largely a function of the **proximity** and **connectivity** between places, or how easily people can travel directly between their home, job, and other important destinations. Characteristics of walkable neighbourhoods also support other forms of active transportation, like bicycling and public transit. Measures of neighbourhood walkability can be combined with other data to model built environment influences on travel, physical activity, diet, and greenhouse gas emissions.

An objectively measured neighbourhood “walkability index” was developed at the six-digit postal code level for the Metro Vancouver region using 2011 property land use and street network data. The walkability index captures four measures of utilitarian walkability after methodology described in Frank et al. (2010): residential density, commercial floor-to-land area ratio, land use mix, and intersection density (Figure 2). Pedestrian “walk-sheds” created around each postal code in GIS (geographic information systems) software enabled the calculation of land use and connectivity characteristics within a one kilometre walking range of each postal code centre. Survey participants were linked to the walkability index based on their home postal code and assigned to equal range walkability quartiles based on the range of walkability scores present across the entire region. Similar versions of the walkability index has been previously used to predict travel behaviour in other regions (Frank et al. 2007, Norman et al. 2013; Owen et al. 2007) supporting validity and generalizability.
Walkability index values are shown in FIGURE 3 for the Metro Vancouver region. Areas shaded in purple indicate greater utilitarian walkability – these neighbourhoods have community design features that are more conducive to pedestrian travel including smaller blocks, closely spaced houses, greater intensity of retail and commercial building development, and several different types of land uses (e.g. office, residential, recreation, entertainment) located in close proximity to one another.
FIGURE 3. UTILITARIAN WALKABILITY IN THE METRO VANCOUVER AREA

Source: UBC Health and Community Design Lab (http://health-design.spph.ubc.ca/tools/walkability-index)
ABOUT THE PARTICIPANTS

1,223 SURVEY PARTICIPANTS

512 CITY OF VANCOUVER
711 OUTER METRO VANCOUVER

FIGURE 4. SURVEY PARTICIPANTS BY HOME POSTAL CODE
Residential preferences and public health in Metro Vancouver

GENDER, AGE AND HOUSEHOLD

60% are female

Male 40%

Female 60%

Average age is 51 years old

44% are married
19% have one or more children
2.1 average household size

DWELLING TYPE

40% live in a single-detached home
60% own their dwelling

40%

12%

3%

29%

16%
Residential preferences and public health in Metro Vancouver

INCOME AND EDUCATION

Average annual household income is between $40,000-$60,000

41% have a university degree
61% are employed

ETHNICITY AND IMMIGRATION

<table>
<thead>
<tr>
<th>Ethnic Origin</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Isles</td>
<td>31%</td>
</tr>
<tr>
<td>European</td>
<td>12%</td>
</tr>
<tr>
<td>Asian (east/south)</td>
<td>11%</td>
</tr>
<tr>
<td>Canadian</td>
<td>8%</td>
</tr>
<tr>
<td>West Asian</td>
<td>2%</td>
</tr>
<tr>
<td>Latin, Central, South American</td>
<td>1%</td>
</tr>
<tr>
<td>Black African/African American/Caribbean</td>
<td>0.4%</td>
</tr>
<tr>
<td>Arab</td>
<td>0.3%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
</tr>
<tr>
<td>Multiple origins</td>
<td>28%</td>
</tr>
</tbody>
</table>

33% immigrated to Canada
45 average number of years lived in Canada

Sample Strengths and Limitations

Survey participants were drawn from the range of walkability and incomes present in Metro Vancouver to ensure that the sample was representative of the region’s population, however the absence of potential recruits in the high income (>70,000)/high walk categories was identified as a potential limitation of the sample.

Participant characteristics were found to be comparable to the 2006 Census for income, dwelling type and ownership, and employment status. The percentage of males, households with children, and immigrants in the sample was slightly underrepresented in the sample compared to the population in Metro Vancouver, thus caution should be used when generalizing findings to all residents.
SURVEY RESULTS

Survey findings are presented separately for participants residing in the City of Vancouver (CV) and participants living in other areas of Metro Vancouver (Outer MV) to help understand how neighbourhood preferences, attitudes, and travel behaviour may vary between the region’s most densely populated municipality and other areas of Metro Vancouver.

Neighbourhood Selection Factors

Community design and personal factors that influence neighbourhood selection were ranked by participants on a scale of 1 (not important) to 4 (very important). Affordability/value and ease of walking were ranked as the two most important factors for people selecting their current neighbourhood, regardless of where they live in Metro Vancouver (FIGURE 5). Other features that were considered to be important included closeness to shops and services, public transit access, public recreation opportunities, and living near a wide variety of food stores. Lower value was placed on living in a specific cultural or ethnic community, the quality and nearness of schools, and ease of cycling.

