Incorporating Social Space into Pedestrian Planning

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Abstract

Walking is undergoing a resurgence in transportation planning as a means to manage demand for single-occupant vehicles, improve public health and environmental outcomes, and recreate the vibrant human-scale communities which characterized urban life in North America until the midtwentieth century. Pedestrian planning currently prioritizes land use and infrastructural interventions empirically proven to increase the choice to walk: dense forms which connect residents to amenities; street and intersection designs protecting pedestrians from other modes; environmental designs conducive to crime prevention; and aesthetic and functional features which offer comfort to passersby. While these features reliably predict travel behaviour for society as a whole, they fall short in explaining the propensity to walk among groups whose travel behaviour is shaped by socioeconomic constraints rather than environmental attractiveness. This epistemological gap coincides with higher rates of pedestrian injury and death among physically- and socioeconomically-disadvantaged groups across Canada. Greater attention to pedestrians' unique experiences in appraisal and decision-making could inform more effective interventions, yet improving planning practice hinges on better understanding planners' attitudes toward public consultation, municipalities' approaches toward strategic planning, and most importantly, the non-built spatial factors shaping pedestrians' behaviour and perceptions.

This dissertation strives to improve pedestrian planning procedures and outcomes through four objectives:

- 1. To demonstrate how social space impacts pedestrians' behaviour and perceptions, and as such the ontological underpinnings of what constitutes a walkable space;
- To illustrate how qualitative geographic information science can bring social space into walkability assessment;
- 3. To examine variations in professional values among transportation planners and their personal and institutional circumstances, and;
- 4. To assess the prevalence of social policies among strategic pedestrian plans, revealing inclusionary practices at a national scale.

Findings indicate that social space impacts pedestrians' engagement with amenities and streets and, as such, that social space should be incorporated into pedestrian planning to maximize the number of opportunities that can be satisfactorily and voluntarily reached on foot by all members of society. Chapter 3 demonstrates how social distances affect pedestrians in the environmentally- and socially-heterogeneous neighbourhood of Parc-Extension, Montreal, ultimately informing a socialized walkability framework which builds upon existing frameworks informed by built characteristics. Chapter 4 illustrates how geographic information science can grapple with social spaces as perceived by residents. Chapter 5 turns toward the attitudes of transportation planners as they negotiate their professional expertise with public insights, revealing multiple types of planners whose respective views associate with institutional and training differences. Chapter 6 steps back to look at strategic pedestrian planning among Canadian municipalities, finding lacklustre public and stakeholder consultation and the neglect of certain socially-excluded groups within plan policies. Chapter 7 concludes this work by noting its contributions to knowledge and practice, as well as additional research necessary to validate and more effectively operationalize its conclusions for planning practice.

Résumé

La marche est au cours d'une renaissance dans la planification des transports comme un moyen de gérer la demande des voitures, d'améliorer la santé publique et les résultats environnementaux, et de recréer les communautés dynamiques à l'échelle humaine qui ont caractérisé la vie urbaine en Amérique du Nord jusqu'au milieu du vingtième siècle. La planification des piétons priorise actuellement l'utilisation des terres et les interventions infrastructurelles prouvées empiriquement à augmenter le choix de la marche: formes denses qui relient les habitants aux services; les designs de rue et d'intersection qui protègent les piétons d'autres modes; des designs environnementales qui sont favorables à la prévention du crime; et des caractéristiques esthétiques et fonctionnelles qui offrent un confort aux passants. Bien que ces caractéristiques prédisent de manière fiable les comportements à l'échelle sociale, ils n'expliquent pas la propension à marcher parmi les groupes dont le comportement est façonné par des contraintes socioéconomiques plutôt que par une attractivité environnementale. Cet écart épistémologique coïncide avec les taux plus élevés de blessures et de décès des piétons chez les groupes physiquement et socioéconomiquement défavorisés au Canada. Une plus grande attention aux expériences uniques des piétons en matière d'évaluation et de prise de décision pourrait éclairer des interventions plus efficaces, mais ces changements repose sur la façon dont les planificateurs perçoivent la consultation publique, les approches des municipalités en matière de planification stratégique, et surtout comment l'espace social impactent le comportement et les perceptions des piétons.

Cette thèse s'efforce d'améliorer les procédures et les résultats de la planification des piétons à travers quatre objectifs:

- Pour démontrer comment l'espace social influe sur le comportement et les perceptions des piétons et, en tant que tel, les fondements ontologiques de ce qui constitue un espace accessible à pied;
- Pour illustrer comment la science de l'information géographique qualitative peut amener l'espace social dans l'évaluation des espaces piétons;
- 3. Examiner les variations des valeurs professionnelles parmi les planificateurs de transport et leur situation personnelle et institutionnelle;

v

 Évaluer la prévalence des politiques sociales parmi les plans stratégiques des piétons, révélant des pratiques d'inclusion à l'échelle nationale.

Les résultats indiquent que l'espace social a un impact sur l'engagement des piétons avec les aménités et les rues et, en tant que tel, que l'espace social devrait être incorporé dans la planification des piétons pour maximiser le nombre d'opportunités qui peuvent être obtenues de manière satisfaisante et volontaire à pied par tous les membres de la société. Le chapitre 3 démontre comment les distances sociales affectent les piétons dans le quartier environnemental et socialement hétérogène de Parc-Extension, à Montréal, en informant finalement un cadre de « walkability » socialisé qui s'appuie sur les cadres existants, en fonction des caractéristiques physiques de l'espace. Le chapitre 4 illustre comment la science de l'information géographique peut incorporer les espaces sociaux perçus par les résidents. Le chapitre 5 se tourne vers les attitudes des planificateurs des transports lorsqu'ils négocient leur expertise professionnelle avec des idées publiques, révélant de multiples types de planificateurs dont les points de vue respectifs sont associés aux différences institutionnelles et de formation. Le chapitre 6 fait un pas en avant pour examiner la planification stratégique des piétons parmi les municipalités canadiennes, constatant que la consultation médiocre du public et des parties prenantes et la négligence de certains groupes socialement exclus dans les politiques des plans. Le chapitre 7 conclut cette œuvre en notant ses contributions à la connaissance et à la pratique, ainsi que des recherches supplémentaires nécessaires pour valider et mettre en œuvre plus efficacement ses conclusions pour la pratique de planification.

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Author Contributions

This dissertation compiles four manuscripts which have been submitted to peer-reviewed journals. The authorship of these manuscripts is described below.

Chapter 3: "Stores and Mores: Toward Socializing Walkability" by Geoffrey A. Battista and Kevin Manaugh. Geoffrey Battista is the primary author. He designed the interview protocol and conducted all recruitment, data collection, and qualitative analyses. Prof. Manaugh contributed intellectually and provided comments and edits on the manuscript. The project was funded through a SSHRC Insight Development Grant in his name.

Chapter 4: "Using Qualitative GIS to Generate Walkability from Pedestrians' Perspectives" by Geoffrey A. Battista and Kevin Manaugh. Geoffrey Battista is the primary author. He designed the interview protocol and conducted all recruitment, data collection, and qualitative analyses. Prof. Manaugh contributed intellectually and provided comments and edits on the manuscript. The project was funded through a SSHRC Insight Development Grant in his name.

Chapter 5: "Framing Planners' Attitudes at the Intersection of Expertise and Public Insights" by Geoffrey A. Battista and Kevin Manaugh. Geoffrey Battista is the primary author. He designed all stylistic questions for the North American Transportation Planner Survey, in addition to other survey contributions, and created the analytical framework for this study. He conducted all statistical analyses, manuscript writing, and manuscript edits associated with earlier submissions. Prof. Manaugh also contributed to survey design, spearheaded online recruitment, and offered statistical and editing insights. The project was funded through FRQSC Nouveaux Chercheurs grant in his name.

Chapter 6: "Examining Social Inclusion among Pedestrian Plans in Canada" by Geoffrey A. Battista and Kevin Manaugh. Geoffrey Battista is the primary author. He designed and executed the document analysis and wrote the manuscript. Prof. Manaugh offered editing insights before submission.

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Chapter 6: "Examining Social Inclusion among Pedestrian Plans in Canada" is currently under review at *Case Studies in Transport Policy*. (April 2018)

Chapter 1: Introduction

This chapter succinctly introduces the reader to the rationale for this dissertation. It begins with a brief history of the role of walking in transportation planning over the past century. I summarize current issues before detailing four objectives to address these issues. I finish the chapter by outlining the dissertation structure, namely the content of chapters and their relationship to the stated objectives and other chapters.

1.1. Setting the Stage

Before the mid-twentieth century, North American cities developed densely as residents sought to access amenities and employment in close distance to their homes or, as omnibuses, streetcars, heavy rail, and buses proliferated, along densely-packed transit corridors whose spokes connected peripheral residences to industrial areas and central business districts (Hanson, 1995). Economic and technological limitations constrained the outward expansion of cities, as middle-and lower-income households could not afford automobiles which could grant them greater freedom to navigate their own cities and, among both drivers and other transport users, the physical qualities of roadways and their unpredictable behavioural norms could leave much to be desired in terms of safety and comfort. These limitations nevertheless yielded benefits for the pedestrians of the time: shopping, recreation, employment could be accessed inexpensively and intuitively; defensible (observable and well-lit design) architecture and strong community bonds fostered "eyes on the street" ownership over space, preventing crime and promoting children's independent mobility, and; vibrant commerce which drew critical masses of pedestrians into the streetscape, offering safety in numbers (Jacobs, 1962; Newman, 1973).

The strength of these forces began to ebb in the second quarter of the century. The legalization of single-use zoning, initially conceived to reduce residential exposure to industrial nuisances (Village of Euclid v. Ambler Realty Co., 1926), starkly defined and separated the functions of urban space such that newly-built households increasingly found themselves far from everyday destinations. Pedestrian behaviour was increasingly regulated, e.g., the criminalization of "jaywalking" in American municipalities beginning in the early 1920s, to stem a sensational rise

in pedestrian-vehicular collision fatalities¹ by ensuring vehicular traffic could speed unencumbered on exclusive roads (Norton, 2011). Economic and population growth spurred the development of bedroom communities, i.e., primarily residentially-zoned municipalities in lower-cost peripheral areas, whose residents could commute to urban centres thanks to rail and road innovations which reduced travel time while keeping fares relatively inexpensive. The Great Depression and Second World War tempered the expansion of urban areas (Hanson, 1995), though retrospectively, this period underscores the dramatic nature of changes to urban and transportation planning in the decades to follow.

The middle of the century marked a turning point in urban form and, by extension, the practicality of walking in everyday life. Economic prosperity, from higher wages to greater access to government-backed financing, made automobile and home ownership possible for working-class households. Federal and state/provincial governments leveraged this economic growth to fund roadways, particularly limited-access highways, allowing young families to relocate to burgeoning suburban communities with lower housing costs and better public goods (Tiebout, 1956). This emigration was exacerbated by systemic racism, particularly in the United States where white flight gutted inner-city neighbourhoods of tax revenue necessary to provide public services while leaving remaining residents to cope with poverty, crime, and ultimately civil unrest. Urban policymakers embarked to renew underprivileged communities by razing them outright. Neighbourhoods were severed or displaced by new commercial and residential development and, per the design principles of the time, the highways and parking lots needed to make such investments successful.

Walking rarely factored into the transportation geography equations during this period, as the new sub-discipline aligned itself with contemporary economists and engineers to optimize the flow of people and goods across space (Taaffe et al., 1996). However, an emerging group of urban planners argued that predominant planning principles resulted in declining community

¹ It is worth noting an alternative approach to reducing pedestrian-vehicular collisions taken around this time: the ban of automobiles on Prince Edward Island, Canada by plebiscite from 1908 to 1919. This ban applied across the province, though it could be overturned on any road segment where three-fourths of residents agreed to allow cars (Croken, 2017).

cohesion and safety from crime (Gans, 1969; Jacobs, 1962; Newman, 1973). The quantitative measures behind contemporary approaches also came under criticism, as they neglected residents' unique relationships to their neighbourhoods in favour of disembodied aggregated measures at a network scale (Martens, 2016). Ethnographic research gained credibility in planning as a means to assess how architecture and amenities contributed to welcoming and safe communities, as participant observation and understanding space as perceived by people in marginalized communities could elucidate the interaction among physical and social factors in greater depth than top-down modelling alone (Lynch, 1960; Merry, 1981). These developments continued to edge into mainstream practice as cities reckoned with weaknesses in their automobile-based transportation systems: fuel supply shortages; ecological externalities; tightening public budgets, and; vocal opposition by socioeconomic groups whose exclusion from decision-making procedures gave them little recourse to combat socioeconomic and ecological externalities to which they were disproportionately subjected (Banister, 2008).

The New Urbanism paradigm arose as a means to address these shortcomings by promoting residential density, zoning diversity, and tightly-knit street design akin to the gridded blocks of older downtowns (Congress of New Urbanism, 1993). While criticized for failing to resurrect the genuine vibrancy of established urban neighbourhoods², the movement garnered attention from practitioners seeking a one-size-fits-all formula capable of attracting households to communities which balanced homeowners' aspirations for suburban privacy with the social and ecological advantages of urban living. Scholars used emerging technologies, such as digital geographic information systems and statistical analysis software, to empirically validate the impact of New Urbanist principles on travel behaviour. These early studies generally corroborated that neighbourhood-scale built characteristics promote transit use and walking independent of residents' demographic characteristics or attitudes (Cervero and Klosterman, 1997; Handy et al., 2006), setting the stage for practitioners to design spaces which, with increasing precision, promote walking in lieu of other forms of transportation.

² New Urbanist developments typically lack everyday amenities and, generally being built in suburban areas from scratch, are often inaccessible from urban activity centres except by car (Ellis, 2002).

1.2. Problem Statement

Pedestrians are receiving more attention than ever in the design of cities as governments realize numerous advantages to walking when compared to personal automobile use. Pedestrian-friendly neighbourhoods-densely developed with mixed land use-yield higher real estate values, and by extension tax revenue, while simultaneously delivering cost savings in providing public services and infrastructural investments (Leinberger and Alfonzo, 2012; Litman, 2003). Such neighbourhoods also promote public transportation adoption (Lachapelle et al., 2011), which planners can use to manage demand for scarce transportation resources by reducing congestion while holding users' travel costs relatively constant (Meyer, 1999). Substituting automobile trips with walking and walking-to-transit reduces neighbourhood particulate matter emissions to the benefit of residents' respiratory and cardiovascular health (Frank et al., 2006; Pope et al., 2002). The well-documented effects of moderate physical activity on physical health conditions such as obesity (Doyle et al., 2006; Frank et al., 2008b) and cancer (Albanes et al., 1989; Thune et al., 1997) coincide with additional benefits relating to mental health, namely depression (Robertson et al., 2012; Roe and Aspinall, 2011). Where governments bear the lion's share of infrastructural and health care costs, as in Canada, catering to pedestrians over the long term bodes well for public budgets as much as constituents' well-being and satisfaction (Cavill et al., 2008; Litman, 2003).

Municipalities, more often responsible for addressing pedestrian issues than other levels of government, draw from decades of scholarship to promote walking through built interventions (Chapter 2, Section 1). Zoning boards can make walking more practical by allowing higher densities of residential and commercial development in close proximity to one another. Public works departments may allocate sidewalks and crossing infrastructure, providing pedestrians with ownership over space and increasing their safety from vehicular collisions. Developers, transit providers, and opinion leaders in urban design can work with municipalities to prevent crime through environmental design while making walking more comfortable through functional and aesthetic investments. As these categories of built interventions consistently associate with higher levels of walking and, by extension, outcomes relating to health and quality of life, they comprise the thematic backbone of assessment and decision-making procedures deployed by

public-sector stakeholders. These procedures include environmental measures such as systematic audits (Clifton et al., 2007; Day et al., 2006; Negron-Poblete and Lord, 2014; Rosenberg et al., 2009; Schlossberg et al., 2015) and geospatial algorithms (Frank et al., 2010; Walk Score, 2016) as much as the quantifiable scope of features and impacts considered in transportation project appraisal (Cavill et al., 2008; Martens, 2006; van Wee, 2012).

However, built interventions do not generate comparable outcomes across society. Adkins and colleagues (2017) conclude through a systematic review of the literature that the built environment is half as effective in predicting the walking behaviour of disadvantaged groups³ than their more advantaged counterparts. Three of these studies (Kerr et al., 2007; Manaugh and El-Geneidy, 2011; Sallis et al., 2009) prompt investigators to suggest that disadvantaged groups respond less to built interventions because socioeconomic constraints, rather than environmental attractiveness, primarily shape their travel behaviour. These results correspond with several studies discounting the role that built interventions play in shaping walking behaviour after considering personal characteristics such as lifestyle attitudes, socioeconomic status, and residential self-selection (Boarnet and Sarmiento, 1998; Crane and Crepeau, 1998; Gebel et al., 2009; Giles-Corti and Donovan, 2003; Hirsch et al., 2017; Kitamura et al., 1997). If policymakers would like to foster positive pedestrian planning outcomes across society, such as tackling proportionally higher transportation expenditures (Sanchez et al., 2008) and worse public health outcomes (Crouse et al., 2009; Frank et al., 2008b; Lovasi et al., 2009; Morency et al., 2012; Sider et al., 2015) among disadvantaged groups, it is necessary to concurrently examine how built and social factors motivate individuals' everyday walking behaviour.

Transportation planners do not rely exclusively on built factors as they assess and intervene in their communities, as public consultation and stakeholder engagement increasingly factor into urban governance (Chapter 2, Section 2). However, their attitudes regarding procedural alternatives are poorly understood and largely assumed from studies examining urban planners more broadly. Pedestrian plans are perhaps one of the most effective means to design strategic

³ Adkins and colleagues (2017) define "disadvantage" as low income, low educational attainment, or minority status.

interventions, as their creation pools knowledge from disparate public- and private-sector agents who shape the walking environment. Yet, despite their increasing popularity among large- and medium-sized cities, there is no generalizable understanding of the state of practice for creating such plans in Canada. Compounding these uncertainties is a lack of analytical frameworks, for plan design or pedestrian planning more generally, which could assist practitioners in leveraging social factors to improve walking outcomes for disadvantaged groups. It is therefore necessary to situate findings within pedestrian planning to ensure knowledge is transferable to practitioners.

1.3. Research Objectives

A significant proportion of variation in pedestrian travel behaviour can be explained by social factors which are, at present, poorly registered in project assessment and decision-making. The precise extent to which social factors contribute to planning remains unclear, however, because there have been few investigations into either the attitudes of transportation planners or the procedures and policies they pursue in practice. These knowledge gaps inspired the four objectives structuring my doctoral research agenda:

- 1. Demonstrate how social space impacts pedestrians' behaviour and perceptions, and as such the ontological underpinnings of what constitutes a walkable space. This objective serves to inform an assemblage of built and social spatial factors which affects pedestrians' engagement with space and which can be easily transferred to contemporary municipal planning and governance.
- 2. Illustrate how qualitative geographic information science can bring social space into walkability assessment. This objective serves to illuminate methodological avenues for planning stakeholders to more seamlessly analyze social factors, as refracted through the lens of residents' everyday lives, alongside built factors for the design of pedestrian interventions.
- 3. *Examine variations in professional values among transportation planners and the personal and institutional circumstances.* This objective serves to inform planning organizations and associated stakeholders about attitudinal clusters among present-day

practitioners and the factors which significantly associate with planners' stated identification with cluster characteristics.

4. Assess the prevalence of social policies among strategic pedestrian plans, revealing *inclusionary practices at a national scale.* This objective serves to inform planning organizations and associated stakeholders about how social factors may be incorporated into strategic planning through a social inclusion framework, which is deployed to examine the state of social inclusion in pedestrian planning among Canadian municipalities.

1.4. Dissertation Structure

I meet these objectives through three separate studies, as described throughout the remaining chapters of this dissertation. The sequence of chapters is formatted to first demonstrate the relevance of social space in pedestrian planning through a literature review and capstone study, followed by an examination of social factors among three domains of pedestrian planning: appraisal instruments; planner values, and; the structure of strategic plans. Each chapter except the literature review and conclusion comprises an introduction, a literature review, a transparent description of data collection, analysis, and results, and a discussion relating results to pedestrian planning practice and scholarship.