FIGURE 5. NEIGHBOURHOOD ATTRIBUTES INFLUENCING CHOICE OF RESIDENTIAL LOCATION

<table>
<thead>
<tr>
<th>CITY OF VANCOUVER</th>
<th>OUTER METRO VANCOUVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4 Affordability/Value</td>
<td>3.5 Affordability/Value</td>
</tr>
<tr>
<td>3.4 Ease of walking</td>
<td>3.1 Ease of walking</td>
</tr>
<tr>
<td>3.2 Convenient access to work, other destinations on public transit</td>
<td>2.9 Closeness to shops and services</td>
</tr>
<tr>
<td>3.1 Closeness to shops/services</td>
<td>2.8 Closeness to public open space</td>
</tr>
<tr>
<td>3.1 Closeness to grocery stores, fruit/vegetable stands, specialty food stores</td>
<td>2.8 Closeness to wide range of grocery stores, fruit/vegetable stands, specialty food stores</td>
</tr>
<tr>
<td>3.0 Closeness to a bus stop</td>
<td>2.7 Closeness to public recreation space</td>
</tr>
<tr>
<td>3.0 Closeness to public open space</td>
<td>2.6 Convenient access to work and other destinations on public transit</td>
</tr>
<tr>
<td>2.8 Closeness to job or school</td>
<td>2.5 Closeness to job or school</td>
</tr>
<tr>
<td>2.8 Closeness to public recreation space</td>
<td>2.5 Closeness to friends and family</td>
</tr>
<tr>
<td>2.6 Closeness to a train station or stop</td>
<td>2.4 Closeness to a bus stop</td>
</tr>
<tr>
<td>2.6 Closeness to restaurants</td>
<td>2.3 Closeness to restaurants</td>
</tr>
<tr>
<td>2.5 Closeness to cultural/entertainment venues</td>
<td>2.2 Closeness to a train station or stop</td>
</tr>
<tr>
<td>2.4 Closeness to friends and family</td>
<td>2.1 Quality of schools</td>
</tr>
<tr>
<td>2.2 Ease of bicycling</td>
<td>2.0 Closeness to cultural/entertainment venues</td>
</tr>
<tr>
<td>1.8 Quality of schools</td>
<td>1.9 Closeness to elementary school/child care/early learning centre</td>
</tr>
<tr>
<td>1.7 Closeness to elementary school/child care/early learning centre</td>
<td>1.9 Ease of bicycling</td>
</tr>
<tr>
<td>1.7 Closeness to particular cultural/ethnic community</td>
<td>1.5 Closeness to particular cultural/ethnic community</td>
</tr>
</tbody>
</table>
Which Destinations do People Walk to?

Survey participants were asked about the number of times they walk to various destinations in a typical month. The survey suggests that:

- Residents in the City of Vancouver walk most frequently to bus stops and public open spaces, on average, about 8 times each month (FIGURE 6);
- Residents in Outer Metro Vancouver walk most frequently to public open spaces, on average about 7 times each month, followed by bus stops, grocery stores, and shops/services.

When considering the types of destinations people walk to over the course of a month, over 80% of survey participants in the City of Vancouver said they walk to small-medium grocery stores, shops or services, and public open spaces at least once per month; and over 70% walk to restaurants, supermarkets, and bus stops at least once per month (FIGURE 7).

In other areas of Metro Vancouver, 71% of survey participants indicated that they travel on foot to a public open space like a park at least one time a month. Just under one half walk to small-medium grocery stores, shops and services, and supermarkets at least once a month.
In the City of Vancouver, less than 15% of survey participants reported walking to the following places at least once in a typical month: places of worship (14%), elementary schools/daycare facilities (9%), and other schools (8%). Participants in other areas of Metro Vancouver reported similar behaviour, with places of worship (14%), the workplace (11%), and middle/high schools (8%) as the destinations they are least likely to walk to over the course of a typical month.
Mode of Transportation to Work and School

Survey participants were asked to indicate how they normally commute to their place of work. Travel using active modes of transportation (walking, cycling, and public transit) was reported by about half of City of Vancouver participants, compared to about one-quarter of participants in other areas of Metro Vancouver. In Outer Metro Vancouver, driving in an automobile alone was reported as the most common mode of transportation to work (55%), compared to 29% in the City of Vancouver who travelled to work that way (FIGURE 8).

FIGURE 8. USUAL MODE OF TRANSPORTATION TO WORK

<table>
<thead>
<tr>
<th></th>
<th>City of Vancouver</th>
<th>Outer Metro Vancouver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk</td>
<td>19%</td>
<td>6%</td>
</tr>
<tr>
<td>Walk/Bike to Public Transit</td>
<td>25%</td>
<td>6%</td>
</tr>
<tr>
<td>Drive Alone</td>
<td>29%</td>
<td>55%</td>
</tr>
<tr>
<td>Work from Home</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Carpool</td>
<td>4%</td>
<td>7%</td>
</tr>
<tr>
<td>Drive to Public Transit</td>
<td>5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>
Participants with one or more children travelling to school (or work) were asked about their child’s usual mode of transportation. Walking was specified as the most common mode of transport – about 40% in both regions (FIGURE 9). Taking public transit was more common among those living in the City of Vancouver (19%), compared to other areas of Metro Vancouver (13%). The share of participants with children that cycle to work or school was less than 5% in both regions.