Chapter 2 reviews literature to understand the ontological and epistemological foundations of what constitutes a walkable environment and how strategic pedestrian planning can foster such environments. I draw primarily from the disciplines of transportation planning and geography to highlight gaps in current measures and propose avenues for bridging these gaps. I accompany discussion of these concepts by reviewing two domains of planning theory: planner values and plan design.

Chapter 3 proposes that the inclusion of social space as perceived by users can further explain their travel behaviour and perceptions. I uncover that social features profoundly impact participants' assessments and submit a revised "socialized walkability" framework in which built and social features in space are mediated though pedestrians' own characteristics to shape the utility of the amenities and streets which constitute walkable space. Chapter 4 draws from the same study to demonstrate how qualitative geographic information science facilitates the analysis of built and social factors at multiple scales, either as a complement to existing appraisal instruments or as a stand-alone tool for practitioners.

Chapter 5 turns toward the values of transportation planners, one of the most influential stakeholders in pedestrian planning, to examine how they negotiate their expert knowledge with public insights as they design interventions. A literature review informs the development of a "planning style" framework, which is tested using principal component analysis of survey data from the United States and Canada. Four planning styles emerge—technical planning, political planning, collaborative planning, and advocacy planning—all which associate with unique bundles of personal and institutional characteristics. This chapter closes with recommendations for transportation planning organizations to foster desired attitudes among their planners, particularly the importance of institutional guidelines to promote planning in the public interest and, conversely, the insignificance of planners' demographic characteristics in shaping their approach.

Chapter 6 steps back from individual pedestrians and planners to assess the comprehensive strategies outlined in municipal pedestrian plans across the country. I draw from ongoing debates at the intersection of transportation planning and social inclusion, i.e. the ensuring of access to opportunities such that populations largely excluded from the public sphere can participate and thrive in society without relying on an automobile, to design an analytical framework which examines the participatory procedures and substantive policies of more than two dozen strategic plans. Results suggest the latest generation of Canadian pedestrian plans are designed without proactive engagement with socially-excluded groups during public and stakeholder consultation while the policies which result seldom consider the needs of vulnerable socioeconomic groups to the same extent as those whose age or physical abilities require special attention.

Chapter 7 situates findings from the previous chapters to inform strategies by which social space can be incorporated into contemporary pedestrian planning practice. This concluding chapter further incorporates lessons learned from my scholarship outside these pages, the totality of

which shapes future directions for research to maximize residents' access to opportunities beyond the extent that physical interventions alone can provide.

Chapter 2: Literature Review

This chapter outlines prevailing principles for registering socio-spatial factors in pedestrian planning, from the ontological and epistemological characteristics of walkable space to the philosophical underpinnings of planning theory guiding practitioners as they negotiate complex social trade-offs in planning interventions. It begins with an extensive overview of what constitutes walkable space according to ongoing debates in geography and urban planning. These competing ontologies inform a review of transportation project appraisal and decision-making approaches. The remainder of the chapter delves into professional values and strategies as debated in urban planning, offering a springboard from which to connect innovative definitions of walkable space to contemporary planning procedures. As my research deals primarily with the United States and Canadian cities, the transferability of the reviewed evidence is confined to these locations unless otherwise stated.

2.1. Walkable Space

2.1.1. Introducing Core Concepts

This dissertation draws from multiple disciplines to better comprehend how pedestrians and planning practitioners perceive walkable space and conceive interventions. *Transportation geography* studies the movement of people and goods across space to explain travel behaviour and related phenomena such as urban and economic development (Taaffe et al., 1996). It has traditionally been associated with civil engineering and transportation economics in striving to "devise better, more efficient⁴ ways of organizing our transport system" (Taaffe et al., 1996, p. ix). While the principles of these disciplines are often used together to investigate transportation issues, transportation geography is distinguished by its preoccupation with spatial analysis. Transportation geographers have predominantly used quantitative approaches to investigate these issues, even as paradigmatic shifts led associated disciplines to embrace other approaches. Hanson (2003) lamented that the discipline had "become a quiet, some might say moribund,

⁴ A classic example would be the optimization of commuter flows subject to fiscal or temporal cost (Hanson, 1995).

corner" of geography (p. 469) for its reliance on quantification and system-wide measures at the expense of approaches registering the manifold factors shaping travel in everyday life (see Alfonzo, 2005; Law, 1999). Although this critique continues to resonate today, Schwanen (2016a, 2016b) points to crosspollination among geographical disciplines as a revitalizing force for transportation geography, particularly as technological innovations (e.g., big data, geographic information science) and novel approaches (e.g., relating to feminist geography, geographies of identity, qualitative research) make the discipline more inclusive to the diverse experiences and behaviours shaping movement across space.

Transportation planning encompasses a wide range of procedures guiding transportation interventions including, but not limited to: defining shared visions of the future; collecting behavioural and perceptual data; weighing interventions through scenario modelling; appraising impacts according to projected impacts on performance and public feedback; making decisions regarding interventions catering to the vision; and implementing them in concert with various stakeholders (Meyer, 2016). Throughout the latter half of the twentieth century, urban transportation planning prioritized personal mobility by automobile as a cure-all for moving users across space at low cost while generating economic development in previously peripheral regions (Martens, 2016; Vigar, 2002). Road-building has since been eclipsed by multi-modal interventions⁵ which can more comprehensively promote accessibility to everyday amenities for those without automobiles (Sanchez et al., 2008) and manage infrastructural scarcity through the carrots and sticks of transportation demand management (Meyer, 1999), e.g., reducing congestion by tolling roads and providing transit service along the same route.

Accessibility denotes the ease of reaching opportunities, especially those relating to everyday activities which reliably dictate travel behaviour such as shopping for food, commuting to work, and seeking recreation (Handy and Niemeier, 1997; Morris et al., 1979). It depends primarily on three factors: the spatial distribution of trip-generating opportunities (nodes); the spatial distribution of pathways to reach these opportunities (links), and; the marginal temporal or fiscal

⁵ Multi-modal transportation planning treats public transportation, walking, cycling, ridesharing, personal automobiles, paratransit, and many other services as complementary to meeting transportation objectives.

cost associated with movement through space (friction of distance). While there are countless approaches to qualifying accessibility in transportation geography and planning, the predominant underlying framework for these approaches is the gravity model.

Equation 1. Accessibility = $U_i = \sum A_j f(T_{ij})$

The gravity model equates accessibility for a person at location i (U_i) as a function of the sum of possible destinations to all locations within category of destinations (T_{ij}) subject to the friction of distance (A_j) mediating possible interaction between location i and locations j (Morris et al., 1979). The gravity model signifies that that people derive greater benefit from more proximate destinations, all else held constant, but that transportation costs dictate the magnitude to which distance matters. Handy and Niemeier (1997) further note advantages to distinguishing the utilities of possible destinations relative to other destinations with the same function in precisely predicting travel behaviour, such as classifying supermarkets as more beneficial than general stores when calculating latent food choice accessibility in rural communities (Kolodinsky et al., 2017).

2.1.2. Navigating Built Environments

Pedestrians are relatively sensitive to the friction of distance due to their slow speed, and as such, walking behaviour profoundly depends on the spatial distribution of opportunities and links in close proximity to residences and, acknowledging the uncertain geographic context of people's everyday travel behaviour (Kwan, 2012a), other locations such as central business districts where people frequently navigate streets outside the home (Owen et al., 2004; Saelens et al., 2003). Residential and amenity density is integral to this relationship (Berrigan and Troiano, 2002; Carr et al., 2010; Cervero, 2002; Handy et al., 2006). Population and employment density negatively associate with the propensity to travel by automobile, which spurs the adoption of other modes such as transit and walking (Cervero and Kockelman, 1997; Cervero and Radisch, 1996; Ewing and Cervero, 2017; Frank and Pivo, 1994). Residents of denser urban and suburban neighbourhoods are significantly more likely to walk more than one mile (1.6 kilometres) at least twenty times per month (Berrigan and Troiano, 2002) while, conversely, residents of sprawling

counties engage in less physical activity and incur worse cardiovascular health outcomes (Ewing et al., 2008). Density should not be taken as an exclusive indicator of accessibility for pedestrians, however, as dense areas with uniform land use do not yield strong interactions between residential and commercial amenities after controlling for other components of urban form (Forsyth et al., 2007; Neatt et al., 2017).

These "other components of urban form" have coalesced into generalizable categories over the past two decades. Cervero and Kockelman (1997) underscore the importance of mixed-use zoning and transportation network design in complementing density to augment accessibility. Mixed land uses yield higher rates of walking behaviour when adjacent land uses are complementary, such as when consumers reside close to restaurants, and when their representation in analysis registers subtle variations in products, services, and zoning topology (Hajna et al., 2014; Manaugh and Kreider, 2013; McConville et al., 2011). Transportation network designs which promote connectivity among nodes, such as downtowns made of small blocks and gridded streets, promote walking by reducing physical distances necessary to reach amenities (Ellis et al., 2016; Leslie et al., 2005; Saelens et al., 2003). These findings correspond with evidence that indirect street paths and cul-de-sacs can render otherwise amenity-rich suburbs undesirable for walking, as residents must traverse far greater distances on the transportation network than "as the crow flies" representations would suggest (Southworth, 1997).

While neighbourhood-scale factors are perhaps the strongest built predictors of walking behaviour (Badland and Schofield, 2005; Frank et al., 2008b; Leslie et al., 2005; Saelens et al., 2003), human-scale factors can also predict pedestrians' engagement with space. Infrastructural interventions related to traffic safety augment pedestrians' perceived safety from traffic and in turn their propensity to walk (Brown et al., 2007; Giles-Corti et al., 2013). Crime safety features exert a comparable impact, though the impact seems to be more profound among population groups who independently exhibit heightened anxiety about crime (Cerin et al., 2006; Foster and Giles-Corti, 2008; Leslie et al., 2005). While omitting streetscape elements associated with crime prevention from their analysis, Doyle and colleagues (2006) find that, holding walkability and personal characteristics constant, metropolitan crime rates account for enough variation in

women's travel behaviour and cardiovascular health to explain gendered differences in these outcomes within the United States. Environmental design principles such as visibility-providing windows and territorial boundaries which delineate ownership over space can improve safety (Newman, 1973), though their impact becomes less significant when considering social and psychological factors impacting crime independent of built features (Cozens et al., 2005; Merry, 1981). These design principles nevertheless reduce the odds of vandalism and graffiti, an outcome which feeds back into perceptions about crime and streetscape aesthetics which shape travel behaviour (Foster et al., 2011).

Comfort-providing urban design features generally associate with walking behaviour, though the impact of these features depends heavily on their form and context (Boarnet et al., 2011; Owen et al., 2004). Natural amenities such as green space and waterways positively associate with walking (Adkins et al., 2012; Giles-Corti et al., 2005; Owen et al., 2004). Residents of selfidentified environmentally-attractive neighbourhoods walk more frequently than others even after controlling for socioeconomic and social network characteristics, e.g., having someone with whom to walk (Ball et al., 2001; Humpel et al., 2004). Ewing and Handy (2009) attempt to parse out what constitutes "environmentally-attractive" urban design by designating vaguely-defined qualities popular in urban design literature—imageability, enclosure, human scale, transparency, and complexity—and operationalizing them according to the judgments of experts exposed to video-recorded streetscapes. Adkins and colleagues (2012) turn to residents to unpack "street segment attractiveness" according to five dozen variables as rated by several hundred residents of a lower-income Portland neighbourhood. They determine that on-street parking, sidewalks buffered from the road, and green street design features like stormwater landscaping positively associate with streetscape attractiveness while deep building frontages and streetscape enclosure⁶ negatively impact it. Aesthetic and functional urban design feature can yield different sentiments from pedestrians depending on their characteristics. Portland and Vancouver seniors value benches for relaxing and socializing while navigating their neighbourhoods (Chaudhury et al.,

⁶ *Enclosure* is an umbrella term designating walled yards, short sight lines, and minimal view of the sky above and ahead (Ewing and Handy, 2009).

2012), for instance, while Dutch children walk more frequently to school if their route includes green space and designated pedestrian crossings (de Vries et al., 2010).

While there is widespread consensus that neighbourhood- and human-scale characteristics of urban form influence walking behaviour independent of personal characteristics (Ewing and Cervero, 2010; Frank et al., 2008b; McCormack and Shiell, 2011), including residential selfselection into walkable neighbourhoods (Cao et al., 2009; Giles-Corti et al., 2013), the magnitude of their impact relative to personal characteristics continues to be debated. The built environment accounts for less than half of the variation in walking behaviour (Clark et al., 2013; Neatt et al., 2017). Socioeconomic factors like income and educational attainment have accounted for a greater variation of travel behaviour than urban form (Cerin et al., 2009; Cervero and Duncan, 2003; Hirsch et al., 2017; Kitamura et al., 1997). Hirsch and colleagues (2017) determine that socioeconomic characteristics, social connectedness, physical and cognitive abilities, and non-pedestrian transportation resources respectively explain greater variation in walking behaviour than urban form among middle-aged and older adults in British Columbia. In Montreal, the walking behaviour of low-income individuals is relatively inelastic, regardless of urban form, compared to the environmentally-sensitive behaviour of higher-income counterparts whose household resources enable them to use transportation alternatives to walking (Manaugh and El-Geneidy, 2011). Upon systematically reviewing this and similar studies, Adkins and colleagues (2017) determine that the urban form features are half as effective in predicting the travel behaviour of disadvantaged groups than more advantaged counterparts.

2.1.3. Situating Social Factors within Built Environments

While earlier studies interpreted such results as an indication that pedestrian behaviour depends too much on the geographic context of research to generalize built environment indicators (Boarnet and Sarmiento, 1998; Crane and Crepeau, 1998), this caution ebbed as transportation researchers broadened the scope of factors considered in travel behaviour models (Geurs and van Wee, 2004; Law, 1999; Pikora et al., 2003). Socio-ecological analytical frameworks endogenize non-built characteristics influencing travel behaviour to more comprehensively explain what motivates movement through space, from physical capabilities to the cultural norms shaping one's trajectories and destinations (Sallis et al., 2006). Alfonzo (2005) argues for a socio-

ecological approach in which walking outcomes depend on how personal, socioeconomic, and natural circumstances mediate one's engagement with the built and social structures shaping travel behaviour. A person with a physical disability, for example, may be unable to walk to nearby amenities unless they are able to afford innovative technology to assist them or can otherwise count on relatives and friends to accompany them. Even with these assistive factors, however, this person may choose to not walk depending on external considerations, such as the cost and convenience of transportation substitutes like public transportation and the automobile (Frank et al., 2008a; Lachapelle et al., 2011; Winters et al., 2015).

Socio-ecological studies examine complex causal pathways for pedestrian behaviour which cannot be registered through urban form studies alone (Sallis et al., 2006). Physical activity research leverages socio-ecological models extensively, revealing unique processes and outcomes among disparate populations (Hirsch et al., 2017; Kolodinsky et al., 2017; Pan et al., 2009). In Auckland, for example, Collins and Kearns (2005, 2010; Kearns et al., 2003) find that walking school buses, i.e., volunteer-led walking groups which guide young children to-andfrom school along a recurring trajectory, may improve public health outcomes among children, yet the automobile's dominance in urban form and social norms as well as the scarce free time among possible parent-volunteers in lower-income neighbourhoods are structural barriers which perpetuate inequalities in children's health across society. Sreetheran and van den Bosch (2014) ultimately discount the influence of physical and social factors on perceived safety from crime in urban green spaces, determining instead that personal factors like gender and previous experiences with crime are more influential and should therefore be the focus of future policy interventions. Socio-ecological approaches can inform multifaceted interventions which improve pedestrian outcomes through transportation and social services provision. Sallis and colleagues (2006) underscore this benefit in reviewing active living research across several disciplines public health, transportation planning, economics, and public policy—concluding that policymakers can deliver more robust active living outcomes by promoting collaboration among specialists of disparate social and ecological phenomena.

Despite its advantages, the socio-ecological framework is not a panacea for understanding what motivates pedestrians. Sallis and colleagues (2006) contend that the "sheer number of variables

on land use, transportation, recreation, school, worksite, and home environment" (p. 315), to say nothing of their unique relationships to one another and unknown factors, makes it difficult to design studies and even longer-term research programs which can investigate the theorized scope of causal pathways. Pedestrian planning scholarship also reveals considerable mismatch in environmental perceptions between researchers and pedestrians, and within each group respectively—an issue which obfuscates the comparison of socio-ecological components within and between studies (Gebel et al., 2009, 2011; Hajna et al., 2013; Koohsari et al., 2015; Ewing and Handy, 2009). Socio-ecological and other approaches grounded in an objectively-measured built environment are also susceptible to the uncertain geographic context problem (Kwan, 2012a), as pedestrian behaviour depends on physical and temporal factors which are sufficiently context-specific to make comparison among participants difficult. Andrews and colleagues (2012) note "different forms of embodiment, movement activities...and the experience, agencies, and cultures" (p. 1925) influence physical activity yet are seldom considered in the creation and validation of walking behaviour measures. These concerns tie into criticisms regarding the discrete categorization of socio-ecological factors in travel behaviour research, particularly where aggregate measures distill the characteristics of users and their environment into quantifiable though imprecise proxies (Schwanen, 2016b; van Acker et al., 2010).

2.1.4. Illuminating Social Space

Social ontologies of space eschew the reduction of space into discrete realms—whether physical, economic, social, or psychological—to more precisely explain phenomena within the context of everyday life. While acknowledging that built features influence physical and social behaviour, Lefebvre (1974/1991) proposes that space is socially constructed: hegemonic groups strategically produce spaces which functionally and ideologically perpetuate their interests (*le conçu*); marginalized groups perceive these spaces, though they are capable of tactically transgressing their intended functions (*le perçu*), and; symbols and ideas embedded in society constitute a third space not easily managed from above and thus fertile ground for changing spatial conditions through bottom-up visioning and resistance (*le vécu*) (de Certeau, 1984; Merrifield, 1993). In critiquing sociological theories that treat space as a detached physical realm where social relations occur, Soja (1989) advances from Lefebvre by arguing that

the intelligible lifeworld of being is always and everywhere comprised of a multi-layered system of socially created nodal regions, a configuration of differentiated and hierarchically organized locales. The specific forms and functions of this existential spatial structure vary significantly over time and place, but once being is situated in-the-world the world it is in becomes social within a spatial matrix of nested locales. The topological structure is mutable and permutable, but it is always there to envelop and comprise, to situate and constitute all human action, to concretize the making of both history and geography. (p. 148)

Succinctly put, social ontologies of space recognize that our everyday lives are contextually unique yet universally dependent on their topological relationships to other physical and social phenomena, and vice versa. Massey (2005) argues such topologies can be quite extensive, such as the relationship between economic globalization and urban politics. As everyday life is "utterly dispersed, unlocalised [sic], in its source and in its repercussions" (Massey, 2005, p. 184), space ultimately constitutes an unbounded aggregate of innumerable physical and social distances whose breadth cannot be comprehensively observed.

Perhaps unsurprisingly, transportation geographers and planners have been slow to recognize social space because its principles necessitate a paradigmatic leap for most practitioners to understand while socio-spatial conclusions may be difficult to operationalize in practice (Hillier, 2008; Middleton, 2010). Despite these challenges, recent studies have used social space to elucidate physical and social factors influencing people's movement through space. Middleton (2010, 2011) stresses the importance of sensory rhythm in shaping pedestrians' engagement with space, finding that pedestrians' own corporeal attributes, complementary technologies, and everyday routines are as crucial as the material infrastructures of urban form in shaping pedestrian satisfaction. "This is significant in policy terms," she notes, "as an area might be considered more 'walkable' if a pedestrian is able to walk on 'autopilot' and the flow of their movement is uninterrupted by an awareness of their corporeal planes of experience" (Middleton, 2010, p. 591). Travel behaviour also depends on the meanings which system users attribute to their behaviour and spaces, from the changing pace and trajectories of joggers as they pursue different goals (Cook et al., 2016) to the symbolism which motivates recreational cyclists to

scale Mont Ventoux, one of the most difficult segments of the Tour de France circuit (Spinney, 2006). Health and ecological attitudes influence the magnitude that distance exerts on transportation choices and satisfaction, even overshadowing distance as the most significant predictor of travel behaviour among some groups (Manaugh and El-Geneidy, 2013; Susilo and Cats, 2014; Ye and Titheridge, 2017). Pedestrians' memories of urban form and past social interactions shape their assessments while walking (Bean et al., 2008; Degen and Rose, 2012; Sreetheran and van den Bosch, 2014), though the ultimate impact of these assessments on behaviour remains unclear.

2.2. Planning Walkable Space

Pedestrian planning and related disciplines, such as public health, have leveraged recurring associations between urban form and walking behaviour to evaluate the qualities of walkable space. This section reviews how walkable space is registered and appraised in contemporary transportation planning.

2.2.1. Registering Walkable Space

Geographic information systems (GIS) have been instrumental in analyzing how urban form influences walking behaviour at the neighbourhood and metropolitan scales (Ewing and Cervero, 2010). They offer advantages to transportation planners responsible for implementing policies in tandem with other offices and jurisdictions (Schlossberg, 2006): urban form data regarding land use and roadways are widely available at low cost; data management structures and analytical toolkits embedded in software facilitate the replication of algorithms, and; travel behaviour and demographic data can be efficiently incorporated into algorithms for validation purposes, down to the explanatory power of isolated variables. Geospatial indices deploy these strengths to systematically appraise the "walkability" of space using transferable variables and algorithms (Frank et al., 2010; Leslie et al., 2007; Porta and Renne, 2005; Walk Score, 2016). Leslie and colleagues (2007), for example, draw from predominantly public data sets relating to residential dwelling density, street density and connectivity, and land use characteristics such as retail

classifies the data characteristics of each census district into deciles, e.g., a dense downtown district may be in the highest decile of kilometres of roadway per square kilometre, and sums the decile rankings among ten variables to derive a scalar value signifying a given tract's suitability for walking relative to all other tracts. Walk ScoreTM prioritizes distance to several categories of commercial amenities, rating more proximate amenities as more important, to generate a scalar value representing absolute access to opportunities for individual addresses (Carr et al., 2010; Duncan et al., 2011). Geospatial indices are by-and-large comparable in predicting travel behaviour outcomes after controlling for demographic characteristics (Manaugh and El-Geneidy, 2011). They also share epistemological shortcomings (Schlossberg et al., 2007): data are lower resolution than experienced by pedestrians on the ground, and transportation data often rely on roadway classifications designed for vehicular traffic rather than the sidewalks, pathways, and parks traversed by pedestrians.

These deficiencies can be addressed in part through streetscape auditing (Schlossberg, 2006; Vernez Moudon and Lee, 2003). Walkability audits register human-scale features associated with walkable urban form, such as the presence of grocery stores, while accounting for additional variables seldom recorded in geospatial data, such as building maintenance and tree cover (Clifton et al., 2007; Day et al., 2006). Ill-defined associations between human-scale features and travel behaviour require audit developers to tailor their instruments to fit the occasion. Day and colleagues (2006), for example, complemented their requisite literature review of travel behaviour factors by consulting disadvantaged groups and an interdisciplinary team of experts before rigorously testing a draft version of their instrument at three-dozen field sites. Their final product ultimately prompts trained auditors to describe street segment characteristics across four dimensions: accessibility (62 questions); pleasurability (56); perceived safety from traffic (31), and; perceived safety from crime (15). Walkability audits are more time-consuming than geospatial approaches, even though they derive comparable (Spearman correlation = R = 0.7) outcomes (Hajna et al., 2013). However, audits can be adapted to register the unique needs of specific populations. To capture the transportation needs of Montreal seniors, for instance, Negron-Poblete and Lord (2014) reconfigure the Pedestrian Environment Data Scan (Clifton et al., 2007) to record the presence of provincial health clinics, eldercare facilities, and *dépanneurs*. Cerin and colleagues (2011) design an auditing instrument specifically tailored to Hong Kong

and other East Asian metropolises, whose residents experience residential and commercial densities orders of magnitude higher than residents of North American or European cities. Walkability audits may further be developed with auditors' capabilities in mind, as demonstrated in procedures which use dichotomous and open-ended questions to facilitate direct input from untrained community residents (Brownson et al., 2004; Schlossberg et al., 2015).

Geospatial and audit-based algorithms poorly account for socioeconomic variations in travel behaviour. Gebel and colleagues (2009, 2011) note that residents with low educational attainment, low income, or poor cardiovascular health are more likely to perceive objectively, i.e., algorithmically-derived, highly walkable neighbourhoods as less walkable. Pedestrians' perceptions of the built environment "may be more strongly correlated with cognitive antecedents and with behaviour than are objective measures" (Gebel et al., 2009, p. 228). When investigating this mismatch between objective conclusions and residents' perceptions, Hajna and colleagues (2013) find that geospatial and audit-based approaches correlate poorly with residentreported environmental qualities ($\mathbf{R} = 0.2$) as framed through an open-ended instrument (Brownson et al., 2004). Environmental perceptions exert a strong effect on walking behaviour, even after controlling for household resources and the scheduling of habitual activities (Lindelöw et al., 2014), to say nothing of the socioeconomic factors influencing people's walking behaviour as discussed in the previous section (e.g., Adkins et al., 2017).

Representing walkable space according to users' perceptual and socioeconomic realities requires practitioners to endogenize socio-spatial factors within the assessment of urban form. Contradictory perceptions and intangible features are, however, neither easily registered nor reconciled. Pierce and Martin (2015) propose that scholars register the nebulous components of Lefebrvrian social space by investigating how specific locations, e.g., amenities and streets, influence and are influenced by "various political-economic, cultural, classed, gendered, and racialized processes" (p. 1280). Pierce and Lawhon (2017) demonstrate this approach in analyzing the travel behaviour of ethnic minorities in Portland. Though using a well-regarded multi-modal transportation system, minority residents perceive barriers to their right to navigate gentrifying neighbourhoods and often change their route trajectories to avoid them.

Transportation planning seldom operationalizes social space in assessment, at least not formally. Martin (2003) notes that community advocates mobilize residents for political action through "place-frames" which "define the scope and scale of the shared neighbourhood of collective concern" (p. 733). Her findings correspond with the behaviour of other stakeholder groups, such as commercial interests and public offices, who frame transportation interventions according to their shared visions and stakes (Clark et al., 2010; Grant et al., 2011; Hatzopoulou and Miller, 2008). Clark and colleagues (2010) exemplifies this phenomenon in studying pedestrian planning stakeholders in Edmonton, Alberta, noting that private-sector stakeholders are less invested in the development of walkable neighbourhoods because they more widely equate residents' physical activity with individual choice than urban form.

Qualitative geographic information systems (QualGIS) can examine these conflicting understandings of space using geospatial approaches already familiar to transportation practitioners (Battista and Manaugh, 2017a; Eizenberg and Shilon, 2015; Kwan, 2012b). QualGIS harness the database structures of conventional geographic information systems to conduct qualitative analyses (Cope and Elwood, 2009): geo-ethnography can situate household activities within neighbourhood-scale geospatial data to more comprehensively explain behaviour (Matthews et al., 2005); geo-narratives can underscore how social space alters the time-space trajectories of people's routines (Kwan and Ding, 2008), and; grounded visualization can take stock of the numerous demographic and political factors shaping the development of urban space (Knigge and Cope, 2006). Despite its adaptability, QualGIS does not yet feature prominently in transportation planning practice. Its application in academic circles, however, present opportunities for buttressing contemporary understandings of the determinants of travel behaviour with the unique perspectives of transportation system users (Brennan-Horley and Gibson, 2009; Wridt, 2010) and their underlying socioeconomic conditions (Boschmann and Cubbon, 2014; Kwan and Ding, 2008; McCray and Brais, 2007). Yet how might stakeholders value such a broad scope of built and social factors when determining planning interventions?

2.2.2. Valuing Transportation Interventions

Transportation planners value interventions according to economic and political considerations. Cost-benefit analysis (CBA) is perhaps the most common means to appraise transportation
investments. Stakeholders calculate the impacts, that is benefits and costs, associated with alternative scenarios, and then they monetize these outcomes over the life of the intervention to determine which scenario will generate the largest net benefit to society (Boardman et al., 2010). Cost-benefit analysis is frequently used to approximate the health benefits and real estate gains associated with walking (Boarnet et al., 2008; Sælensminde, 2004; Wang et al., 2005). While efficient and transferable to non-transportation domains such as municipal budgets, CBA does not consider the distribution of impacts across society and can therefore disadvantage communities bearing the brunt of negative externalities unless there are complementary principles dictating vulnerable populations and compensation (Boarnet et al., 2008; van Wee, 2012). Martens (2006) notes that policymakers conventionally use variables relating to travel time and trip frequency to determine the impact of transportation investments. This approach, he argues, skews decision-making toward roadway investments which disproportionately benefit higher-income groups who are already mobile. Such inequalities are compounded by the method's vague conceptualization of winners and losers and their respective valuation of impacts, which may not be transferable from one group to the next, despite procedural adjustments which can more precisely account for valuation among groups (Hyard, 2012; Martens, 2011; Mouter et al., 2013).

Multi-criteria analysis (MCA) compares transportation scenarios without reducing impacts to common monetary values (Hill, 1968; Saaty, 1995): impacts are tabulated across scenarios in their own terms, including quantitative and ordinal measures, and practitioners use these tables and scalar approximations of their aggregate impacts to choose which scenario best addresses intervention objectives. MCA promotes accountability by establishing transparent objectives and their performance measures in the first stages of project evaluation (Novak et al., 2015). Such transparent measures are imperative when operationalizing aspirational objectives like social equity and social justice (Beyazit, 2011; Jones and Lucas, 2012). MCA has nevertheless been criticized for its high level of subjectivity, particularly when participants do not comprehensively represent all stakeholder groups to be impacted by proposed interventions (Macharis and Bernardini, 2015; Thomopoulos and Grant-Muller, 2013). Criteria also can be manipulated by stakeholders early in evaluation to bracket the factors under consideration (Thomopoulos et al., 2009; van Wee, 2012). This manipulation is especially a concern for projects that span multiple

jurisdictions such as, for our purposes, changes to the pedestrian environment as decided by disparate transportation and land use offices (Macharis and Bernardini, 2015).

Transportation planning has increasingly incorporated case studies to appraise projects according to their contextual merits (Feitelson, 2002). Weinstein and Sciara (2006) use qualitative research—relatively uncommon in transportation assessment to that date—to conclude that high-occupancy vehicle lanes are not exclusively beneficial to higher-income car owners after considering funding flows and project externalities: lanes can be tolled to fund transit service improvements for low-income communities; roadway congestion can be reduced by inducing people to carpool to use high-occupancy lanes; noise and air pollution exposure can decrease in communities adjacent to freeways due to lower vehicle volumes, and; low-income drivers can reap valuable time savings by using high-occupancy vehicle lanes themselves. The authors draw attention to political debates, rather than the systematic quantification of project impacts, as a way to assess project qualities. The appraisal of residents' concerns in the public sphere can provide precise information about issues already registered by practitioners while opening the door to new project-specific concerns by key stakeholders and the general public (Healey, 2006).

2.2.3. Operationalizing Social Issues

Diffuse outcomes across society oblige practitioners to weigh social metrics against economic and ecological ones (Banister, 2008; Campbell, 1996; Hanson, 2003; Rittel and Webber, 1973). Jones and Lucas (2012) argue that social factors have historically been neglected in transportation planning because they are poorly articulated in research and practice, blunting practitioners' ability to address them through travel behaviour interventions. They propose that impacts should "register at the same time as having economic, environmental, and social outcomes" rather than exclusively classifying impacts within one of these domains (Jones and Lucas, 2012, p. 13). This analytical shift has featured heavily in recent approaches to appraising transportation outcomes according to socially-inclusive distributive principles (Golub and Martens, 2014; Lucas et al., 2015; Martens, 2016), yet it has not been applied to transportation planning procedures more comprehensively (Meyer, 2016; Pereira et al., 2017; Sanchez et al., 2008). As residents' voices can more precisely explain factors influencing their travel behaviour, from perceptions of urban form to socioeconomic factors mediating these perceptions, it is

necessary to amplify the voices of users in post-appraisal decision-making and implementation procedures.

Who has the right to contribute to transportation decision-making has been the subject of lively debate for decades. Present-day transportation planning emerged from mid-century technocratic approaches to public service which referenced civil engineering and economics to optimize of passenger and freight flows across entire transportation systems (Martens, 2016). Positivism ruled the day; planners focused on modelling scenarios and calculating their impacts while final decisions were deferred to elected offices whose normative views presumably reflected those of the voting public. Transportation (dis)investments and environmental injustices, such as the razing of low-income and minority neighbourhoods for highways, spurred criticism of the profession's self-imposed positivism whose "limited scope has tended to bias strongly many of its recommendations toward [the] perpetuation of existing social and economic practices" (Davidoff, 1965, p. 336). Davidoff and others (Arnstein, 1969; Gans, 1969) therefore argued that planners have a responsibility to appraise urban issues as experienced by residents, especially politically-marginalized residents, and intervene in decision-making procedures to turn their views into reality. Arnstein (1969), however, distinguished between tokenistic and informational approaches to public engagement versus all-encompassing procedures which proactively involve resident-stakeholders from the earliest stages of project development, such as delegating power to community groups whose funding comes from higher levels of government. Her calls for genuine citizen participation in planning coincided with the rise of the "right to the city" (Lefebvre, 1970/2003) and national neighbourhood (Goering, 1979) movements which, within planning, espouse residents' right to democratically (re)produce spaces-physical, social, and political—that enable them to freely move and thrive in everyday life.

Collaborative planning theory designates procedural assumptions necessary for public engagement to meaningfully and legitimately shape planning interventions (Healey, 2006): stakeholder representativeness; information transparency; truth and sincerity in normative claims, and; mutual comprehensibility of claims and outcomes. The planner's primary roles are to disseminate technical information, such as the costs and impacts of proposed interventions, and facilitate public-led deliberation about which interventions should be pursued. As public

consultation seldom occurs in a procedural vacuum, planners must also use their bureaucratic knowledge to translate public insights into deliverable interventions. Collaborative planning can derive functionally-successful outcomes while promoting community buy-in and mitigating the risk of last-minute surprises to plan approval (Burby, 2003; Healey, 2006). However, it has been criticised for its failure to live up to its procedural assumptions: power imbalances permit influential stakeholders to shape consultation behind the scenes (Forester, 1989; Fox-Rogers and Murphy, 2014; Hillier, 2000; Ploger, 2001); planners may present interventions in such a way that their preferred solution is a foregone conclusion (Maginn, 2007; McCann, 2001); planners may develop antagonism toward parties which contest policies (Hillier, 2003; Ploger, 2004), and; politically-marginalized groups are poorly represented, despite their high stake in addressing mobility needs (Bickerstaff et al., 2002; Elvy, 2014; Forester, 1989; Hillier, 2000; Maginn, 2007; Tewdwr-Jones and Allmendinger, 1998).

The approaches of planners as they negotiate professional expertise with public insights has been the subject of research for several decades. Their professional values have been broadly classified into stylistic factors which correspond with the paradigms described above (Fox-Rogers and Murphy, 2016; Howe, 1980; Howe and Kaufman, 1981; Innes and Gruber, 2005; Johnson, 2012; Ploger, 2001; Sager, 2009): data-driven technical styles; top-down and normative engagement with politics; value-free collaborative approaches, and, most recently; channeling "the art of governance" (Ploger, 2001) to more strongly advocate the interests of politicallymarginalized groups during public engagement. Empirically, planners' education is most significantly associated with their planning style with socioeconomic and political characteristics playing a secondary role (Howe and Kaufman, 1981; Johnson, 2012; Laurian and Shaw, 2009). Planners' style also depends institutional objectives and cultural affiliations as encountered through practice, e.g., to their profession and to current and future generations (Bolan, 1983; Schon, 1984). Flyvbjerg (1998) chronicles procedural conflicts in Denmark's second city, Aarhus, to argue that planners' strategies depend on their power relative to other stakeholders in the planning process, such as automobile-oriented chambers of commerce, and that this power ebbs and flows as political fortunes change across multiple levels of government. Planners' values shape their self-perceived responsibilities and, in turn, the procedures and metrics they employ in practice (Forester, 1989; Tennøy et al., 2016).

Transportation planners are notably absent from these studies as a unique group, requiring a dedicated investigation before the profession can tailor training and institutional measures which reliably intervene in their values and performance. Survey instruments can present attitudinal questions which, subject to sampling procedures, glean insights generalizable to the entire profession. Principal component analysis (PCA) can parse trends among these responses into clusters—latent variables comprising multiple attitudinal characteristics—which efficiently explain variance among responses up to a certain threshold of plausibility (Everitt et al., 2001). By classifying participants according to these clusters, one may examine statistical associations between their cluster classifications and external institutional, educational, and demographic characteristics. This approach offers an exploratory framework with which to deliver procedural innovations which foster certain transportation planning styles, say, regarding public consultation and outreach to socially-excluded groups.

Transportation planning, of course, involves numerous stakeholders outside the profession: zoning boards, private developers, employers, social services, transit agencies, and even regular commuters whose established routines may preclude any desire for changes to the transportation system (Meyer, 2016). Strategic plan design is among the best opportunities for these disparate stakeholders to come together and deliberate the future of mobility in their communities subject to legislation and modelling forecasts (Burby, 2003; Hatzopoulou and Miller, 2008; Healey, 2006; Norton, 2008; Stevens, 2013). Municipal plans are typically designed using a common approach: stakeholders use professional expertise and public insight to formulate a common vision; they operationalize their vision through accountable objectives and policies, and; they allocate responsibilities for carrying out the plan to municipal departments and other stakeholders, e.g., provincial authorities, according to an implementation plan with verifiable performance measures (Stevens, 2013). Despite these generalizable procedures, social factors are poorly articulated and operationalized in the latest generation of transportation plans (Bickerstaff et al., 2002; Elvy, 2014; Jones and Lucas, 2012). Large municipalities seldom complement aspirational social objectives with concrete policies and performance measures (Lee and Sener, 2017; Manaugh et al., 2015), an outcome further associated with quality of life objectives among metropolitan transportation plans in the United States (Lee and Sener, 2016).

Lucas (2012) proposes that planning can more effectively address transportation deficiencies across society by intervening in the social structures which ultimately bracket transportation system users' everyday lives. *Social inclusion* in transportation planning conceives transportation disadvantage and social disadvantage as co-dependent, such as when low income precludes car ownership and by extension physical access to employment, and that these factors are concurrently structured by broader socioeconomic conditions, such as when low household income and public service cuts mutually relate to economic recession. Social inclusion situates transportation planning as a means to greater ends: access to opportunities; access to social networks; access to social capital; access to transportation decision-making, and; other forms of access which can emancipate socially-excluded populations from systemic barriers to their wellbeing (Lucas, 2006, 2012; Lucas et al., 2015; Schwanen et al., 2015). As these outcomes cannot be addressed through transportation planning alone, strategic planning must promote linkages across multiple realms, from social services (e.g., transportation, health care, education, affordable housing, and employment) to the principles of democratic governance shaping the provision of these services.