FIGURE 9. USUAL MODE OF TRANSPORTATION BY CHILD TO SCHOOL OR WORK
Travel Behaviour and Health Characteristics

Participants were asked how many days in a usual week they engaged in active and non-active modes of transport. Information about health-related indicators including height and weight, high blood pressure, and diabetes were also collected. Descriptive results are presented below for participants residing in the City of Vancouver and participants residing in other areas of Metro Vancouver.

The study findings suggest that:

Walking and Cycling

- Residents in the City of Vancouver walk 4 days/week for utilitarian purposes (e.g. to work or to run errands) – twice as frequently as those in other areas of Metro Vancouver;
- Residents in both the City of Vancouver and other areas of Metro Vancouver walk for recreation 3 days/week;
- Cycling frequency across Metro Vancouver averages about 1 day per week, with rates slightly higher in the City of Vancouver (1.4 days/week).

Public Transit

- Residents in the City of Vancouver use public transit (e.g., bus, SkyTrain), on average, 2 days/week compared to 1 day/week in other areas of Metro Vancouver.

Vehicle Travel

- Residents in the City of Vancouver drive their vehicles 3 days/week and an average of 7,500 km/year, nearly half as far as residents in other areas of Metro Vancouver (14,000 km/year).
Health-Related Indicators

- 30% of City of Vancouver residents had a BMI that classified them as overweight (25.0 –29.9), compared to 38% among residents living in other areas of Metro Vancouver;
- Obesity, measured by a BMI of 30 or higher, was 9% lower among residents of City of Vancouver (13%);
- Incidence of high blood pressure was also 9% lower among City of Vancouver participants, while the rate of diabetes in the City of Vancouver was 7% compared to 11% in other areas of Metro Vancouver.
Neighbourhood Trade-offs

Participant responses to the neighbourhood trade-offs questions measuring attitudes and perceptions towards seven specific neighbourhood and community design features were grouped into three categories:

- Strong response towards an auto-oriented neighbourhood (0-2 or 8-10 on the Likert scale);
- Moderate/neutral response (3-7 on the Likert scale);
- Strong response in favour of a walkable neighbourhood (0-2 or 8-10 on the Likert scale).

Grouping participants who responded in the extreme “tails” of the Likert scale isolated the most extreme responses for a particular type of residential environment, and revealed the magnitude of demand for either auto-oriented or walkable neighbourhoods that people are willing to make given certain trade-offs.

The following sections describe results for three different questions related to neighbourhood design features:

What type of neighbourhoods do people prefer?
What is the neighbourhood like where people currently live?
What type of neighbourhood would people move to, relative to their current one?

---

Walkable versus auto-oriented trade-off descriptions alternated between “Neighbourhood “A” and Neighbourhood “B”.
Neighbourhood Preferences

What type of neighbourhood do people want to live in?

An overwhelming majority of participants in the City of Vancouver indicated a strong preference for pedestrian-friendly communities. On average, nearly 60% of participants for each of the seven trade-off pairings describing different aspects of neighbourhoods said they strongly prefer design features that support walking and public transit (8–10 on the Likert scale), and would be willing give up desirable aspects of auto-oriented environments to do so. In contrast, an average of just 8% of City of Vancouver participants responded that they would strongly prefer to live in a single-use neighbourhood where car travel is necessary (0–2 on the Likert scale).

Participants in other areas of Metro Vancouver also demonstrated preference for walkable neighbourhoods (8–10 on the Likert scale) – an average of 34% said they strongly prefer to live where neighbourhood features are pedestrian-friendly across all seven trade-off questions, compared to an average of 20% who strongly prefer an auto-oriented neighbourhood (0–2 on the Likert scale).

What aspects of walkable communities are valued most?

In both regions, living within walking distance to shops and services and a living near a variety of small-medium sized food stores were the two trade-offs that elicited the highest percentage of participants desiring a very walkable type of neighbourhood (FIGURE 10):

- 64% of City of Vancouver participants and 38% of Outer MV participants strongly prefer a neighbourhood where homes and commercial areas are within a ten minute walk of one another so they don’t need a car to get there;
- 62% of City of Vancouver participants and 40% of Outer MV participants strongly prefer to live in a community where they can walk to a wide variety local small/medium grocery stores;
- Willingness to live in areas with public recreation opportunities nearby, such as trails and sports fields also scored high among Outer MV participants, with 37% strongly preferring a neighbourhood with these features.

40% in Outer MV strongly prefer a neighbourhood within walking distance of a variety of small-medium food stores, compared to 15% who would strongly prefer to drive at least 10 minutes to a large supermarket.
Figure 10. Neighbourhood Preferences in Metro Vancouver

Neighbourhood Preference

Walkability and Proximity of Commercial Services
Where commercial areas are accessible without having to walk more than 20 minutes or to drive less than 10 minutes.