While social inclusion features extensively in transportation research (Battista et al., 2015; Casas, 2007; Casas and Delmelle, 2014; Delbosc and Currie, 2011; Hodgson and Turner, 2003; Mattioli, 2014; McCray and Brais, 2007; Preston and Rajé, 2007; Xia et al., 2016), Lucas (2012) notes "relatively poor take-up of the transport and social [inclusion] agenda among local transport authorities" (Lucas, 2012, p. 112). She attributes its lacklustre adoption in part to the poor integration of transportation planning with social services which do not conceptualize or assess comparable outcomes in their respective strategic plans. Its success in the United Kingdom depends on both coordination at the highest levels of government and "local champions" who "have the skills to develop multi-stakeholder agreement" (Lucas, 2012, p. 110). Canadian transportation planning is markedly more fragmented, impeding the design of comprehensive strategies which promote social inclusion (Bergeron and Lévesque, 2012; Hatzopoulou and Miller, 2008). Unclear causal pathways further hamper the design and assessment of social inclusion interventions (Mattioli, 2014; Schwanen et al., 2015). Pedestrian issues are glaringly absent from social inclusion research, which has tended to focus on outcomes associated with public transportation and paratransit. As walking is a common transportation mode for groups conventionally associated with social inclusion, e.g., non-driving seniors, children walking to school, and low-income households, it is necessary to elucidate the avenues currently taken by municipalities to promote social inclusion through pedestrian measures.

2.3. Chapter Summary

This chapter synthesizes conclusions from multiple literatures to outline the factors which constitute and produce walkable space. Physical distance to amenities explains the greatest variation in walking behaviour, though its influence depends on numerous built and social factors whose relationship to space varies by literature. Contemporary transportation planning registers and appraises built factors more consistently than social factors. Innovative practices such as qualitative geographic information science can more effectively operationalize the public's perceptions of built and non-built factors, yet in practice, transportation planning is currently poorly-equipped to handle such factors. Planners are not universally willing to defer to public insights as they design interventions, and strategic transportation planning seldom considers non-built factors mediating one's engagement with space and society.

Preface to Chapter 3

This chapter aims to demonstrate how social space impacts pedestrians, as stated in the first objective of my research agenda. I cite epistemological gaps in contemporary walkability measures to propose that broadening the scope of what constitutes walkable space can better explain what motivates pedestrian behaviour and perceptions. I investigate this proposition through the spatially-grounded testimonies of residents in a compact and amenity-rich neighbourhood whose population is socioeconomically diverse. Their testimonies inform a socialized walkability framework in which built and social factors are mediated through personal factors to determine the utility of locations for pedestrians. This ontological shift sets the stage for subsequent chapters by underscoring social factors which should be incorporated into the assessment of walkable spaces and outlining the importance of public insight to accurately register social space in planning procedures.

Chapter 3: Stores and Mores: Toward Socializing Walkability

3.1. Introduction

Walkability has proven to be a useful framework to foster pedestrian realms that promote physical activity, improve environmental outcomes, and fuel economic development. Yet while there is wide agreement that built factors alone cannot shift pedestrian behaviour and, equally important, that pedestrians' social characteristics impact travel behaviour independent of the built environment (Adkins et al., 2017; Hirsch et al., 2017), there has been little attempt to incorporate these factors directly into walkability. By representing walkability through strictly physical spaces, practitioners risk ignoring generalizable social circumstances as much as resident- and neighbourhood-specific particularities grounded in walkable space. These omissions have implications for planning practice to such an extent that they may perpetuate structural inequalities in society (Lucas, 2012; Zavestoski and Agyeman, 2014). Schwanen (2016a, 2016b) notes that contemporary theory and methods offer rich opportunities to broaden the horizon of transport geography such that policies can be driven by space in all its overlapping scales (neighbourhood, street, body) and scopes (built, social, psychological). We can therefore privilege both the physical and social relationships encountered by the pedestrian in determining what constitutes walkable space.

We propose that walkability can, and should, be conceptually adjusted to include social factors shaping travel behaviour for two reasons: to more precisely account for travel behaviour in the city, and; to maximize the number of potential opportunities for residents to meet their needs on foot, voluntarily and satisfactorily, regardless of their socioeconomic constraints. We review the development of walkability over the past two decades before describing our own user-oriented assessment as implemented in a socially-heterogeneous neighbourhood. We outline our formative framework with case example, which we follow with implications for practice applicable not only to pedestrian planning practitioners, but a broader scope of professions associated with urban governance and social inclusion.

3.2. Background

Walkability signifies any assemblage of built features whose components statistically associate with the propensity to walk. Amenity access—a latent variable including residential density, land use diversity, and street grid design—explains the greatest variation in mode share (Frank et al., 2008; Handy et al., 2006). Traffic safety factors like pedestrian infrastructure and roadway characteristics play a smaller though significant role (Brown et al., 2007; Giles-Corti et al., 2013). Safety from crime has been linked to walking behaviour, though its explanatory power for travel behaviour varies depending on pedestrians' characteristics and experiences (Cerin et al., 2006; Doyle et al., 2006; Foster and Giles-Corti, 2008). Urban design elements that make walking more pleasurable, such as trees for shade and benches for rest, marginally associate with walking behaviour (Adkins et al., 2012; Giles-Corti et al., 2005; Owen et al., 2004). Our understanding of these built features continues to evolve as researchers use innovative approaches and data to examine behaviour and perceptions (Ewing and Handy, 2009; Neatt et al., 2017).

Geospatial indices and audit instruments incorporating these features have been found to validly predict travel behaviour and associated outcomes, e.g., moderate physical activity (Carr et al., 2010; Clifton et al., 2007; Day et al., 2006; Frank et al., 2010), yet their performance varies depending on pedestrians' socioeconomic characteristics. Adkins and colleagues (2017) review seventeen empirical studies comparing walking behaviour between "advantaged" and "disadvantaged" groups to conclude that walkability, as currently conceived, is half as effective at predicting the walking behaviour of disadvantaged groups as their advantaged counterparts. They relate these results to factors such as disadvantaged areas being less walkable, household resource constraints preventing car ownership, and the notion that disadvantaged areas have social networks conducive to delegating or pooling tasks, reducing the number of walking trips per person. These variations extend beyond socioeconomic disadvantage to age and residential characteristics. Among middle-aged and older residents in British Columbia, for example, the impact of the built environment on travel behaviour is marginal after controlling for physical ability, cognitive ability, and social interaction (Hirsch et al., 2017). In validating geospatial measures, Hajna and colleagues (2013) discover significant mismatch between residents' own

perceptions of crime and the conclusions derived from walkability algorithms. While some attribute the mismatch between user-based and algorithmic assessments to misperception on the part of pedestrians (Gebel et al., 2009), the recurring behavioural differences among sociodemographic groups, *ceteris paribus*, illustrate a need to refine the conceptual underpinnings of walkability such that pedestrian planning interventions can be more flexibly tailored to various socio-spatial contexts.

Transport scholars increasingly consider both built and social factors as they frame what motivates travel behaviour. Overarching socioeconomic structures shape users' destinations and mobility choices, from how cultural norms shape gender roles and, by extension, their everyday behaviour in the public realm (Law, 1999) to how inclusionary social policies counter behavioural differences emerging from market inequalities to offer more activity and mobility choices for politically-marginalized groups (Lucas, 2012; Zavestoski and Agyeman, 2014). Van Acker and colleagues (2010) underscore the importance of psychological factors, such as attitudes and preferences, which mediate residential choices and travel behaviour. Riggs (2016), for instance, notes that racial inequalities in residential walkability throughout metropolitan San Francisco stem in part from racial minorities' preferences for affordable housing in close proximity to existing social networks. Gentrification alters long-time residents' perceived right to navigating their neighbourhoods, compelling them to adapt by changing their destinations and routes (Pierce and Lawhon, 2017). Lord and colleagues (2011) argue that déprise, i.e., proactively reorganizing one's activities and expectations as one ages, allows seniors in suburban neighbourhoods to maintain their perceived quality of life despite increasing dependence on others for transportation and homecare needs. Alfonzo (2005) situates the decision to walk within a hierarchy of socio-ecological factors, from one's physical abilities and household resources to the attractiveness of the built environment for walking-an approach which continues to inform the refining of walkability indices for specific populations, e.g., the inclusion of eldercare and provincial healthcare clinics in an audit for Quebec seniors (Negron-Poblete and Lord, 2014).

These advances in framing walking behaviour continue, for the most part, to envision "space" as represented in earlier behavioural studies: physically static; socially sterile, and; topologically

disembodied from the rhythms of everyday life. Decoupling the built attributes of space from the social and psychological relationships which mediate individuals' engagement with space reinforces the notion that urban form primarily and independently determines walking behaviour. Riggs (2014) critiques the physical determinism which prevails in active mobility research as biased toward generalizable trends at the expense of unique environmental contexts and participant activities, masking unforeseen causal pathways which are not easily quantifiable. Contending with diminishing returns to attributing travel behaviour to the built environment, Andrews and colleagues (2012) advocate moving beyond walkability by turning to the "different forms of embodiment, movement activities...and the experience, agencies, and cultures" that broadly influence physical activity (p. 1925). Yet as innovations in geographic analysis prove increasingly capable of managing multiple genres and scales of data to investigate complex phenomena (Schwanen, 2016b), it seems premature to throw the baby out with the bathwater. But how can we complement the empirical foundations of built walkability with pedestrians' social and psychological factors to more effectively assess spaces for walking?

We turn to *social space*, a decades-old geographic ontology that relates physical and social features in comparable terms such that one can more comprehensively observe the processes shaping everyday life. Lefebvre (1991) noted that space is primarily social, as its physical features are conceived and perceived through a human lens while, concurrently, our actions and ideas constitute a third space there social relations play out. Pierce and Martin (2015) advance that relational place-making, i.e., determining the qualities of a space from multiple and oftentimes contradictory perspectives, illustrates that an area or feature can have overlapping meanings contingent on social debates and personal beliefs. Massey (2005) blurs the boundaries of physical and social features by altogether delocalizing them, asserting that "space" is not an objective realm but rather the messy aggregate of countless physical and social differences [i.e., the space between them] and, as a result of these extensive topologies, that any examination of a feature's attributes will only partially reveal its relation to other features and attributes.

Walking has featured prominently in social space scholarship since its inception, typically as a means to demonstrate the complexity of space at ground level (e.g., de Certeau, 1984), yet it is only recently that social space has been featured in pedestrian planning research. Zavestoski and

Agyeman (2014) anthologize numerous studies denoting how pedestrian planning prioritizes physical investments without taking into account socioeconomic externalities, such as gentrification and displacement which accompanies neighbourhood investment. At the user scale, several studies harness sensory perceptions through multimedia or pedestrians' own words to demonstrate how physical and social factors influence the mobility of individuals, including pedestrians and joggers (Cook et al., 2016; Middleton, 2011). Degen and Rose (2012) complement these sensory perceptions with participant testimony about the past to underscore how one's perception of urban design features may depend on memory. While not directly incorporating social space, Manaugh and El-Geneidy (2013) find that attitudes regarding the environment and health associate with walking further while commuting. Our growing understanding of social factors, opens a window to incorporate social factors into current assemblages of walkability features.

3.3. Method

In designing an approach, we sought to examine social factors shaping pedestrian behaviour while retaining the evidence-based conclusions behind contemporary walkability instruments. We developed a two-stage interview procedure whose themes were structured by an existing audit (Negron-Poblete and Lord, 2014): a one-hour sedentary interview at a location of the participants' choosing followed by a one-hour walking interview along a path chosen primarily by the participant with the understanding that the researcher could suggest diversions, with the participant's permission, to more closely examine features discussed during the participant's sedentary interview. These diversions preclude our drawing conclusions about participants' travel behaviour and preferences from their walking interview trajectories. The walking interviews was recorded with a video camera mounted on the participant's chest. Using ATLAS.ti (ATLAS.ti GmbH, 2016), a qualitative analysis software package, interviews were transcribed alongside path trajectories as observed from the video. Transcripts were coded using a semi-structured coding scheme, including street segment and amenity location codes, and the scheme was adapted to emerging insights over the course of coding. Though free-form memos

and the development of coding structures, we constructed a categorical network signifying the qualities of "walkable space" according to the built and social factors discussed by participants.

This network formed the backbone of a qualitative geographic information system whereby the built and social qualities of locations (amenities, street segments, and intersections) could be queried and flexibly analyzed, including the extrapolation of attribute codes to identify associated locations and related attributes and the display of transcribed and multimedia primary sources. Participant characteristics were embedded in documents, allowing for code-document crosstabulation within the program to explore perceptual trends, e.g., men vs. women participants' assessments of codes and locations. We derive our results from these queries and crosstabulations, supported by experiences conducting the interviews and managing the data from recording through coding and categorization. As this method has many moving parts, we invite the reader to examine other papers from this study which discuss how videotaped walking interviews (Battista and Manaugh, 2017a) and qualitative geographic information systems (Chapter 4) complement pedestrian assessment. These papers detail our approaches, their precedents, and their methodological limitations, namely the challenges associated with systematically assessing built and social spaces through mobile methods and those associated with attributing interview statements to locational and participant attributes, if at all (Evans and Jones, 2011; Merriman, 2014).

We conducted our research in a dense mixed-use neighbourhood seven kilometers from Montreal's central business district. Parc-Extension has long been the first stop for New Canadians settling in the region, drawn by affordable rents, transit access, and high densities of their respective cultural communities. In recent years, these factors have attracted students and young families whose precarious commercial footprint continues to grow. The reported crime rates lie near the per capita median among all neighbourhoods in the city (Marchal, 2017), which is itself one of the safest large cities in North America. Parc-Extension is severed by several large-volume arterial roadways, though a majority of households lie along one-way residential streets. Urban design features vary significantly from one intersection to the next: bungalows within eyesight of high-rise apartments; grassy lawns adjacent to paved frontages; public utility infrastructure next to small grocery stores, which ubiquitously dot the neighbourhood's major

streets and cater to the neighbourhood's diverse residents. A top-down view of the neighbourhood using a commercial point of interest dataset would undoubtedly reveal a high density of food amenities—stores, groceries, cafes, bars—providing a high level of choice in close proximity to most households. This accessibility is augmented by a dense grid neighbourhood design including links generally excluded by walkability audits, such as alleyways and "desire paths" across parks and private land.

Our recruitment strategy sought neighbourhood residents meeting the following criteria: six or more months of residency within the neighbourhood; conversational in either French or English, and; the physical ability to participate in the walking interview component of the study after accounting for walking aids/substitutes and sitting breaks. We distributed several hundred fliers denoting these criteria and compensation details—C\$20 in supermarket gift cards per participant—in person outside the neighbourhood's two metro stations and on bulletin boards at municipal and social service institutions and local businesses. Thirty residents were ultimately interviewed between August and November 2016. While we did not seek a statistically generalizable cross-section of the neighbourhood's population, given that qualitative research embraces alternative standards for rigor, e.g., plausibility in design and accounts, analytical reflexivity, and case transferability (Baxter and Eyles, 1997; Martin, 2009), participants' characteristics largely mirror the sociodemographic mosaic for which the neighbourhood is known (Table 1). Income, ethnicity, and physical abilities also varied among the participants, though we have chosen to not enumerate these attributes due to the differing classifications used among the participants themselves.

3.4. Results

Although a high density of amenities within Parc-Extension promotes access to many goods and services, e.g., milk can be purchased within a short walk of any residence, residents' testimonies divulge a more nuanced view of pedestrian accessibility which cannot be registered using systematic measures. While walking past one of the neighbourhood's largest employers, for

	-
Gender (n)	
Women	17
Men	13
Age (years)	
Median	47.5
Min – Max	23 - 81
Residential Origin (n)	
Parc-Extension	8
Elsewhere in Canada	14
International	8
Residency in Parc-Extension (years)	
Median	14
Min – Max	1 - 65
Interview Language (n)	
English	23
French	7

Table 1. Sample Descriptive Statistics (n=30)

example, Catherine breaks away from the walking interview to engage with a man selling fruits and vegetables to employees from his unmarked minivan (Figure 1). This is her first time encountering this opportunity, though she has lived in the neighbourhood for more than a year, and she is excited to purchase a mango for snacking on this hot late-summer afternoon. However, the transaction quickly runs into trouble. The vendor does not seem proficient in either French, Catherine's native language, or English, the lingua franca for many first-generation immigrants to the neighbourhood, yet through words and gestures he indicates that he will sell her a crate of mangos for less than C\$5. Quite the bargain, but she clarifies that she wants one mango, after which the vendor realizes her request and responds in broken English that he only sells his products by the crate. As prospective customers mill around nearby, she thanks the vendor for his time and the walking interview continues to a new location and topic.



Figure 1. Catherine (behind the camera) prepares to buy a mango.

Similar encounters as described through participant testimony or experienced during the walking interviews illustrate many non-built factors influencing amenity accessibility. Ephemeral and hidden amenities can shape travel behaviour, such as local workers whose purchases from the van save them a grocery excursion later in the day, yet one cannot take advantage of these opportunities without knowledge that they exist. James, for instance, praises an inexpensive buffet provided by a passing restaurant during the month of Ramadan, though with insider knowledge he notes "you have a very specific time slot [for the evening meal breaking the daily fast] because when you're like 30 minutes late, they're just removing the food." Language and other social factors mediate knowledge of, and access to, opportunities. Stewart has seen shops and restaurants change with each wave of immigration over the past eighty years. He has taken to the numerous South Asian restaurants along the main commercial drag, yet derives no utility from two nearby electronic shops ("I don't like going into them because they don't put prices on their products, and they can name any price.") and local clothing stores ("No reason to go for saris!"), prompting him to travel downtown by bus for these products while neighbors with other characteristics, such as being accustomed to bargaining for electronics, can utilize these amenities more comfortably.

These social factors may be location-specific or apply broadly to an amenity category, such as a participant-identified subcategory of cafes catering to older men from the Greek community. Stewart visits these cafes when invited by an acquaintance, but for others, particularly women and recent arrivals, social barriers render these locations useless for grabbing coffee. Irene draws from family experience to characterize one of these cafes:

So that's where my grandfather, when he was well, he used to go there a lot. Greek men kind of like ditch their wives at home and they come to these cafes and they just sip on coffee and smoke all day. I don't see women here pretty much ever. I've never seen a woman here [...] But it's still great, I think, for some part of the community. Some place to go!

Exclusive spaces—including these cafes, most places of worship, and even the local pool during women-only hours—in part denote social phenomena manifesting in physical locations to shape amenity access. Three participants with non-profit and volunteering experience related this to social siloing, which we summarize as the fragmentation of the public realm by language, nationality, and religion. While "there is a great deal of respect among citizens," notes a middleaged professional on the boards of several local initiatives, there is far less civic discourse and participation than one would expect of another neighbourhood with a more homogenous population. Social siloing further dampens interpersonal communication and impacts access to goods and services, particularly those requiring insider knowledge and social capital. Tula, a middle-aged woman who was raised in the neighbourhood and recently returned to care for her parents, recounts how it took two years of shopping at her favorite corner store to elicit a conversation from its immigrant proprietor. While inconsequential at face value, this social relationship proved beneficial when she was sick, as the proprietor offered her an over-thecounter cough syrup from his home country which was not displayed on the shelves. She notes that it was very effective at beating her cold, but when she recommended to a friend that he buy the same cough syrup at the same location, the proprietor claimed no cough syrup existed until the friend mentioned Tula's name.

Crime is another factor which we situate primarily in the social domain, as physical proxies from audit instruments did not correspond with participants' assessments of safety from crime. Graffiti, vandalism, and drug dealing were linked to isolated events which did not impact participants' propensity to walk, and poor building maintenance was attributed to absentee landlords and precarious household resources. The background of participants could mediate these built assessments, however. Spotting a door with a window during our walking interview prompted Zeinab, an immigrant from northern Africa, to discuss how she knew the neighbourhood was safe from crime after arriving in the city.