Level of Activity and Mix of Housing
With single-family houses, townhouses, apartments or mixed, even if this means it has a mix of single family houses, townhouses, and apartment buildings that are close together or on various sized lots with how private backyard space.

Home Size and Travel Options
With larger homes and more interior living space, where the commercial areas are distant, but 30 minutes or more than 45 minutes walk away.

Lot Size and Commute Distance
With houses that are far apart, on large lots, (50 acres or more) with lots that mean traveling more than 50 minutes or more than 45 minutes to work, school or other important destinations.

Street Design and Travel Options
With cul-de-sacs and few people from other neighbourhoods walking or driving on them, even if this means it must drive for all my trips.

Public Recreation Opportunities and Lot Size
Where there is lots of space on my own property for recreational activities, but there is a short walk to a place to swim or to walk.

Access to and Size of Food Stores
With few food stores within walking distance but several very large supermarkets within a 10 minute drive.

Vancouver
Outer MV

Vancouver
Outer MV
What aspects of auto-oriented communities do people still want?

In both regions, the neighbourhood design element where people most preferred a more auto-dependent type of neighbourhood related to level of activity and mix of housing:

- 12% in the City of Vancouver and 29% in Outer MV would be willing to live in a community where there are single-family houses spaced farther apart with more backyard space, even if it means there are few services or activities nearby.

Does neighbourhood preference vary by income or age, or for households with children?

Participants in both regions were pooled together to assess whether preference for walkable or auto-oriented communities varied by income, age, or presence of children in the household.

Results averaged across the seven neighbourhood trade-offs suggest that walkable neighbourhoods are strongly preferred over auto-oriented places by the majority of people, regardless of household income level. Between 40-48% of participants in each income category strongly preferring to live in such a place (Figure 11).

Preference for walkable neighbourhoods was highest among the 25-29 age cohort (47%), while the 40-49 age group had the lowest percentage of participants who strongly prefer a very walkable neighbourhood (39%) (FIGURE 12).

Preference for a very walkable neighbourhood was expressed by 46% of participants with no children in the household. Among households with children, 32% strongly prefer a walkable neighbourhood, compared to 21% who strongly prefer an auto-oriented neighbourhood (FIGURE 13).
Residential preferences and public health in Metro Vancouver

**FIGURE 11. NEIGHBOURHOOD PREFERENCE BY HOUSEHOLD INCOME LEVEL**

- Low Income (<$40K): 15% Very Walkable, 48% Very Auto-oriented
- Medium Income ($40-100K): 16% Very Walkable, 40% Very Auto-oriented
- High Income (>=$100K): 17% Very Walkable, 47% Very Auto-oriented

**FIGURE 12. NEIGHBOURHOOD PREFERENCE BY AGE GROUP**

- 25-29: 10% Very Walkable, 47% Very Auto-oriented
- 30-39: 14% Very Walkable, 44% Very Auto-oriented
- 40-49: 17% Very Walkable, 39% Very Auto-oriented
- 50-64: 15% Very Walkable, 45% Very Auto-oriented
- 65+: 16% Very Walkable, 44% Very Auto-oriented
FIGURE 13. NEIGHBOURHOOD PREFERENCE BY PRESENCE OF CHILDREN

Neighbourhood Preference

<table>
<thead>
<tr>
<th>Household with No Children</th>
<th>Household with Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Walkable</td>
<td>Very Auto-Oriented</td>
</tr>
<tr>
<td>46%</td>
<td>32%</td>
</tr>
<tr>
<td>14%</td>
<td>21%</td>
</tr>
</tbody>
</table>
Perceived Neighbourhood Walkability

How walkable do people feel their neighbourhood is right now?

When asked to assess the features in the neighbourhood where they live, about two-thirds of participants living in the City of Vancouver said their neighbourhood was very walkable across the seven neighbourhood trade-offs. An average of only 30% in other areas of Metro Vancouver felt their neighbourhood was very walkable. Among City of Vancouver participants, an average of just 6% said they live in a community that is very auto-dependent; while 20% in other areas of Metro Vancouver indicated that they live in neighbourhood where car travel is usually necessary.

What aspects of community design are most pedestrian-friendly?

Neighbourhood trade-offs relating to Street Design and Travel Options and Walkability and Proximity of Commercial Services were the two aspects of their community people indicated were most walkable (FIGURE 14):

- 71% in the City of Vancouver and 37% of Outer MV participants feel that their current neighbourhood is designed so they can walk, cycle, or take public transit;
- 64% of City of Vancouver participants and 36% of Outer MV participants responded that they live in a community where they are in walking distance to shops and services.
What aspects of their current neighbourhood do people feel are not supportive of walking or public transit?

Living in walking distance to a variety of food stores was the aspect of neighbourhood design that people said was least pedestrian-friendly in both regions:

- Just 22% of Outer MV participants indicated they live in a neighbourhood where it is easy to walk to a wide range of small/medium grocery stores, while 55% in the City of Vancouver said they live in such a neighbourhood.