In Algiers, in a working-class neighbourhood, there's a lot of people. It's risky having a door like that because someone, doesn't matter who, if there's no one home, they can break the window to get inside. [...] And me, when I came to Montreal, the first time [I saw that] I was impressed! Like, "Oh wow, people have normal doors with windows!" So that's a good thing. It shows that the neighbourhood is safe. (Translated from French by GB)

A lack of spatial familiarity with the study neighbourhood was also associated with participants' perception of crime, though this relationship was almost exclusively linked to women's travel behaviour at night. Longtime residents of the neighbourhood, men or women, seldom expressed concern about crime beyond isolated incidents and specific locations, such as a halfway house subject to protests in recent years for housing sexual offenders near children's amenities. Spatial familiarity also facilitated tactical decision-making while walking, such as pacing oneself according to the timing of countdown signals and avoiding jaywalking at intersections where law enforcement traps have been set in the past. Such in-depth knowledge of the neighbourhood as gleaned through everyday routines enabled many participants to tune out and travel "on autopilot" (Middleton, 2011), oftentimes mediating their sensory engagement with their surroundings by texting on the move, listening to music via earbuds, or simply daydreaming when the opportunity arose.

Yet even among pedestrians familiar with walking in the neighbourhood, uncertainty regarding the behaviour of other roadway users could disrupt safety and comfort. Driver behaviour was

often described as unpredictable due to rush-hour traffic seeking shortcuts between downtown and the northern suburbs, a high density of drivers licensed overseas and, more verifiably, drivers' ignorance of stop signs and other features which seem to be planned *ad hoc* among the neighbourhood's smaller residential intersections. Cyclists, only recently making their appearance in Parc-Extension due to demographic and infrastructural changes, seemed to reduce traffic safety as perceived by older participants because they are difficult to see and hear—to say nothing of their tendency to run through stop signs. Maria, a free-speaking septuagenarian who views the neighbourhood through decades of experience, points her cane at a roadway sign to expound the futility of managing user conduct through tokenistic informational measures.

Maria: And they put these yellow things up recently, a few years ago.

GB: The « Corridor Scolaire » sign? (Author note: "[Safe] Route to School" in English) *Maria:* Yeah, we didn't have those.

GB: And what do you think that's done?

Maria: [she laughs]

GB: You're doing a little zero sign with your hands.

Maria: Nothing. Zip. There's too much going on. And here you get the buses, you get the trucks, the bicycles, the parked cars. On both sides [of the street].

She goes on to suggest that bicycle licenses would hold cyclists accountable to the rules of the road, citing their greater civility decades before when licenses were mandated by the city. In contrast, many younger participants seemed at ease with uncertainty on the street, even viewing intermodal conflict as a desirable marker of a neighbourhood whose "urban engine," according to one young father, "is chugging away." When asked whether he finds himself changing his path because of roadway construction, a perennial concern among residents throughout the city, he reframes a nuisance into an amenity: "I mean, if anything, because my kid loves construction vehicles so much, we sometimes change our path to go and check out the construction. [...] He's really into construction vehicles, so there's always a lot for him to see. There's always like a cement mixer or an excavator or something for him to look at, in action."

Many participants employed strategies to augment the number of perceived opportunities within walking distance of their home, and the pleasurability of getting there, even as objective built and social factors remained relatively constant. This spatial adaptation took many forms: shaping their food choices to products sold closer to home; changing their thresholds for walking to encompass a wider range of amenity choices, and; proactively seeking out information about opportunities while ambling (Fr. *flâner*) through the streets. Community organizations play an instrumental role in bringing together people with similar preferences to manage amenities for their own benefit, e.g., community gardens and a local cooperative café, and in the case of a local youth organization, to promote safety from crime by providing teenagers with afterschool activities. Jane, a middle-aged homeowner, mobilized other residents of her high-speed, treeless residential street to call for improvements at borough meetings. Walking interview observations also revealed tactical urbanism, such as guerilla gardening and knitted yarn sleeves on light poles, which suggest an undercurrent of informal beautification undertaken as the neighbourhood gentrifies.

3.5. Simulating Socialized Walkabilities

Using composites of participant attributes, we can see profound variation in walkability grounded in pedestrians' relationships to social factors mediating their behaviour and assessment. Let us assume that two people live in the same duplex in the center of the neighbourhood: Steve and Claire. Steve is a 65-year-old retiree who has lived in Parc-Extension since emigrating from southern Europe as a young adult. He is very familiar with the blocks surrounding his home, and he has a large social network of former colleagues and neighbors within walking distance. He varies his morning coffee among four locations including a corner store, a gas station adjacent to an arterial roadway, his sister's apartment ("Cheaper than a café!"), and a fast food restaurant located in the local mall. He has gone to the mall less frequency since knee surgery last year because it is the least proximate option and, he may note, any visit requires crossing an intersection so large that he will have to wait at the median between signals. He alternates between taking the bus and walking to the library to read the papers and check his email, since he does not have home internet access or a smartphone. From time to time during the summer, he will surreptitiously steal a newspaper from the library rack

and do the crossword in the park. He spends many evenings at a building rented by his home country's community association, where his pension affords him an extra beer, but he feels welcome in nearby bars when a soccer game is on. He feels safe walking around at night despite drug dealing at a nearby intersection because, he may note, "If they're gonna hurt someone, it's another dealer. Anyways, it's a hell of a lot quieter than twenty years ago."

Claire has not felt as comfortable since moving to the neighbourhood six months ago after finishing her degree at a local university. Her perceptions have never prevented her from travelling after dark, though she may forego night excursions to surf the web at home. She employs tactics to mitigate any risk of crime, however: walking briskly; jaywalking; and sticking to well-lit residential arterials with eyes on the street. She does not go to local bars, which she believes cater exclusively to older men, yet she has no problem walking or taking the bus to a trendy neighbourhood a kilometer across the park. When a new day starts, she hops off to work on the southbound bus and returns from downtown in the evening, leaving little time to explore the shops and streets of the neighbourhood beyond her bus stop. Her unfamiliarity with the northern section of the neighbourhood, characterized by large apartment blocks and poor maintenance, means she relies on these physical indicators to perceive the area as "sketchy" and impoverished. On her days off, she walks fifteen minutes south a new café catering to younger clientele. She is on the waiting list for a plot at a community garden, but she picks apples from trees hidden behind a city-managed senior residence. Foraging may be a hobby, but it can also be a substitute for shopping, particularly when she fetches perfectly-edible baklava from a dumpster outside one of the neighbourhood's renowned and, as she may attest, expensive Greek bakeries.

While these narratives neglect many everyday amenities, we can begin to see how pedestrians' characteristics mediate walkability outcomes. Despite his reduced mobility and modest pension, Steve derives far more utility from many nearby amenities thanks to his spatial familiarity and social network. Claire feels excluded from these amenities yet adapts by behaving tactically, accustoming herself to travelling further, and seizing opportunities in unlikely places. We take a purposefully subjective approach in representing their walkabilities to underscore the epistemological limitations of completely capturing socialized walkability (Figure 2). The scale of features varies from points and lines to entire blocks depending on users' perceptions.

Directions are represented using local conventions, e.g., south being the direction of the central business district rather than true south. Scale adapts to the friction of distance as experienced by users based on their physical capabilities and time of day, to say nothing of seasonal changes to amenities and streetscapes not represented here, e.g., a long walk through the snow after parking one's car in a designated lot during snow removal operations. The maps leave out many intangible factors shaping their interactions with the neighbourhood, such as linguistic and cultural factors shaping interpersonal communication, demonstrating the limits of representing their walkabilities from the top-down.



Figure 2. Space-time matrix of Steve (top) and Claire's walkability perceptions (bottom), day (left) and night (right).

3.6. Implications for Practice

Through our conversations with residents and associated audiovisual evidence, we develop a preliminary framework in which walkability depends on several factor categories simultaneously shaping pedestrians' engagement with space (Figure 3). Built factors largely resemble those in contemporary measures, although the pedestrian network incorporates a broader scope of pathways such as alleyways and private land used in everyday life. Social factors draw attention to underlying social phenomena which impact travel behaviour independently of built factors, such as social siloing in our diverse study neighbourhood and the behavioural norms of roadway users. We situate safety from crime as a social factor because participants' testimonies did not relate physical proxies to concerns about their safety. Built and social factors can interact to shape conditions on the ground, such as when architectural features provide eyes on the street to increase safety from crime. Pedestrians' personal factors ultimately mediate their travel behaviour and perceptions when engaging built and social factors: spatial familiarity caused by community engagement and longer-term residency; attitudes and beliefs, e.g., food preferences and religious obligations; socio-technical factors related to the mind, body, and intermediating technologies from canes to smartphones and earbuds; socioeconomic status shaping financial accessibility; routines and needs as habituated over time, and; spatial adaptation-which can include either pedestrians' tactical decision-making while walking or strategic efforts to shape space to their preferences. These six sub-categories of personal factors and their examples are by no means an exhaustive list, but merely constitute the most salient findings in our case. One can attribute the resulting perceptions to the utility of "xy coordinate" locations in space, i.e., amenities and streets, though the geographic boundaries and relative importance of these locations varies by person. The aggregate of these overlapping locational assessments among all people engaging with the area constitutes walkability: a delocalized assemblage of built and social relationships influencing walking behaviour and perceptions.



Figure 3. Socialized walkability framework.

How can our framework contribute to the promotion of walking? By simulating walkability according to our participants' stories, we see that built indicators cannot fully capture the scope of factors influencing individuals' walkabilities. We surmise that if individuals' unique relationships to space were extrapolated across the entire neighbourhood, complementary and conflicting perceptions would render socialized walkability practically immeasurable. Practitioners will therefore derive the most value from this framework by acknowledging the limits of contemporary instruments and more comprehensively including social factors into pedestrian planning and governance more broadly. Non-built pedestrian interventions such as community policing (Rukus and Warner, 2013), educational campaigns promoting safe pedestrian behaviour (Duperrex et al., 2002), and assistive technology provision from health and human services (Pettersson et al., 2016) augment users' activity areas and comfort, even though they have been understated in walkability research to date. Such measures, however, do little to reduce social siloing and promote spatial familiarity such that more amenities can be knowingly accessed by more residents—a concern perhaps compounded in Canada by limited

acknowledgment of the unique needs of low-income and minority users in strategic pedestrian planning (Chapter 6).

We propose that social factors detrimental to walkability can be addressed in part through policies which promote shared values and language in the public sphere. Interculturalism in the Province of Quebec is perhaps the most salient of these policies in the context of our study. Negotiating the visceral cultural concerns of its demographically-precarious white francophone majority with those of minority groups and recent arrivals, interculturalism establishes a social contract which heavily emphasizes a shared language and secular public institutions among other principles to mitigate the presence of cultural enclaves and strengthen a common public sphere while, in the same breath, reiterating the responsibility of existing residents to accommodate other ways of living through inclusive institutions and funding (Bouchard, 2015). Parc-Extension exemplifies these principles despite its unique challenges as a first destination for new arrivals: a high density of social services including non-profit food and clothing providers; a multitude of religious institutions providing resources and information to their congregants; borough councilors fluent in no less than four languages at the time of writing; a public library which includes titles in several languages, and, above the library; the largest French language education center in the province. We surmise through statements made by recent arrivals during our interviews that these services are fundamental to augmenting residents' spatial familiarity and their adaptive capabilities, from illustrating where one might find employment to outlining how one accesses care at the neighbourhood's provincial health clinic. While interculturalism has come under fire for privileging the cultural majority by none other than philosopher Charles Taylor (2012), co-author of the provincial report guiding its implementation to date (Bouchard and Taylor, 2008), he concedes-and we argue-that it offers a useful policy framework which can be adapted to geographic circumstances and ways of governing, in our case at the intersection of inclusionary social services and pedestrian planning.

Drawing from these insights, we conclude with a tentative recommendation which may prove useful to socializing walkability in practice. Enmeshed in physical and social factors, perceived through the situated perspectives of users, and influenced by the approaches of stakeholders throughout the public sphere, walkability should be treated by practitioners as an ongoing

phenomenon rather than a static snapshot of the environment under their charge. They should work with a broad base of partners to improve access to amenities within walking distance, though physical and social projects, while deeply exploring residents' circumstances to tailor interventions which (a) allow more people to safely and comfortably access more opportunities and (b) allow more people to contribute to the design of urban spaces. Future research should examine the interconnectedness among these factors through the eyes of residents to generate human-scale solutions, i.e., interventions which embrace the variations in building height, step length, relationships among neighbors, and other factors which distinguish pedestrians' relationships with space from those experienced by users of other transportation modes.

Preface to Chapter 4

This chapter advances an effective method to incorporate social space into the assessment of walkable spaces using a qualitative geographic information system, per the second objective of my research agenda. I describe how participants' testimonies can be spatially transcribed and coded using a schema which represents physical and social distances in transferable terms. The system filters urban features through the eyes of users, including intangible factors and personal circumstances influencing their engagement with walkable space. Chapter 4 originates from the same study as the preceding chapter and explains the precedents and trade-offs of the study's method in substantial detail. Its conclusions also relate to planner outreach and public consultation strategies critiqued in later chapters, which are oftentimes ill-equipped to register the unique built and social circumstances of socially-excluded pedestrians.

Chapter 4: Using Qualitative GIS to Generate Walkability from Pedestrians' Perspectives

4.1. Introduction

"The ordinary practitioners of the city live 'down below,' below the thresholds at which visibility begins." Michel De Certeau (1984)

Pedestrian-friendly spaces are a key ingredient in making healthy and vibrant communities. Their attractiveness has given rise to numerous geospatial and audit instruments that gauge whether a built environment can generate physical activity and comfort (e.g., Clifton et al., 2007; Day et al., 2006; Frank et al., 2010). These instruments validly predict travel behavior in broad strokes, yet their focus on built features has come under scrutiny for poorly registering social factors which mediate pedestrians' engagement with amenities and streetscapes. A handful of studies have sought to remedy this gap by employing mobile methods that illuminate the qualities of pedestrian space through the lens of residents' own senses and perceptions (Cook et al., 2016; Middleton, 2011; Spinney, 2014). Yet, as Merriman (2014) notes, mobile methods glean their results from individuals on the move—a partial perspective which runs the risk of neglecting the broader built and social conditions they hope to elucidate.

How can practitioners reconcile the street as lived by residents, whose unique circumstances shape travel behavior and sentiments, with the tangible qualities of locations as examined in contemporary walkability instruments? In this paper, we discuss a method which uses a qualitative geographic information system (QualGIS) to assist in generating more comprehensive understandings of walkable space by considering physical and social components in like terms. We describe the underpinnings of our approach before using case examples to demonstrate how our data management and analytical strategy enabled us to derive conclusions about the walking environment in sync with residents' everyday life and knowledge of urban form⁷.

⁷ These conclusions and their implications for planning practice are discussed in Chapter 3.

4.2. Background

Walkability assessment emerged as technological change in behavioral monitoring and geographic information science allowed researchers to isolate the built elements of urban form associated with walking behavior (Cervero and Kockelman, 1997; Handy, 1996). Amenity access, including both the mix of homes and services across space and the structure of the transport network, explains more variation in travel behavior than streetscape features associated with traffic safety, crime safety, or pleasurability-an umbrella category which encompasses shade-giving trees, benches, and aesthetic attributes of urban design (Ewing and Cervero, 2010; Giles-Corti et al., 2013; Leslie et al., 2007; Saelens and Handy, 2008). The reliability of these categories in predicting walking behavior and related outcomes, including physical activity and cardiovascular health (Carr et al., 2010; Manaugh and El-Geneidy, 2011; Rosenberg et al., 2009), help to explain their broad-based inclusion among the instruments currently used to measure walkability. Geospatial algorithms such as WalkScoreTM, which computes walkability on a 100-point scale using a gravity model of nearby amenities, and those which co-analyze built and population characteristics at a tract level (Frank et al., 2010; Leslie et al., 2007; Porta and Renne, 2005) efficiently illustrate walkability at municipal or regional scales. Street audit instruments such as the Irvine-Minnesota Inventory (Day et al., 2006) and PEDS (Clifton et al., 2007) provide a more fine-grained perspective of amenities and human-scale determinants of walking behavior including roadway segment and intersection design, physical indicators of crime like graffiti and broken windows, and urban design elements such as building frontage and roadway buffers. Street audit instruments can be adapted for diverse populations and geographic contexts, e.g., seniors and children in urban areas (Millstein et al., 2013; Negron-Poblete and Lord, 2014; Weiss et al., 2010).

While these algorithms and checklists have generally fared well when validated against travel behavior, the built indicators of walkability may not correspond with residents' perceptions. Safety from crime, for example, is more accurately understood through local knowledge than physical proxies (Hajna et al., 2013). Gebel and colleagues (2011) argue that users' perceived walkability, as opposed to walkability assessments grounded in objective environmental

characteristics, shapes walking behavior and is therefore crucial in explaining physical activity and health outcomes. However, in separately noting that low-income and less physically active adults "were more likely to misperceive" walkability as measured by instruments (Gebel et al., 2009, p. 231), there seems to be a reluctance to admit the shortcomings of the systematic measurement of built factors in explaining socioeconomic variations in travel behavior and perceptions, all else held constant (see Koohsari et al., 2015; van Lenthe and Kamphuis, 2011). Participatory exercises with residents and planners hold promise as a way to redefine streetscape attributes for more precise assessment, such as the photovoice-inspired defining of abstract urban design terms (Ewing and Handy, 2009) or the rating of streets for children's walking by their parents (Schlossberg et al., 2015).

These exercises generally bracket their scope to physical factors while neglecting more extensive socio-ecological factors fundamental to walking (Alfonzo, 2005). Kwan (2012a) argues that study outcomes are profoundly impacted by "spatial uncertainty in the actual areas that exert contextual influences on the individuals being studied" (p. 959). A focus on the physical environment, for example, obfuscates other motivations which mediate one's decision to walk, from a lack of financial or social network access to other modes to pedestrians' attitudes regarding personal health and the environment (Blumenberg and Smart, 2010; Manaugh and El-Geneidy, 2011, 2013). The wholesale transfer of existing instruments to new contexts can meanwhile omit features significantly impacting active mobility and associated outcomes (Riggs, 2014). How can we adapt the geographic context of walkable space to endogenize social factors at play? We argue that by treating the pedestrian as integral to the geographic context of walkability, assessment can bear a broader scope of neighborhood features shaping residents' walking behavior everyday life, including: non-street linkages such as alleyways and parks (Ford, 2001; Seymour et al., 2010); linkages off the beaten path relating to jaywalking or trespassing (Hess and Farrow, 2010), and; trip-generating amenities unique to certain populations, such as drug dealing sites to addicts (Johnson et al., 2013; Pettiway, 1995). Incorporating both physical and social distances as components of space, as espoused postmodern geography and the mobilities paradigm in sociology (Massey, 2005; Urry, 2007), have further influenced studies relating to pedestrian travel: using travel diaries and interviews to reflect on the relationship between one's movements and assessments (Middleton, 2011);

examining the interaction between memory and assessment using walking interviews (Degen and Rose, 2012); and employing video-taped walking interviews to explain how urban streetscapes shape well-being (Miaux et al., 2010). However, these approaches tend to value the perspective of the subject in the present as they move through space—a perspective which Merriman (2014) critiques because it neglects the "infrastructures, technologies, materialities, and spaces that are integral to [yet separate from] the embodied movements of human subjects" (p. 177).

How can walkability scholars bring pedestrians' particular circumstances into the geographic context of walkability to examine individuals' perceptions and, perhaps more importantly, facilitate comparison among pedestrians' diverse characteristics across different environments? Kwan (2012b) asserts that qualitative geographic information systems (QualGIS) can capably aid the investigation of issues relating to uncertain geographic context. Broadly speaking, QualGIS adapt the database structures which define geographic information systems to spatially organize and analyze data according to long-standing qualitative methodologies (Cope and Elwood, 2009). While initially allowing scholars to privilege on-the-ground perspectives in spatial analysis, such as the accounting for informal economic activity in 1990s Moscow as gleaned from interviews (Pavlovskaya, 2002), QualGIS has become more agile with the emergence of methodological and technological innovations. Geo-ethnography, for example, situates cultural observations within their infrastructural and socio-spatial conditions to better articulate what motivates the behavior of groups under study, e.g., low-income families and their children (Matthews et al., 2005). Geo-narrative leverages spatial factors associated with participant testimonies to reorient geospatial analysis toward the human scale (Bell et al., 2015; Kwan and Ding, 2008). Knigge and Cope (2006, 2009) draw from grounded theory, an inductive approach to understanding phenomena as data are collected and analyzed, to comprehend how various groups perceive community gardens by visualizing geodata and multimedia anchored in space.

QualGIS can aggregate subjective understandings to illustrate how social and personal factors mediate perceptions of the amenities and streetscapes which constitute walkability (Bell et al., 2015; Boschmann and Cubbon, 2014). Brennan-Horley and Gibson (2009), for instance, situate interview data and sketch maps in a QualGIS to reveal mismatches between civil servants and local artists regarding the location of creativity hubs in Darwin, Australia. Wridt (2010)

privileges children's voices in a Denver suburb to understand which built and social factors shape their physical activity, notably demonstrating how gender shapes their activity spaces, parental expectations and, ultimately, walking behavior. Kwan and Ding (2008) visualize the time-space paths of Muslim women following the September 11 attacks, as gleaned through interviews, to generate red-hued trajectories and landscapes which demonstrate the influence that fear of confrontation exerts on their daily routines. Jones and Evans (2012) geocode walking interview statements to precisely connect discursive and sensory judgments to their associated locations, while Battista and Manaugh (2017b) assert that ground-truthing urban space using rudimentary QualGIS practices can illuminate land use and transport characteristics not readily apparent in large-scale datasets. We advance from these studies to examine how QualGIS can contribute to the assessment of built and social factors in urban space.

4.3. Method

Between August and November 2016, thirty residents of a dense, low-income neighborhood in central Montreal were recruited via fliers distributed at transit and service hubs to speak about walking in their neighborhood. While not intended to derive a statistically representative sample of the neighborhood's population, our strategy ultimately yielded the wide range of ages, abilities, and origins which characterize the neighborhood. Each participant was subject to a twostep procedure to assess their perceived walkability of the neighborhood. First, we conducted a one-hour sedentary interview structured by the elements of the Montreal-specific MAPPA walkability audit (Negron-Poblete and Lord, 2014) to understand residents' everyday walking experiences. We followed each sedentary interview with a one-hour walking interview, as mobile methods prompt individuals to speak in greater detail about their environment than sedentary interviews (Anderson, 2004; Evans and Jones, 2011). After briefing them about the walking interview procedure, participants had video cameras mounted to their chests and were asked to lead the researcher on a tour of the neighborhood. The walking interviews primarily focused on locations related to participants' respective routines, with the caveat that the researcher could divert the interview trajectory to discuss salient features. We describe this twostep procedure in greater depth, including its methodological underpinnings and implications for practice, in recent work (Battista and Manaugh, 2017a).

The unique trajectories and discussion points of each participant required a data management strategy which could bridge conceptual and spatial gaps, e.g., comparing social characteristics of streets with similar physical characteristics to explain variations in participants' assessments. Furthermore, this data strategy had to remain flexible to new concepts and spaces, such as shortcuts through alleys and private land, which shaped both walking interview trajectories and participants' everyday walking behavior. We chose to spatially transcribed walking interviews by embedding trajectory vectors alongside participant statements as observed in the walking interview video footage (see Jones and Evans, 2012). Using ATLAS.ti (ATLAS.ti GmbH, 2016), a qualitative analysis software package, we devised a semi-structured coding schema to reclassify statements for comparisons among participants (Figure 4).



Figure 4. Qualitative coding schema, with location categories (yellow), attribute categories (blue), and example codes (red)

We described locations—broadly categorized as amenities, streets, and intersections—according to physical and social attributes as mediated by participants' personal factors. We refined the codes within the schema as the interviews were sequentially coded, including the reformatting and consolidation of existing codes and the construction of higher-order codes describing relationships among other codes. The coding schema eventually comprised 1248 unique codes: 199 amenities; 77 street segments, intersection-to-intersection or groupings of street segments;

47 intersections; over 250 physical space attributes and over 100 social attributes⁸, of which 42 relate to safety from crime; several dozen personal factor codes touching on themes from physical capabilities to neighborhood self-selection; several dozen higher-order codes denoting relationships among codes and participants for theory-building; and, the remaining number of codes denoting methodological concerns and insights. Seventy-three percent (907/1248) of the codes were grounded more than once to participant statements, with the highest grounding frequencies among major street segments and the lowest among highly-contextual assessments and personal factors. We used free-form memos to record our evolving understanding of statements and codes for later stages of the analysis.

Through these memos and relationships embedded in codes, e.g., "safeFromCrime – lighting" and "isPleasant – lighting," we struck out to manually relate relationships among codes using ATLAS.ti's network function. Several foundational networks ultimately emerged, representing thematic relationships among the codes. We refined these relationships through exploratory queries of codes embedded in transcripts and associated primary data. Linkages among physical and social attribute codes informed higher-level codes such as "architecture shapes safety from crime." These networks coalesced into a comprehensive analytical framework over time. Our QualGIS is structured by this analytical framework. Users input location codes into the software's networking interface to reveal associated physical and social attributes, and vice versa. Inter-code linkages include attributes which elaborate on the nature of each association. Using the network relationship "[attribute code A] *contradicts* [attribute code B]" as embedded in the analytical framework, for example, one can identify physical and social factors, and by extension amenities and streets, which provide opposing environments for walking. The source media files, still embedded in the system, can be quickly referenced to offer conceptual clarification as well as compelling evidence for planning and policy exercises.

Personal factor codes serve two primary functions in exploring associations between participants' attributes and their assessments. First, thematic relationships among the personal

⁸ These approximations reflect that some codes may be construed as being physical and/or social, e.g., "safeFromCrime – eyes on the street."

factor codes provide clues with which to interpret participant assessments. These insights do not automatically influence outputs generated by the QualGIS but rather, drawing from qualitative analysis more generally, guide users as they structure the data and examine relationships within them. Personal factor codes can further function as document families—assemblages of primary data files categorized within the software. Document families permit efficient cross-tabulation of personal factors, e.g., "gender – male" vs. "gender - female," with code frequencies within the documents. Assuming the analyst has a strong grasp of the site and participant data, particularly the generalizability of participants' statements, these cross-tabulations can be used to extrapolate participants' stated assessments to other locations and attributes. We explore this assumption and others shaping the effectiveness of the QualGIS in the Discussion section.

4.4. Methodological Results

QualGIS offers advantages to examining walkable spaces by incorporating physical and social factors which, though influencing pedestrians' assessments of space, cannot easily be incorporated into contemporary walkability measures. We can begin to examine this capabilities by focusing on a location which featured heavily in the walking interviews. Ogilvy and Hutchison is an intersection adjacent to a large supermarket, a metro station, and two all-day bus routes (Figure 5).


Figure 5. Intersection of Ogilvy and Hutchison on a weekday afternoon (Interview #7)

By querying all codes which co-occur with the location "intersection - Ogilvy/Hutchison," we see an extensive assemblage of built and social factors emerging from participant testimony (Figure 6). The pedestrian crossing infrastructure would mark highly on a conventional walking audit: traffic lights for cars; well-maintained crosswalks; dedicated pedestrian signals with countdowns, and; a light sequence which allows pedestrians to cross diagonally while traffic is stopped in all directions. This last feature is attractive to several long-term residents who asserted that the previous intersection design favored automobile traffic despite pedestrians' right of way. However, it is the only intersection in the neighborhood with a four-way crossing signal, and, as mentioned by participants and captured on camera, those who are unfamiliar with the signal sequence will cross when parallel traffic lights are green—the norm throughout the city.



Figure 6. Walkability factors at Ogilvy/Hutchison with locations (yellow), positive attributes (green), negative attributes (red), and broader attribute associations (pink). Some codes and links have been removed for clarity.

Two in-vivo codes derived from the assessment of other intersections co-occur with Ogilvy/Hutchison: "They see the green light, and they just go" and "There's a lot of hardheaded pedestrians [and] that's where the problem is." Participants noted that it is common for law enforcement to entrap pedestrians caught off-guard by the intersection's signal sequence, though when asked about their own behavior, there was no consensus regarding whether enforcement reduced their willingness to jaywalk at the intersection. Ogilvy/Hutchison remains a bottleneck for large volumes of commuters and shoppers whose behavior can seem unpredictable, edging through red lights and maneuvering around buses. Participants noted that such behavior places people with reduced mobility, e.g., the elderly and parents with strollers, at greater risk for collisions, honking, and verbal aggression. Extrapolating the co-occurring codes of each attribute

would reveal intersections with similar characteristics, though "intersection – JT/Hutchison" is directly linked to Ogilvy/Hutchison because their proximity and similar characteristics prompted two participants to compare them during their respective interviews.

QualGIS permits street-level observations to be grounded in space, including human behavior which transgresses the intended function of built infrastructure. Observing a family caught in the median of an arterial between intersections, for instance, or the participants' own choice to jaywalk during the walking interview signify a parallel layer of "pedestrian networks as lived by locals" and its implications for traffic safety and pleasurability. When considered alongside social factors influencing amenity choice, e.g., a Muslim resident's need for halal products, we begin to see that accessibility depends heavily on individuals' socioeconomic characteristics, beliefs, and behavioral choices. Participants' socio-technical assemblage-the corporal, mental, and technological elements shaping their engagement with space—further mediate their perception of walkability factors. A middle-aged skin cancer survivor deliberately chooses streets with mature trees or, if this is not possible, the southern side of the street where apartment buildings block the sun. William, a gregarious septuagenarian, sits several times during his walking interview with the expressed desire to rest his legs while David, another senior, pauses the interview to urinate in an alleyway due to his self-identified weak bladder and a lack of public bathrooms along our interview trajectory. When incorporated into the QualGIS, their actions can speak volumes about the adequacy of the built environment to accommodate their unique needs and, in sum, demonstrate universally-shared perceptions of the neighborhood as well as multiple formative walkabilities grounded in the shared characteristics of participant subgroups, e.g., senior citizens.

By incorporating participants' characteristics within the QualGIS, rather than controlling for them, it is possible to run crosstabulations that distinguish which factors shape participants' respective travel behavior. Table 2 shows perceptual differences for three recurring "unsafeFromCrime" factors, by gender and neighborhood familiarity. Night has a profound impact on the stated travel behavior and feelings of women and those who have moved into the neighborhood for its affordable housing, central location, or spousal influence—three of the most common codes within the "neighborhoodSelection" code family (not shown). There are no

differences between sub-groups for factors related to gazing on the street and the presence of a halfway house recently targeted by protests for accommodating high-risk individuals. However, the inclusion of these codes within the QualGIS points to salient features of built and social space ignored by standardized instruments, despite their relevance to residents. While these factors could not be systematically investigated with each participant, a constraint tied to collecting data through walking interviews (Battista and Manaugh, 2017a), there are no limitations to the QualGIS as designed to compile additional data, such as audit baseline data linked to street locations as codes, to promote the design of robust information systems for statistical and qualitative analysis.

	During ho	g night urs	Gazin str	g from eet	Halfway house		
	n	%	n	%	n	%	
Male participants (n=13)	4	31%	4	31%	3	23%	
Female participants (n=17)	12	71%	5	29%	5	29%	
Grew up within neighborhood (n=8)	3	38%	2	25%	2	25%	
Grew up outside neighborhood (n=22)	13	59%	7	32%	6	27%	

Table 2. Perceptual Differences For Selected "unsafeFromCrime" Factors

Note. Findings derived using ATLAS.ti Code-Document-Table tool.

4.5. Discussion

We demonstrate in this methodological piece how, by spatially structuring qualitative assessment data, QualGIS can operationalize pedestrians' assessments to examine a wide range of neighborhood features shaping their walking behavior and satisfaction: built features from existing measures; social factors for which there are no physical indicators, and; personal factors mediating the relevance of neighborhood features among individuals and groups. Our system's structure yielded representations of the environment as habitually used, rather than relying on static physical indicators whose influence on behavior is assumed through previous studies. Unlike qualitative methods more generally, our system's spatial dimension allowed us to efficiently examine thematic relationships at multiple geographic scales, from the conflicting assessments regarding a street segment to neighborhood-wide beliefs regarding access to certain amenities, and explore these perceptions among participant subgroups. The QualGIS can incorporate multiple genres of data—transcripts, multimedia, and researchers' open-ended reflections—to validate conventional assessments of walkable space and triangulate the unique factors influencing everyday travel behavior in specific locations.

QualGIS comes with some notable limitations despite addressing many of the epistemological shortcomings of contemporary instruments. Our particular system, for example, is structured by relationships among text strings without supporting geospatial coordinates, precluding cartographic visualizations and many of the geospatial operations taken for granted in ArcGIS, e.g., buffering and algorithmic extrapolation. Practitioners must further consider the norms and standards of rigor associated with qualitative methods, to which certain professions, e.g., engineering, are seldom exposed. QualGIS users must interpret participants' statements knowing that they may not reflect common views or even relate to the "real" characteristics of locations at all, e.g., a business owner disparaging competing businesses. A location or attribute may elicit conflicting qualities, as we observed regarding streetscape enclosure (a catch-all associated with narrow streets, mature trees, and tall buildings), which assessed anywhere from intimate humanscale design to claustrophobic tunneling. One must also be careful when extrapolating assessments and human behavior at one location to similar locations, or more importantly, whether to generalize such codes at all. We strongly advise practitioners to be familiar with the neighborhood context, particularly its social characteristics, to mitigate the risk of misinterpretation and overgeneralization. Participants' seemingly contradictory statements are best understood by collecting and analyzing data first-hand, such that the researchers' experiences can inform the development of codes and their relation to one another.

We close by noting that practitioners may derive more value from the underlying principles of qualitative geographic information systems than the analytical minutia of our own approach. By structuring physical and social factors in comparable terms across space, pedestrian planners can register their diverse constituents' needs, whether overlapping or characteristically exclusive, to inform more comprehensive interventions and partnerships: promoting social inclusion; improving law enforcement; and reducing travel disparities associated with income and gender. It is well-suited for public consultation exercises, as well as the health and environment impact analyses increasing required for transportation and land use investments, because spatially-grounded assessments can inform location-specific physical and social interventions tailored to

the personal characteristics of those voicing their opinions. QualGIS also complements pedagogy in urban planning and related disciplines by operationalizing physical and social distances which are necessary to design interventions and promote buy-in. We anticipate that opening walkability to new spaces will augment its usefulness in promoting healthier travel behavior, fostering safer communities, and making more vibrant places in the public realm.

Preface to Chapter 5

Transportation planners are one of the most influential stakeholders in pedestrian planning, yet their approaches to reconciling their professional expertise with public insights—a source of data integral to registering social space in planning—are poorly understood. This chapter complements the third objective of my research agenda by elucidating variations in planning style and the personal and institutional circumstances associated with these variations among public-sector transportation planners. The outcomes suggests institutional regulations and training are strong predictors of prioritizing public insight, particularly among "advocate" planners who proactively reach out to socially-excluded groups. These findings suggest that organizations can facilitate the incorporation of social space in pedestrian planning, in assessment and strategic planning, through procedural and human resource initiatives.

Chapter 5: Framing Planners' Attitudes at Intersection of Expertise and Public Insights 5.1. Introduction

We are now sensitized to the waves of repercussions generated by a problem-solving action directed to any one node in the network, and we are no longer surprised to find it inducing problems of greater severity at some other node. And so we have been forced to expand the boundaries of the systems we deal with, trying to internalize those externalities. (Rittel and Webber, 1973, p. 159)

For decades, the domain of transportation planning has been expanding beyond system-level engineering and economic performance measures toward a broader scope of impacts across space and society, from public health to social inclusion (Lucas et al., 2015). The profession has responded in part by devoting greater attention to the role that values play in resolving complex problems, particularly those whose interventions require careful consideration of trade-offs among disparate impacts and stakeholders: scenario modelling (Hatzopoulou and Miller, 2009); project appraisal (Mouter et al., 2013; van Wee, 2012); policy goals and performance measures (Martens, 2016; Mouter et al., 2017), and; public consultation (Healey, 2006; Innes and Booher, 2016). However, there has been comparably little attention paid to the attitudes of the individuals who ultimately design and implement these procedures. Our current understanding of transportation planners' professional attitudes impedes the development of practice-wide training and regulatory interventions aimed at fostering certain attitudes among planners and, ultimately, procedural outcomes desired by employing agencies.

This paper examines how transportation planners might resolve complex problems through two questions: (1) how do transportation planners approach their professional responsibilities, and; (2) how do their personal characteristics associate with their respective approaches? We review previous studies of urban and transportation planners' approaches to problem-solving to inform a two-dimensional attitudinal framework. We test this framework across a sample of 311 U.S. and Canadian public-sector transportation planners to reveal evidence supporting the existence of multiple distinct attitudes regarding how to negotiate professional expertise with public insight in

transportation planning. We continue by illuminating the personal and institutional characteristics unique to each category to inform educational and institutional interventions which employers might consider to influence planners' attitudes according to their institutional mission. Through this systematic approach, we strive to illuminate population-scale insights whose generalizable patterns can assist scholars and practitioners as they weigh the marginal value of certificates, legislation, and other interventions as tools to shape transportation planners' approaches to their profession.

5.2. Background

Transportation planners undertake a comprehensive analysis and evaluation of the potential impact of transportation plans and programs while addressing the aspirations and concerns of the society served by these plans and programs. Planners examine past, present, and prospective trends and issues associated with the demand for the movement of people, goods, and information at local, rural, tribal, metropolitan, statewide, national, and international levels. (FHWA, 2016)

Planning has evolved from a rational and empirical practice toward a multifaceted one, bridging numerous types of data from various stakeholders to triangulate best courses of action. The profusion of approaches accepted in contemporary practice, as well as the specialization of training and tasks among planners, have contributed to several ideas regarding planners' responsibilities in broader appraisal and decision-making systems. These "planning styles" (alternatively referred to as "planner roles") denote how planners negotiate their professional opinion with public insights and how they invest themselves in the implementation of planning solutions.

Most studies of planning style have focused broadly on urban planners, a population whose training and practices coincide if not directly intersect with those of transportation planners more specifically: forecasting different scenarios; appraising their impacts; soliciting public feedback; and assisting decision-making subject to codified procedures. However, it is unclear whether stylistic conclusions from urban planning are generalizable to the subsection of practitioners

working in transportation. This uncertainty precludes the wholesale transfer of broad-based training and regulatory interventions relating to style to the latter group. We target transportation planners in this study to more confidently understand the personal attitudes behind everyday practice, striving to determine which training and regulatory interventions are in fact associated with style among transportation planners. To this end, we discuss style in the following section to inform the theoretical framework guiding our approach.

5.2.1. Leaving Planning to the Experts

Modern-day planning theory emerged in the immediate post-war era, a time when institutions adopted a more scientific approach toward designing cities and transportation systems (Friedmann, 1998; Martens, 2016). The *technical* style of planning turned toward professionally-trained practitioners to rationally design systems using quantitative data and consistent procedures, particularly those established by bureaucratic regulations (Howe, 1980; Innes and Gruber, 2005). This rational approach prompts technical planners to avoid normative judgments, leaving such assessments to elected officials and civil servants. Technical planning also treats public consultation as a processes outside the realm of planning, limiting planners' engagement to what Innes and Gruber call "one-way educational efforts" (Innes and Gruber, 2005, p. 181). In lieu of public consultation, a quintessentially technical planner would keep in contact with policymakers and key stakeholders over the course of their work and, after providing solutions grounded in an established procedure, defer the decision-making process to these groups.