FIGURE 14. CURRENT NEIGHBOURHOOD ASSESSMENT
Evaluating Unmet Demand for Walkable versus Auto-oriented Neighbourhoods

To determine the level of demand for specific neighbourhood features (auto-oriented or walkable), and how that demand compares to where people currently live, participants who indicated that their current neighbourhood (Question B) was either very auto-oriented or very walkable (0-2 or 8-10 on the Likert scale) were grouped according to their response to the question that asked about their desire for change to a different type of neighbourhood (Question C).

Quantifying the magnitude of demand among the subset of people who indicated that they strongly desire a different type of neighbourhood environment compared to where they currently live explores the degree of discrepancy between existing housing supply and consumer demand among people who are most dissatisfied with their current neighbourhood, and may be most likely to consider a change to their residential environment upon moving.

Specifically,

A) For those who live in a very auto-oriented\(^2\) neighbourhood, how many indicated they would like to move to a very walkable\(^3\) neighbourhood instead?

B) For those who live in a very walkable-oriented neighbourhood, how many indicated they would like to move to a very auto-oriented neighbourhood instead?

Survey results revealed considerable demand in Metro Vancouver for neighbourhoods that are highly walkable among those who currently live in very auto-oriented communities, with upwards of 20-30% responding this way, depending on the specific neighbourhood feature being described (FIGURE 15). By contrast, less than 8% in the City of Vancouver, and less than 12% in other areas of Metro Vancouver living in high walkable neighbourhoods responded that would strongly prefer an auto-oriented environment.

\(^2\) Participants who responded 0–2 on the Likert scale
\(^3\) Participants who responded 8–10 on the Likert scale
Among people living in very auto-oriented neighbourhoods:

City of Vancouver

- **30%** strongly desire to live in a neighbourhood within walking distance of a variety of grocery stores and specialty food stores;
- **20%** strongly prefer a community where different types of commercial services are with a ten minute walk;
- **18%** strongly desire to live in a neighbourhood where commercial areas are within walking distance, even if it means living in a smaller home;
- **14%** strongly prefer to live somewhere where commute distance to work or school is short and they can walk.

Outer Metro Vancouver

- **25%** strongly prefer to live in a neighbourhood within walking distance of a variety of grocery stores and specialty food stores;
- **24%** strongly desire a community where different types of commercial services are with a ten minute walk;
- **19%** strongly desire a neighbourhood where commercial areas are within walking distance, even if it means living in a smaller home;
- **16%** strongly prefer a neighbourhood where there are trails, parks, and green space nearby for recreational activities, even if it means a living on a smaller lot.

Among people living in very walkable neighbourhoods:

Among the subset of participants who said they already live in a very walkable community, demand in the other direction for a less connected neighbourhood where car travel is necessary was minimal, particularly among City of Vancouver participants (FIGURE 15):

- The percentage of those in the City of Vancouver who would hope to find a neighbourhood that is much less walkable compared to their current one ranged from **2–7%** across the seven trade-offs;
The percentage of those in Outer MV who currently live in a very walkable neighbourhood, but would like the opposite ranged from 3–12% across the seven trade-offs.

FIGURE 15. DEMAND FOR WALKABLE URBAN ENVIRONMENTS

![Demand for Walkable vs. Auto-oriented Environments]

Participants who indicated they live in an “extreme” type of neighbourhood – very auto-oriented or very walkable (0-2 or 8-10 on Likert scale) – were assessed for their desire for change to the opposite type of neighbourhood compared to their current one (e.g. moving from a very car-dependent environment to one that is very pedestrian-friendly).

### CITY OF VANCOUVER

<table>
<thead>
<tr>
<th>Neighbourhood Attribute</th>
<th>(A) current neighbourhood is MORE walkable &amp; would hope to find a neighbourhood that is LESS walkable:</th>
<th>(B) current neighbourhood is LESS walkable &amp; would hope to find a neighbourhood that is MORE walkable:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to and Size of Food Stores</td>
<td>2%</td>
<td>30%</td>
</tr>
<tr>
<td>Walkability and Proximity of Commercial Services</td>
<td>2%</td>
<td>20%</td>
</tr>
<tr>
<td>Home Size and Travel Options</td>
<td>5%</td>
<td>18%</td>
</tr>
<tr>
<td>Lot Size and Commute Distance</td>
<td>7%</td>
<td>14%</td>
</tr>
<tr>
<td>Public Recreation Opportunities and Lot Size</td>
<td>5%</td>
<td>13%</td>
</tr>
<tr>
<td>Level of Activity and Mix of Housing</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Street Design and Travel Options</td>
<td>5%</td>
<td>4%</td>
</tr>
</tbody>
</table>