Technical planning came under attack in the climate of the Civil Rights era for its muted response to social inequalities under the guise of value-free professionalism (Davidoff, 1965). This critique continues into the present day regarding the validity of models and forecasts (Hatzopoulou and Miller, 2009), systematic project appraisal (Mouter, Annema, and van Wee 2013), and transport service and user biases in analysis (Cortright, 2016; Ralph and Delbosc, 2017). As noted by Klosterman (1978), data-driven instruments are devised using normative judgments and subsequently chosen based on the judgments of planners and other key stakeholders. He and others (Bolan, 1983; Wachs, 1990) argued that planners should go beyond "value-free" planning and acknowledge their role as political actors whose rational choices can foster more ethical procedures and outcomes. The *political* style of planning suggests that

planners may intercede in the decision-making process—neutralizing opposition, forming support groups, and getting involved in dispute—to shape outcomes beyond technical optimization (Howe, 1980; Howe and Kaufman, 1981). The goals of political planning are diverse, as they are influenced by planners' own moral obligations to different groups, their cultural ideals outside planning, and the unique contexts of the problems that they must address (Bolan, 1983). Innes and Gruber (2005) observe that planners at the Metropolitan Transit Commission, the federally-designated metropolitan planning organization (MPO) for greater San Francisco, may adopt a political style when tasked with distributing resources in cases where codified appraisal instruments and procedures do not exist (Innes and Gruber, 2005). Like the technical style, political planning is characterized by a top-down positionality seldom concerned with consulting the public.

5.2.2. Empowering Community Voices

Civil rights and environmental justice issues prompted scholars to re-evaluate the wisdom of strictly top-down planning. Technical planning was blamed for perpetuating systematic inequalities in cities in cases where planners provided empirical assessment which suited elected officials' preferences, such as the spatial concentration of public housing as contested in United States v. Yonkers (Kaufman, 1989). Meanwhile, technical and political planning could leave little recourse for disenfranchised stakeholder groups to advocate for planning solutions that met their needs. For example, Arnstein (1969) distinguished between tokenistic-informative public consultation and novel procedural frameworks that allowed citizens to proactively shape their environment from the first, visionary steps of a project. The *collaborative* planning paradigm brought public participation to the fore of planners' professional role. Inspired by communicative action theory, it emphasizes transparent decision-making procedures that permit members of the public to deliberate alternative scenarios on equal footing with one another and, ultimately, arrive at consensus regarding a course of action (Forester, 1989; Healey, 2006). The collaborative style situates the planner as a mediator in consensus-building, tasked with providing technical details to the public in an unbiased manner while simultaneously ensuring procedural fairness in public deliberation. Collaborative planning promotes value-free conduct like technical planning, and while they eschew a top-down approach, collaborative planners

remain central to the planning process by using their field experience and bureaucratic knowledge to turn community ideas into reality.

However, the value-free dimension of collaborative planning disregards procedural inequalities in consensus-building. Low-income individuals and other vulnerable populations are less likely to participate in planning exercises, while influential stakeholders might take informal measures to shape outcomes according to their goals (Fox-Rogers and Murphy, 2014; Hillier, 2000; Tewdwr-Jones and Allmendinger, 1998). The *advocate* style of planning deliberately weighs the validity of knowledge provided by various stakeholders in the public consultation process (Innes and Booher, 2016; Rydin, 2007). Innes and Gruber (2005) note, for example, that advocate planners prioritize disenfranchised groups while seldom consulting with development and commercial interests. Advocate planners politicize public consultation with the understanding that there is an art to governance that requires the mediation of power relations (Ploger, 2001). With this in mind, Johnson (2012) excludes advocates from her analysis of urban planners because their normative conduct "crosses paths with the political style" (p. 32).

5.2.3. Proposing a Planning Style Framework

Planners may adhere to multiple styles in their responsibilities. Howe and Kaufman's earlier studies (Howe and Kaufman 1979; 1981) asserted that the majority of planners adhere to a "hybrid" professional role that embraces technical and political approaches to planning. More recently, scholars argue that modern-day governance compels planners to weigh public consultation against the technical and political expediency desired by developers and other private stakeholders (Fox-Rogers and Murphy, 2016; Sager, 2009). One must also consider the extent to which planners are free to choose their own style given their professional tasks and workplace dynamics. The specialization of training and labor within transportation planning in particular may wholly bracket style. For example, a traffic modeler with a civil engineering degree may not engage with the public because that task is delegated to a community liaison whose planning degree prepares her for outreach.

Given the stylistic trade-offs encountered by planners as they deal with complex problems, we present "planning style" as a theoretical framework along two dimensions (Figure 7). On one

axis, the top-down *positionality* of technical and political planning contrasts with a bottom-up positionality that values public participation. The perpendicular axis highlights the differences in *conduct* between positivistic and normative planning—a distinction grounded in planners' attitudes toward exercising their personal agency in practice (e.g., Klosterman, 1978), as opposed to value judgments implicit in planning instruments and practice more generally, e.g., the normative decision to conduct oneself positivistically. The resulting quadrants correspond with the four types of style, with style becoming more definitive as one moves way from the center. This framework acknowledges that certain attitudes, such as valuing public consultation, intersect with multiple dimensions of style (e.g., Fox-Rogers and Murphy 2016). This continuous framework can reveal associations with broader dimensions, "bottom-up positionality" in the case of public consultation, rather than discrete dimensions of style as proposed in each quadrant. Employing a two-dimensional framework also coincides with stylistic investigations from other professions, such as the idealized roles of scientists in decision-making procedures along axes reflecting their views of democracy and science (Pielke, Jr. 2007, chap. 2).



Figure 7. Planning style framework

But what might compel a planner to adopt a certain style? Howe (1980) contended that "having a planning degree" does not predispose a planner to a certain style, and that planners are not locked into the theoretical paradigm in which they were trained—as demonstrated by large numbers of non-technical planners trained prior to the decline of the scientific planning paradigm. Laurian and Shaw (2009) find that planners certified by the American Institute of Certified Planners (AICP) for more than 10 years more consistently evaluate the success of their public consultation efforts. AICP certification is a voluntary accreditation held by approximately one-quarter of American Planning Association members, demonstrating the planners have met minimum experience requirements, have passed a standardized test, and have sustained their certification though continuing education (American Association of Planners, 2016). Both studies exclude non-certified planners from their sample, which may skew conclusions about planner training away from younger professionals who have not yet acquired the requisite experience to be eligible for certification. Nevertheless, Johnson (2012) does not uncover a significant association between planning style and "professionalism," an author-created composite measure that includes certification status and education level yet no other educational attributes, such as degree subject.

Planners' non-professional attributes also associate with their planning style. Johnson (2012) finds that technical and political planners are associated with being male while the collaborative style is associated with being female. Howe (1980) noted that gender is not significant after controlling for other demographic factors, although women constituted a small proportion of her late 1970s sample. Race is not significantly associated with planning style controlling for other factors, yet Howe and Kaufman (1981; Howe, 1980) noted two perhaps dated personal dynamics that might interact with race: a propensity for racial minorities to sort into more technical degree programs, and a greater commitment among minorities to low-income/minority issues associated with normative planning styles. Age does not significantly associate with planning style across studies. Progressive (left-wing) social values associate with a normative planning style—a finding which has stayed consistent in studies over several decades (Fox-Rogers and Murphy, 2016; Howe, 1980; Innes and Gruber, 2005). This relationship corresponds with literature showing that progressives associate with a desire to intervene to reduce harm and improve procedural fairness while conservatives value authority and tradition (Haidt and Graham, 2007).

Planning style also depends on institutional regulations and public responsibilities. Planners in managerial positions often adopt political planning as they negotiate with multiple stakeholders across many jurisdictions (Innes and Gruber, 2005). In contrast, political planners may be less prevalent in local jurisdictions because in-house planning procedures require "jack-of-all-trades hybrids" or technical planners that defer decision-making to local elected officials (Howe, 1980). Howe and Kaufman (1981) noted, with no small sense of irony, that those most favorable to citizen participation work at the state and federal level—jurisdictions most removed from the direct public participation that can foster antagonism between planners and citizens (Flyvbjerg, 1998; Ploger, 2004). The generalizability of these conclusions come with limits: the structure of transportation governance varies among lower levels of government (Gerber and Gibson, 2009; Hatzopoulou and Miller, 2008) and, as Schon (1984) argues, practitioners constantly reflect on their unique experiences in the workplace, e.g., stakeholder antagonism, and adapt their approach to practice according to their experiences and external factors regulating their profession.

There has not yet been an attempt to capture the planning styles of transportation planners as a distinct group—a missed opportunity as the profession increasingly caters to a diverse scope of modes and users in partnership with other stakeholders. The lack of conclusions specific to transportation planners inhibits the evidence-based development of training programs and institutional regulations aiming to shape the conduct and positionality of practitioners. To address this gap, we explore how transportation planners approach their profession and whether personal and institutional characteristics associate with their views using survey data from transportation planners in the United States and Canada.

5.3. Method

The North American Transportation Planner Survey was designed to examine the state of transportation planning practice across four themes: planning style; personal values; demographic attributes; and institutional characteristics (Appendix D). The instrument was approved by the McGill Research Ethics Board in July 2015. The recruitment strategy sought a generalizable sample of transportation planners that was not confined to AICP or CIP

certification. In autumn 2015, notices were posted on listservs associated with the Transportation Planning Division of the American Planning Association. Trained research assistants then systematically gathered publicly-available email addresses of transportation professionals at municipal and regional transportation planning departments associated with U.S. and Canadian cities with populations of at least 250,000 people, yielding 939 email addresses. Email invitations to participate in the survey were sent out in mid-November, and reminder emails sent on December 14, 2015 and January 7, 2016. The survey remained open online until February 8, 2016. All participants entered a drawing to win one of ten \$50 gift cards to Amazon.com. This recruitment strategy yielded a total of 628 respondents, of whom most responded following the email dissemination strategy. We retained 311 cases—a valid response rate of 33.1%—after removing those who did not respond to one or more of the sixteen planning style questions, those who did not identify themselves as working in the public sector, and a small number of non-U.S. or Canadian residents who may have received the survey link through word of mouth.

5.3.1. Measurement

The survey instrument included four questions per theorized planning style. With slight modifications for clarity, technical and political questions were drawn from Howe and Kaufman (1979, 1981; Howe, 1980) and collaborative questions were drawn from Johnson (2012); a summary of these questions may be found in Table 4. We designed the following advocate questions after identifying a lack of extant survey questions investigating a separate advocate role:

- I go above-and-beyond to attract members of the public to transport decision-making;
- I seek out local opinion leaders to understand the needs of the communities I serve;
- I purposefully encourage politically-marginalized groups to speak out in transportation decision-making; and
- I seek the participation of communities who would not otherwise participate in decisionmaking.

All statements used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), and their sequence within the planning style section of the survey was randomized to ensure respondents were not led to distinguish among the theorized styles.

Several questions investigated planners' professional training. Participants were asked the subject of their most recent degree, and their responses were recoded into "planning as latest degree" and "engineering as latest degree" dummy variables (yes=1). The level of their latest degree was recoded as "Master's degree or higher" (dummy; yes=1) due to the high education level of the sample. Participants were asked the year of graduation from their latest degree, which was recoded into "Years since latest degree" to account for changes in transportation planner training over several decades (Howe, 1980). Participants were also asked whether they were certified by the AICP or CIP (Canadian Institute of Planners). Non-professional personal characteristics included age, gender, and one's identification as a racial (U.S.) or visible (Canada) minority. This study uses two questions from the Social Justice Scale (Torres-Harding et al., 2012) to assess how personal beliefs relate to planning style: "I believe that it is important to try to change larger social conditions that cause individual suffering and impede well-being," and "I believe that it is important to promote fair and equitable allocation of resources in our society." These questions employed the five-point Likert scale as described above.

A series of questions examined the characteristics and responsibilities of planners' institutions. We also asked participants whether their employer was mandated to consider social equity in making decisions for transportation projects. Additional questions categorized the broad scope of organizational frameworks present across jurisdictions in North America, such as independent MPOs versus councils of governments at the regional scale: "My employer's task includes weighing the public's needs," never (1) to always (5); and, "My employer is managed independently from an elected government" (dummy; yes=1). Participants were asked to identify the types of jurisdictions that their employer served, and their responses were recoded into National/State, Regional, and Municipal dummy variables (yes=1) that were not mutually exclusive, given that planning agencies may address issues spanning multiple jurisdictions. In terms of planners' responsibilities as employees, we asked whether they were organizational or project managers (dummy; yes=1), how long they had worked at their current employer (five categories ranging from less than one year to greater than 10 years), and to what extent they agreed with their employers' transportation planning strategy, from never (1) to always (5).

5.3.2. Analysis

The analysis was conducted in SPSS (IBM Corp., 2012) in two stages: an exploratory factor analysis of planning style components (n=311) followed by hypothesis testing between the revealed planning style and planners' personal and institutional attributes ($274 \le n \le 294$). The smaller sample sizes in the second stage stems from incomplete responses to personal and institutional questions. We chose principal component analysis (PCA) for our factor analysis to reduce the theoretically-derived planning style questions, i.e., components, into categories that reflect the stylistic variation of contemporary transportation planning. The variance among planning style responses was both satisfactorily different (KMO measure=0.78) and yet sufficiently correlated (Bartlett's test p=0.00) to draw meaningful conclusions using PCA. To avoid theoretical preconceptions from the literature regarding the existence of four planning styles, the PCA calculated planning styles by reducing the number of questions to components with eigenvalues ≥ 1 . The output was orthogonally rotated (varimax) to emphasize significant factor loadings, and the process repeated once more after removing three variables common among multiple factor loadings (x<0.40).

We chose to investigate associations between planning style and personal attributes in two ways: (1) exemplar cases of style and (2) primary style of cases. Exemplar cases of style are defined as cases whose factor loading for a given style is within the top 33.3% of all cases. This measure acknowledges that planners may be exemplar cases of multiple planning styles. Four dummy variables were created—advocate, political, collaborative, and technical—each designating whether a case was an exemplar case of a given style against other planners (yes =1). The difference in means of personal and institutional attributes was analyzed independently for each style variable using Pearson X^2 tests (nominal and categorical variables) and two-sided t-tests (scale). Separately, we classified cases by their *primary style*, i.e., the style for which they have the highest factor loading. While we have acknowledged limitations to categorizing transportation planners under a single style, this measure enabled us to compare differences in means among the distinctive styles, and the means of the personal and institutional characteristics compared among style values using Pearson X^2 tests (nominal and categorical variable) and ANOVA (scale). By comparing means of styles' exemplar cases and cases' primary styles, our

analysis strives to illuminate patterns between the revealed styles and personal and institutional factors.

5.4. Results

The descriptive statistics of the sample suggests demographic and institutional diversity corresponding with contemporary transportation planning (Table 3). The majority of respondents had master's degrees or higher with the latest subject being planning (58.20%) or engineering (14.30%), and the mean time since graduating was 13 years. One-quarter of respondents were additionally AICP or CIP Certified Planners. One third of respondents were women, while approximately one fifth of respondents were minorities. The average age of the sample was 40 years. Thirty percent of respondents held managerial positions, while two-thirds had worked at their current employer for more than 2 years. Seventy percent of respondents served a regional scale in their work, though the distinction is not mutually exclusive to other jurisdictions, while the sample tended toward institutions that "often" weighed public needs and operated independently from elected governments. Employers "often" considered social equity in transportation decision-making.

The PCA revealed four factors roughly corresponding with the theorized planning styles. In the first PCA iteration, the advocate factor accounted for 18.20% of the variance, the political factor for 15.50%, the collaborative factor for 11.80%, and the technical factor for 9.40%, altogether accounting for 55.70% of the variance in planning style components (Table 4). Some questions were associated with multiple factors, denoting thematic overlap among styles. Both collaborative and advocacy planning, factors with bottom-up positionality, associated with "striving for consensus" and "turning community ideas into reality," while the advocate and political styles, factors with normative conduct, associated with "going the extra mile to turn my own vision into reality." Three components were removed from the analysis due to their high communality among distinctive styles, and a second analysis was run to derive the ultimate style factor loadings. The internal consistency of components ultimately associated with the dependent planning style variables was satisfactory to poor: advocate (α =0.81), political (0.71), collaborative (0.52), and technical (0.51).

Model Variables	Mean or %	Stand.	Min.	Max.
Dansanal Chanastaristics		Dev.		
Personal Characteristics	22.000/			
AICP or CIP Certified Planner	23.90%	-	-	-
Latest degree in planning	58.20%	-	-	-
Latest degree in engineering	14.30%	-	-	-
Master's degree or higher	74.10%	-	-	-
Years since last degree (at end of 2015)	13.10	10.80	0.00	46.00
Age (at end of 2015)	40.30	11.70	22.00	70.00
Being male (vs. being female)	64.60%	-	-	-
Being a minority (vs. being white)	17.70%	-	-	-
Social Values				
Believes it's important to promote fairness	4.33	1.03	1.00	5.00
Believes it's important to change social conditions	4.09	0.99	1.00	5.00
to alleviate suffering				
Employer				
considers social equity in transport decision-making	3.88	1.23	1.00	5.00
weighs public needs	4.37	0.77	2.00	5.00
is managed independently of elected government	58.50%	-	-	-
serves a national or state/provincial scale	19.40%	-	-	-
serves a regional scale	69.70%	-	-	-
serves a municipal scale	26.50%	-	-	-
Employee				
is a project or organizational manager	29.30%	-	-	-
agrees with employer's transportation policies	3.55	0.73	1.00	5.00
Workplace tenure (categorical)	> 10 years	-	< 1 year	> 10 years
	(mode)			

Table 3. Descriptive Statistics of Planner Sample (n=311)

Note. Statistics only include valid responses.

Planning Style Component	Advocate factor	Political factor	Collaborative factor	Technical factor
Encourage politically-marginalized groups to speak out	0.824			
Seek participation of communities otherwise outside decision-making	0.808			
Go above-and-beyond to attract public to decision-making	0.748			
Seek out opinion leaders to understand the needs of communities	0.719			
* Strive for consensus among stakeholders	0.392		0.246	
Work behind the scenes to gain support for own ideas		0.744		
Go the extra mile to turn own vision into reality	0.222	0.717		
Steer decision-making toward best solution		0.700		
Lobby policymakers to defeat harmful proposals		0.687		
Believe public insight is the core of transportation planning.			0.747	
Focus on turning community ideas into reality.	0.324		0.671	
Believe public meetings are useful for decision-making			0.662	
* Leave the final decision-making to other people			0.335	
Depend on quantifiable data more than public insight				0.852
Limit public input because they do not understand technical issues			(-0.313)	0.666
* Leave personal beliefs outside of my work	0.275	(-0.407)		0.359

Table 4. Rotated Component Matrix of Principal Components of Planning Style (n=311)

Note. Factor loadings were derived using principal component analysis with varimax rotation. Factor loadings less than |0.200| are not shown. Components with asterisks (*) were excluded in the subsequent stage due to communalities (not shown) less than 0.400

Table 5 shows differences in descriptive statistics between exemplar cases of a given style and all other planners, assuming planners are not bound to a single style. Compared to their peers, advocacy planners tend to work at institutions that consider social equity in project decision-making (77% vs. 62%, p \leq 0.01), work at institutions that seek out public insight (94% vs. 82%, p \leq 0.05), and agree it is important to change social conditions to alleviate suffering (83% vs. 73%, p \leq 0.05). Political planners tend to work as managers (38% vs. 25%, p \leq 0.01), work at municipal institutions (37% vs. 22%, p \leq 0.01), not work at regional institutions (57% vs. 75%, p \leq 0.05), tend to be male (72% vs. 61%, p \leq 0.10), and believe it is important to alleviate suffering (80% vs. 75%, p \leq 0.10). Collaborative planners tend to have lower levels of education as denoted by master's degrees or higher (66% vs. 78%, p \leq 0.05) and, less significantly, to be minorities (25% vs. 16%, p \leq 0.10) and to believe it is important to promote a fair distribution of resources (93% vs. 83%, p \leq 0.10). Technical planners tend to be younger than non-technical counterparts (38.2 years vs. 41.4 years, p \leq 0.05).

Table 6 shows differences in descriptive statistics among styles by categorizing cases by their primary style. Advocate and collaborative transportation planners, who share a bottom-up positionality, are employed at organizations that consider social equity in project decision-making ($p\leq0.01$), employed at organizations which serve a regional scale ($p\leq0.05$), and to be AICP and CIP Certified Planners ($p\leq0.10$) at higher rates than technical and political planners. Political planners work for municipal jurisdictions at higher rates than other styles ($p\leq0.01$). Social justice beliefs trend overall toward significant differences among all planner types, marked by the grouping of positivistic collaborative and technical planners who are significantly less likely to believe it is important to alleviate suffering ($p\leq0.05$), and technical planners who are significantly less likely to believe it is important to fairly distribute resources than the other planning styles ($p\leq0.05$). Technical planners work in lower numbers at institutions that weigh public needs ($p\leq0.05$), and nearly one-quarter of them have latest degrees in engineering—a rate higher than other planner styles ($p\leq0.10$). Age, gender, and ethnicity do not differ among the planning styles.