### OUTER METRO VANCOUVER

<table>
<thead>
<tr>
<th>Neighbourhood Attribute</th>
<th>(A) current neighbourhood is MORE walkable &amp; would hope to find a neighbourhood that is LESS walkable:</th>
<th>(B) current neighbourhood is LESS walkable &amp; would hope to find a neighbourhood that is MORE walkable:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walkability and Proximity of Commercial Services</td>
<td>3%</td>
<td>24%</td>
</tr>
<tr>
<td>Access to and Size of Food Stores</td>
<td>5%</td>
<td>25%</td>
</tr>
<tr>
<td>Home Size and Travel Options</td>
<td>8%</td>
<td>19%</td>
</tr>
<tr>
<td>Public Recreation Opportunities and Lot Size</td>
<td>10%</td>
<td>16%</td>
</tr>
<tr>
<td>Street Design and Travel Options</td>
<td>12%</td>
<td>14%</td>
</tr>
<tr>
<td>Level of Activity and Mix of Housing</td>
<td>12%</td>
<td>11%</td>
</tr>
<tr>
<td>Lot Size and Commute Distance</td>
<td>11%</td>
<td>10%</td>
</tr>
</tbody>
</table>
The Influence of Neighbourhood Walkability on Travel Behaviour and Health

The role of neighbourhood design on travel behaviour and health-related indicators was assessed by exploring associations between objectively-measured neighbourhood walkability and frequency of walking, cycling, taking public transit, and automobile travel.

Participants were grouped into quartiles based on the objective walkability score of the postal code they live in (Q1=low walkability; Q4=high walkability)\(^4\). Results were pooled for all participants in Metro Vancouver due to a lower number of participants in the highest walkability quartile (Q4) in Outer MV.

ANOVA analyses assessed whether there were significant differences between walkability quartiles in the weekly frequency of engaging in utilitarian walking, recreational walking, public transit, and vehicle travel. Logistic regression analyses evaluated the influence of neighbourhood walkability on the percentage of those reporting body weights classified as overweight or obese, high blood pressure and diabetes, after adjusting for socio-demographic co-variates\(^5\).

Participants living in more walkable neighbourhoods walk significantly more for utilitarian purposes, use public transit more frequently, drive less often, drive fewer kilometres, and have lower body weights.

Walking

Utilitarian walking

Utilitarian walk trips were significantly higher among participants living in the highest objective walkability quartile (4.8 days/week). Those in Q1 walked to work, school, or to do errands just 1.4 days/week, which is three times less than those living in Q3 or Q4. Average minutes on a utilitarian walk trip ranged from 31 to 35 minutes and was not significantly different between walkability quartiles.

---

\(^4\) Participant counts by walkability quartile: Q1=384; Q2=612; Q3=233; Q4=92. Note: Walk index quartiles were not assigned to 13 participants because their home postal code was outside the area included in the walkability surface.

\(^5\) Age, sex, and household income.

**Significantly different (p<0.01) than the lowest walkability quartile (Q1); *significantly different (p<0.05) than the lowest walkability quartile (Q1)
Recreational walking

Weekly recreational walk trip frequency did not vary significantly between walkability quartiles, ranging from 3.0 to 3.5 days/week. Average minutes per trip were highest in the top two walkability quartiles at 43 and 46 minutes per trip respectively.

Public Transit

Public transit trip frequency was highest for those living in Q3 and Q4, averaging about 2 days per week. Participants living in Q1 used public transit significantly less frequently (0.7 days/week), compared to those living in the three highest quartiles of walkability.

Automobile Use

Weekly vehicle use and vehicle kilometres travelled decreased with each quartile removed from Q1. Vehicle travel frequency was three times higher in Q1 (5.5 days/week) compared to Q4 (1.8 days/week), and distance travelled by those living in Q1 was nearly four times as far as those living in Q4 (15.8 thousand km/year compared to 4.2 thousand km/year).
Health-Related Indicators

**Body Weight**

About 10% more participants living in the three lowest quartiles of walkability reported body height and weight that classified them as obese. Incidence of obesity was significantly lower among Q4 participants after adjustment for socio-demographics (8%).

Incidence of body weights classified as overweight/obese was significantly lower (38%) in the highest quartile of walkability.

**High Blood Pressure and Diabetes**

The percentage of people reporting high blood pressure was lowest in Q4 (6%) and highest in Q1 (21%) and Q2 (18%). After adjustment for socio-demographics, there was a significant relationship between high blood pressure incidence and neighbourhood walkability when comparing participants living in Q1 versus Q4.

Diabetes incidence was highest in Q2 (11%) and Q1 (9%). There was no significant association between diabetes and neighbourhood walkability after adjusting for socio-demographics.
Neighbourhood Preference, Walkability, Travel Behaviour, and Health

Travel behaviour and health indicators were compared for participants sharing the same preference (auto-oriented or walkable) but *living in neighbourhoods of different walkability*. The purpose of these analyses were to isolate the effects of the built environment on travel behaviour and health outcomes for people who prefer the same type of neighbourhood, but whose preference may not match their existing neighbourhood walkability level. Participants were assigned to neighbourhood preference/walkability cohorts in the following way:

- **Participants who indicated they prefer an auto-oriented neighborhood** were grouped together (Group A). This subset of participants was further divided based on the objective walkability quartile associated with their home postal code.
  - Those living in areas of lower walkability (Q1 and Q2) were assigned to the low neighbourhood walkability cohort (A1);
  - Those living in the two highest quartiles of walkability (Q3, Q4) were grouped into high neighbourhood walkability group (A2).

- **Participants who indicated they prefer a walkable neighbourhood** were grouped together (Group B). This subset of participants was further divided based on the objective walkability quartile associated with their home postal code.
  - Those living in areas of lower walkability (Q1 and Q2) were assigned to the low neighbourhood walkability cohort (B1);
  - Those living in the two highest quartiles of walkability (Q3, Q4) were assigned to the high neighbourhood walkability cohort (B2).

---

A composite measure of Neighbourhood Preference was developed by conducting Principal Components Analysis (PCA) on the seven neighbourhood trade-off preference responses (*Question A*). Participants were assigned a Neighbourhood Preference factor score and then classified into two groups using the normalized factor score of zero as the breakpoint:

- **Group A**) Prefer auto-oriented neighbourhood; Group B) Prefer walkable neighbourhood.

---

*Group A1* contains participants who indicated they prefer and live in an auto-oriented neighbourhood.

*Group A2* contains participants who prefer an auto-oriented neighbourhood, but live in a walkable place.

*Group B1* contains participants who indicated they prefer an auto-oriented neighbourhood but live in a walkable place.

*Group B2* contains participants who prefer and live in a walkable place.
Residential preferences and public health in Metro Vancouver

Utilitarian Walking

- People who prefer an auto-oriented neighbourhood but live in a walkable one engage in utilitarian walking twice as often (3.7 days/week) as their counterparts who live in an auto-oriented neighbourhood (1.7 days/week).
- People who prefer a walkable neighbourhood but do not live in one walk significantly less often (3.2 days/week) compared to those who prefer and live in a walkable neighbourhood (4.8 days/week).

Recreational Walking

- Recreational walk trips did not vary between those who prefer an auto-oriented neighbourhood but live in neighbourhoods with different levels of walkability, averaging about 3 days/week.
- Similarly, recreational walk trips averaged just over 3 days/week among those who prefer a walkable neighbourhood, regardless of the walkability of their current neighbourhood.

Public Transit

- People who prefer an auto-oriented neighbourhood but live in a walkable one take public transit twice as often (2.2 days/week) as those who prefer and live in an auto-oriented neighbourhood.
- Among those who prefer a walkable neighbourhood, public transit usage did not vary significantly when comparing those living in auto-oriented versus walkable neighbourhoods, averaging about 2 days/week.
Residential preferences and public health in Metro Vancouver

Vehicle Trips

- People who prefer an auto-oriented neighbourhood but live in a walkable one drive significantly fewer days per week (4 days/week) and drive three times fewer annual kilometres than those who share a preference for an auto-oriented neighbourhood and live in one.
- People who prefer and live in a walkable neighbourhood drive significantly fewer days per week and about half as many annual kilometres as their counterparts who prefer a walkable neighbourhood, but do not live in one.

Body Weight

Obese

- Obesity incidence was lower among those who prefer an auto-oriented neighbourhood, but live in a walkable one (14%), although the difference was not significant after adjusting for socio-demographics.
- Similarly, obesity incidence was lower among those, who prefer an auto-oriented neighbourhood, but live in a walkable one (15%), although the difference was not significant after adjusting for socio-demographics.

---

7 Age, sex, and household income
Overweight / Obese

- Among those who prefer an auto-oriented neighbourhood, the proportion of participants with a BMI score ≥25 was lower among those who live in a walkable environment (43%), however the difference was not significant after adjusting for socio-demographics.
- Among those who prefer a walkable neighbourhood, overweight/obese incidence was lower among those who actually live in a walkable neighbourhood (45%), however the difference was not significant after adjusting for socio-demographics.

High blood pressure

- Incidence of high blood pressure was similar among those who prefer an auto-oriented neighbourhood, regardless of actual neighbourhood walkability (17-18%).
- People who prefer and live in a walkable neighbourhood reported significantly lower incidence of high blood pressure (10%) than those who prefer a walkable neighbourhood, but do not live in one (21%).

Diabetes

- Among those who indicated they prefer an auto-oriented neighbourhood, incidence of diabetes was slightly lower among those who live in a walkable neighbourhood (5%)
- People who prefer and live in a walkable neighbourhood reported lower incidence of diabetes (6%) than those who prefer a walkable neighbourhood, but do not live in one (12%), however this difference was not significant when adjusting for socio-demographics.
In summary, among those who prefer an auto-oriented neighbourhood, but live in a walkable one (A2), they:

- Walk twice as often for utilitarian purposes
- Take public transit twice as frequently
- Drive nearly two days less per week
- Drive about a third fewer kilometres over the course of a year

...Than those who also prefer and live in an auto-oriented neighbourhood (A1)

Among those whose preference for a walkable neighbourhood matches their current neighbourhood (B2), they:

- Walk 50% more often for utilitarian purposes
- Drive about one day less per week
- Drive almost twice as fewer kilometres over the course of a year
- Have a significantly lower likelihood of reporting high blood pressure

...Than those who prefer a walkable neighbourhood, but live in an auto-oriented one (B1)

These findings lend support for providing walkable neighbourhood features that allow people to match their activity levels with their preferences. People who prefer and live in a walkable neighbourhood reported engaging in non-motorized transport more frequently and have lower body weights than those who prefer a walkable neighbourhood, but do not live in one. Furthermore, the findings also suggest that providing daily opportunities for walking and taking public transit has the potential to increase physical activity levels even among those who prefer a low walkable place.
CONCLUSIONS

The residential preference survey is an important body of research that assists in understanding the nature of consumer demand for different residential environments, and provides direction for future housing and neighbourhood supply in the Metro Vancouver region. The survey revealed a strong preference among Metro Vancouver residents for walkable urban environments, with preference for such a neighbourhood particularly strong among those living in the City of Vancouver. Findings also showed that while most people feel their current neighbourhood is already quite walkable, there is a segment of the population living in low walkable neighbourhoods (perceived), who would very much like to live in the opposite type of neighbourhood where destinations are within walking distance or accessible by public transit. The study also suggests that regardless of preference, people who live in more walkable neighbourhoods walk more, use public transit more, drive less, and have lower body weights.

Utilitarian walkability scores for Metro Vancouver showed that while many areas urban areas across the region are highly walkable, walkability decreases with distance from city centres. Providing people with affordable housing options in the type of walkable residential environments they prefer will increase the likelihood of people incorporating walking and other modes of active transport into their daily routines and contribute to the development of healthier and more sustainable communities.

The results of this study suggest that the public will support policies that provide more compact neighbourhoods with connected streets and commercial areas. These findings align with the goals outlined in Metro Vancouver’s Regional Growth Strategy which

Improving Neighbourhood Walkability in Vancouver: City Greenways

The Comox-Helmcken Greenway project through downtown Vancouver from False Creek to Stanley Park is an example of how physical neighbourhood design can be improved to encourage an active and health community. The Greenway will provide connections to retail areas, parks, schools, and other destinations while promoting active modes of transportation in a safe and vibrant environment. Evaluating the impact of greenways such as this through pre and post-longitudinal studies will be important to assess how travel behaviour changes across different demographics.

Source: City of Vancouver (vancouver.ca)
Residential preferences and public health in Metro Vancouver

includes creating more compact urban areas, developing sustainable communities, and supporting sustainable transportation choices (Metro Vancouver, 2013). Transportation plans developed by several local governments across Metro Vancouver have prioritized safe and accessible transportation options for all residents, and improving infrastructure connectivity for active transportation modes including walking, bicycling and public transit. The City of Vancouver has identified specific goals for increasing mode share for sustainable transportation options, including increasing active and public transit trips to over 50% by 2020. This would be an increase from 40% in 2008, and would move the city closer its long-term goal of at least two-thirds of all trips made on foot, bike, or transit by 2040 (City of Vancouver, 2012).

“Make the active choice the easier and more attractive choice”

- World Health Organization (2007), on designing neighbourhoods to increase physical activity among people who are less active

Designing more walkable neighbourhoods

Creating pedestrian and transit-oriented communities are shaped by six primary factors, all of which are interconnected and influence mode choice the most when all are present:

- **Diversity of land uses.** Creating a mix of different types of destinations in one area, such as office space, retail, restaurants, schools, single-family and multi-family dwellings;
- **Density.** How concentrated amenities in an urban area are (e.g., housing, food stores, jobs, and commercial areas);
- **Transit accessibility.** Reducing distance to transit stops increases the likelihood that people will choose to take public transit as their preferred method of transport. Neighbourhoods that are concentrated along transit routes enjoy a shorter walk to transit stops;
- **Street design.** Connected streets mean that trips are shorter. Making streets safe and pleasant for pedestrians and cyclists is also important;
- **Destination accessibility.** Places that are near a central business district (CBD) have a high level of destination accessibility. These are destinations people travel to regularly for jobs or services;
• **Parking.** Reduces densities, creates greater distance between destinations, and encourages auto travel when it is free and readily available.

- *Made for Walking (Campoli, 2012)*

**Future Research**

Continuing to objectively quantify specific attributes of neighbourhood design, such as access to parks and open spaces, proximity to commercial areas and retail, and access to public transit will further clarify the extent to which neighbourhood preferences align with the type of neighbourhoods that currently exist.

Exploring how perceived neighbourhood walkability compares with objective neighbourhood walkability will increase understanding of how people behave in the environments where they live and work. For example, the survey showed most people felt their neighbourhood was very walkable, but objective walkability scores placed the majority of participants in the two lowest walkability quartiles.

Comparing the demand for more walkable neighbourhoods with the existing supply of housing with respect to both dwelling type and affordability in Metro Vancouver would provide greater insight into locations where change is most needed, particularly in areas of Metro Vancouver with higher concentrations of vulnerable populations.
REFERENCES