	Exemp	lar Case of A	dvocate S	Style?	Exemplar Case of Political Style?			Exemplar Case of Collaborative Style?				Exemplar Case of Technical Style?				
	Yes	No	Coeff.	Р	Yes	No	Coeff.	р	Yes	No	Coeff.	р	Yes	No	Coeff.	р
Age (n=278)	41.2 (11.7)	39.8 (11.8)	0.889	0.369	40.1 (11.6)	40.4 (11.8)	-0.174	0.862	40.5 (12.9)	40.1 (11.1)	0.273	0.785	38.2 (11.2)	41.4 (11.9)	-2.176	0.03**
Gender (male) (n=285)	63.5%	65.1%	0.066	0.798	71.6%	61.1%	3.067	0.080*	67.4%	63.2%	0.491	0.484	67.0%	63.3%	0.385	0.535
Minority (n=274)	22.1%	17.3%	0.925	0.336	15.4%	20.8%	1.144	0.285	24.5%	16.1%	2.805	0.094*	19.4%	18.1%	0.074	0.785
AICP/CIP (n=289)	29.2%	21.2%	2.214	0.137	19.1%	26.2%	1.712	0.191	26.0%	22.8%	0.371	0.542	25.8%	22.9%	0.289	0.591
Master's degree or higher (n=293)	74.2%	74.0%	0.002	0.964	73.2%	74.5%	0.057	0.812	66.3%	77.9%	4.586	0.032**	71.4%	75.4%	0.531	0.466
Degree: Planning (n=294)	62.2%	56.1%	1.006	0.316	52.0%	61.2%	2.264	0.132	53.1%	60.7%	1.573	0.210	58.2%	58.2%	0.000	1.000
Degree: Engineering (n=294)	13.3%	14.8%	0.125	0.724	13.3%	14.8%	0.125	0.724	12.2%	15.3%	0.500	0.596	15.3%	13.8%	0.125	0.724
Years Since Degree (n=287)	13.2 (10.0)	13.0 (11.2)	0.204	0.838	13.4 (11.14)	12.9 (10.7)	0.424	0.672	12.8 (11.0)	13.2 (10.7)	- 0.316	0.752	12.8 (10.8)	13.2 (10.8)	-0.258	0.796
Justice: Alleviating Suffering (n=294)	A: 83.8% D: 6.1%	A: 73.0% D: 7.1%	11.352	0.023**	A: 79.6% D: 4.1%	A: 75.0% D: 8.2%	8.100	0.088*	A: 77.6% D: 5.1%	A: 76.0% D: 7.7%:	2.717	0.606	A: 73.5% D: 10.2%	A: 78.1% D: 5.1%	3.849	0.427
Justice: Promoting Fairness (n=294)	A: 87.8% D: 9.2%	A: 85.7% D: 7.7%	3.917	0.417	A: 88.8% D: 5.1%:	A: 85.2% D: 9.7%	4.740	0.315	A: 92.9% D: 4.1%	A: 83.2% D: 10.2%	8.198	0.085*	A: 82.7% D: 8.2%:	A: 88.3% D: 8.2%	5.437	0.245
Employer: Uses equity policy in planning projects(n=276)	AO: 77.4% RN: 7.6%	AO: 61.7% RN: 20.2%	14.985	0.005***	AO: 63.4% RN: 20.4%	AO: 68.9% RN: 13.7%	4.360	0.360	AO: 67.7% RN: 16.7%	AO: 66.7% RN: 15.6%	5.457	0.244	AO: 67.7% RN: 14.0%	AO: 66.7% RN: 17.0%	3.624	0.459
Employer: Weighs public needs (n=290)	AO: 93.9% RN: 1.0%	AO: 82.3% RN: 2.6%	9.479	0.024**	AO: 90.7% RN: 2.1%	AO: 83.9% RN:2.1%	4.931	0.177	AO: 88.7% RN: 2.1%	AO: 85.0% RN: 2.1%	3.602	0.308	AO: 87.8% RN: 3.1%	AO: 85.4% RN: 1.6%	1.870	0.600
Employer: Independent from elected gov't (n=294)	58.2%	58.7%	0.007	0.933	54.1%	60.7%	1.184	0.277	58.2%	58.7%	0.007	0.933	58.2%	58.7%	0.007	0.933
Jurisdiction: National/State (n=294)	15.3%	21.4%	1.567	0.211	19.4%	19.4%	0.000	1.000	19.4%	19.4%	0.000	1.000	15.3%	21.4%	1.567	0.211
Jurisdiction: Regional (n=294)	72.4%	68.4%	0.516	0.473	57.1%	74.5%	6.317	0.012**	73.5%	67.9%	0.975	0.323	68.4%	70.4%	0.129	0.720
Jurisdiction: Municipal (n=294)	25.5%	27.0%	0.079	0.779	36.7%	21.4%	7.853	0.005***	22.4%	28.6%	1.256	0.262	27.6%	26.0%	0.079	0.779
Employee: Is a manager (n=294)	32.7%	27.6%	0.822	0.365	37.8%	25.0%	5.136	0.023**	27.6%	30.1%	0.205	0.650	34.7%	26.5%	2.104	0.147
Employee: Agrees with org. transportation policies (n=285)	AO: 63.3% RN: 4.1%	AO: 52.4% RN: 9.1%	7.457	0.114	AO: 57.3% RN: 7.3%	AO: 55.6% RN: 7.4%	1.524	0.822	AO: 61.1% RN: 5.3%	AO: 53.7% RN: 8.4%	2.109	0.716	AO: 56.8% RN: 7.4%	AO: 55.8% RN: 7.4%	3.345	0.502
Employee: Tenure (n=292)	≤ 2 yrs: 27.8% ≥ 10 yrs: 42.3%	≤ 2 yrs: 32.3% ≥ 10 yrs: 36.9%	1.195	0.879	≤ 2 yrs: 30.6% ≥ 10 yrs: 35.7%	≤ 2 yrs: 30.9% ≥ 10 yrs: 40.2%	1.647	0.800	≤ 2 yrs: 35.1% ≥ 10 yrs: 36.1%	≤ 2 yrs: 28.7% ≥ 10 yrs: 40.0%	2.862	0.581	≤ 2 yrs: 28.9% ≥ 10 yrs: 41.2%	≤ 2 yrs: 31.8% ≥ 10 yrs: 37.4%	0.661	0.956

Table 5. Exemplar Cases of Planning Style

Note. ***p≤.01, **p≤.05, *p≤.10. For scale variables, Coeff=t-value and standard errors in parentheses. For ordinal and nominal variables, Coeff. is Pearson X² coefficient "F". For ordinal variables: A=Strongly Agree or Agree; D=Strongly Disagree or Disagree; AO=Always or Often; RN=Rarely or Never. For display purposes in this table, all ordinal variable statistics omit middle value categories; the analysis examined all ordinal values of each variable without merging or omitting categorical values.

	Advocate Planners (n=69)	Political Planners (n=80)	Collaborative Planners (n=78)	Technical Planners (n=67)	Coeff.	р
Age (n=278)	41.7 (10.6)	40.4 (11.8)	41.3 (12.7)	37.4 (11.4)	1.779	0.151
Gender (male) (n=285)	61.2%	66.7%	61.3%	69.2%	1.444	0.695
Minority (n=274)	20.6%	14.7%	22.7%	18.0%	1.718	0.633
AICP/CIP (n=289)	32.8%	15.4%	27.3%	20.9%	6.870	0.076*
Master's degree or higher (n=293)	78.3%	79.7%	67.9%	70.1%	4.014	0.260
Degree: Planning (n=294)	68.1%	60.0%	52.6%	52.2%	4.891	0.180
Degree: Engineering (n=294)	13.0%	11.3%	10.3%	23.9%	6.761	0.08*
Years Since Degree (n=287)	13.2 (9.1)	13.5 (11.7)	13.9 (11.8)	11.4 (10.1)	0.760	0.517
Justice: Alleviating Suffering (n=294)	A: 81.2% D: 7.2%	A: 81.3% D: 2.5%	A: 74.4% ^g D: 7.7%	A: 68.7% ^g D: 10.4%	18.407	0.104
Justice: Promoting Fairness (n=294)	A: 85.5% D: 10.1%	A: 92.5% D: 5.0%	A: 89.7% D: 6.4%	A: 76.1% ^g D: 11.9%	18.270	0.108
Employer: Uses equity policy in planning projects (n=276)	AO: 76.9% RN: 7.7% ^g	AO: 55.8% ^g RN: 26.0%	AO: 75.3% RN: 12.3%	AO: 60.7% ^g RN: 16.4%	29.969	0.003***
Employer: Weighs public needs (n=290)	AO: 91.3% RN: 1.4%	AO: 88.8% RN: 2.5%	AO: 86.7% RN: 1.3%	AO: 77.3% RN: 3.0%	16.239	0.062**
Employer: Independent from elected gov't (n=294)	58.0%	58.8%	56.4%	61.2%	0.351	0.950
Jurisdiction: National/State (n=294)	23.2%	17.5%	20.5%	16.4%	1.261	0.738
Jurisdiction: Regional (n=294)	73.9%	56.3% ^g	78.2%	71.6%	10.229	0.017**
Jurisdiction: Municipal (n=294)	29.0%	40.0% ^g	16.7%	19.4%	13.299	0.004***
Employee: Is a manager (n=294)	30.4%	31.3%	25.6%	29.9%	0.704	0.872
Employee: Agrees with org. transportation policies (n=285)	AO: 61.8% RN: 4.4%	AO: 52.6% RN: 11.5%	AO: 59.2% RN: 3.9%	AO: 50.8% RN: 9.5%	11.192	0.513
Employee: Tenure (n=292)	≤ 2 yrs: 27.9% ≥ 10 yrs: 42.6%	≤ 2 yrs: 35.0% ≥ 10 yrs: 40.0%	≤ 2 yrs: 32.1% ≥ 10 yrs: 46.2%	≤ 2 yrs: 27.3% ≥ 10 yrs: 51.5%	8.411	0.752

Table 6. Primary Style Across Cases

Note. $***p \le .01$, $**p \le .05$, $*p \le .10$. Among both significant and non-significant test results, ^g denotes values that differ significantly from other same-row values at .05 level. For scale variables, Coeff.=t-value and standard errors in parentheses. For ordinal and nominal variables, Coeff. is Pearson X² coefficient "F". For ordinal variables: A=Strongly Agree or Agree; D=Strongly Disagree or Disagree; AO=Always or Often; RN=Rarely or Never. For display purposes in this table, all ordinal variable statistics omit the middle value; the analysis examined all ordinal values of each variable without merging or omitting categorical values.

5.5. Discussion

Using one of the most extensive surveys of North American transportation planners to date, we reveal four distinct transportation planning styles: technical planning grounded in data rather than public deliberation; political planning as characterized by making efforts to advance ideas derived from personal insight; collaborative planning that crafts outcomes primarily through public consultation; and advocacy planning marked by aggressive outreach to underprivileged stakeholders during public consultation. These results offer two key contributions to our understanding of transportation planner attitudes. First, transportation planning styles coincide with urban planning typologies in general and, as such, we can tentatively conclude that training and regulatory interventions for urban planners can yield comparable stylistic outcomes specifically among transportation planners. Second, advocacy planning also emerges for the first time in a broad-based survey as distinct from political or collaborative planning. Its high internal consistency suggests transportation planners adopt the style wholeheartedly or not at all, in contrast to the incorporation of collaborative planning components among other planning types, drawing attention to multiple approaches to public consultation that employers should consider as they foster professional attitudes for public engagement (Innes and Gruber, 2005; Ploger, 2001; Rydin, 2007).

Both analyses underscore strong associations between institutional factors and planning style. Advocacy planners are more likely to be employed by institutions which consider equity in project decision-making and weigh public needs, for example, while political planners tend to work at municipal institutions rather than regional bodies like MPOs. Institutional independence from elected government notably does not associate with planning style, suggesting that placing transportation planners directly under the management of elected office does not affect their approach to the voting public. These findings lead us to propose that institutions wishing to foster transportation planning in the public interest should consider explicit procedural guidelines mandating public consultation, e.g. nationally-mandated accessibility planning procedures at the local level in the U.K. (Lucas, 2006), and France's Local Democracy Act of 2002, which requires public consultation for large infrastructural projects (Hyard, 2012). Such measures would ensure that transportation planners, particularly

those exemplifying the political style, would have their top-down normative conduct mediated by transparent procedures designed to promote administrative goals while accommodating users with unique concerns.

Training predicts planning style independent of institutional factors, though their associations are weak in comparison. The higher levels of AICP/CIP certification among advocacy and collaborative planners suggests that certification programs and continuing education requirements foster greater attention to public consultation, as found by previous work (Laurian and Shaw, 2009). We attribute the higher education levels among advocates and political planners to two factors alluded to within the data: the ascension of highly-educated planners into managerial roles which may require political planning, and; higher rates among technical planners of degrees in engineering, a discipline which may not require postgraduate education to advance through one's career. Our approach precludes us from determining whether training impacts planning style directly or whether training impacts one's subsequent tasks in transportation planning, e.g., modeling and management, which in turn bracket one's planning style. To elucidate the factors behind these associations, we advise future studies to discern among sub-disciplines of transportation planning over time.

As suggested by previous studies, personal characteristics seldom predict planning style. The top-third of cases of political planning tend to be male compared to other planners while technical planners tend to be younger—a finding which we attribute in part to the high turnover and advancement of modelers to other tasks at transportation planning organizations (Hatzopoulou and Miller, 2009). Overlooked to date, social justice values associate with differences in planning style: advocate and political planners believe in greater numbers that it is important to "change social conditions to alleviate suffering", while there is a more widespread appreciation for fairly and equitably distributing resources across society with the notable exception of technical planners. Succinctly put, our sample suggests that planners who embrace normative conduct tend to have progressive social justice values which, presumably, factor into their professional attitudes. These results prompt additional questions about the relationship between transportation planners' personal beliefs and their conduct, primarily whether values shape planners' style (or vice versa), or whether social justice values are an

inherent component of style that should be incorporated as a factor in categorizing planners into styles.

We conclude that institutional and training measures are reliable predictors of transportation planner professional attitudes, and that these attitudes closely resemble those previously described in urban planning scholarship. Our investigation offers foundational insights for employers and associated stakeholders to intervene in the development of planning style, yet our findings should be interpreted according to the epistemological limits of our approach. We remain uncertain about the causal pathways which characterize associations between planners' characteristics and attitudes given our cross-sectional approach and the possibility of hypothetical bias in the stated choices of survey respondents, who may have answered attitudinal questions according to professional ideals rather than revealed preferences tied to on-the-job incentives and penalties (Vossler and Evans 2009; Taylor, Morrison, and Boyle 2010). Future surveys can better control for hypothetical bias by underscoring the possible consequences of stated attitudes on transportation planning outcomes or soliciting respondents' certainty of attitudinal responses as they are provided (Fifer, Rose, and Greaves 2014; Beck, Fifer, and Rose 2016). Systematic survey instruments, however, remain limited in their ability to account for the unique circumstances of planners, including stylistic shifts depending on one's task as observed Innes and Gruber (2005) and the role played by practitioners' own workplace experiences in shaping conduct through reflective practice (Schon 1984). Regarding these factors, we situate our findings as a template for future context-sensitive investigations including, but not limited to, workplace ethnography, case studies, focus groups, and the ongoing validation of stylistic instruments tailored for specific employers, e.g., Deloitte's Business Chemistry system for identifying collaborative strengths and weaknesses among employees (Johnson Vickberg and Christfort 2017).

We close by noting several gaps emerging from our study whose comprehension will assist organizations to more effectively employ planning style to their advantage. Our study did not account for several certifications prevalent in transportation planning, e.g., from ITE and ASCE, yet illuminating their unique associations with planning style could enable employers to seek and train transportation planners with style in mind. We also express a broader concern

regarding who may be classified as a transportation planner. Our sample principally comprised of public-sector employees of municipal and regional transportation planning organizations, yet we advise subsequent studies to differentiate planners' tasks to elucidate the extent to which professional duties bracket one's style. A final gap in understanding, related to the previous two, is whether stylistic characteristics tangibly shape procedural and system outcomes. These outcomes may be assessed in part by comparing constituent satisfaction with planning procedures and system characteristics with the stylistic profiles of their respective organizations, as attempted with scientific organizations (Pielke, Jr. 2007, Appendix), or comparing workplace performance evaluations with stylistic measures controlling for one's tasks as a transportation planner. We surmise that gauging the impact of transportation planning style on individual and organizational performance will enable practitioners to pursue evidencebased strategies to improve team work in their organizations and more efficiently deliver services meeting their diverse constituents' needs.

Preface to Chapter 6

This chapter investigates how social inclusion is incorporated into strategic pedestrian plans by analyzing municipal documents in Canada, according to the fourth objective of my research agenda. I examine the public consultation procedures, consulted stakeholders, and sociallyinclusive policies from latest generation of plans as systematically collected from more than twodozen municipalities. Revealed practices bode poorly for the incorporating social space into pedestrian planning, particularly the widespread reliance on tokenistic approaches to public outreach and stakeholder engagement which may not offer socially-excluded groups the opportunity to shape or comment on plan design. I propose corrective changes to plan design practice in line with collaborative and advocacy planning styles from the previous chapter while highlighting policies which can approximately link social space, an unfamiliar concept to many transportation planners, to concrete and measurable interventions that promote social service access for socially-excluded residents.

Chapter 6: Examining Social Inclusion among Pedestrian Plans in Canada

6.1 Introduction

Walking is a versatile means to address issues in transportation, public health, and other domains. It is the foundational mode of most trips and therefore integral to transit access, parking policy, and other transportation demand management measures (Noland et al., 2015; Poudenx, 2008; Wasfi et al., 2013). There is a well-established link between walking and several health indicators (Frank et al., 2008; Sallis et al., 2012), while walking can complement other transportation measures to mitigate particulate matter and reduce greenhouse gas emissions (Banister, 2008). Furthermore, walking and other active transportation measures elicit economic savings in household and municipal budgets (Litman, 2017). In Canada, a cursory glance at recent stakeholder publications demonstrates a desire to promote walking as an everyday mode of travel (Institut national de santé publique du Québec, 2014; Public Health Agency of Canada, 2014; Transport Canada, 2011), particularly when its share of all commuting trips has declined from 7.0% in 1996 to 5.7% in 2011 and residents' obesity rates continue to rise to unprecedented levels (Twells et al., 2014).

However, as is the case throughout much of the developed world, the positive and negative impacts of pedestrian planning are not equally distributed across Canadian society. The federal government lacks comprehensive guidelines for universal design, exposing people with reduced mobility to a patchwork of provincial and municipal standards despite the country's aging population, which will incur an increased risk of serious injury and death in pedestrian collisions (Forbes and Habib, 2015; Vanlaar et al., 2016). In Canada's largest cities, low-income neighbourhoods bear a disproportionate number of pedestrian-motor vehicle collisions, including those involving children, due to their exposure to through-traffic on arterial roadways and other built environment features that do not favour walking (Brubacher et al., 2016; Morency et al., 2012; Rothman et al., 2017; Yiannakoulias and Scott, 2013). Aboriginal communities, i.e., First Nations, Metis, and Inuit, are overrepresented in pedestrian injuries and fatalities in British Columbia (Amram et al., 2016; Desapriya et al., 2011), while recent immigrants clustered in Toronto's suburban high rise residences navigate their sprawling car-oriented surroundings via

informal pathways and jaywalking (Hess and Farrow, 2010). With institutional linkages between transportation authorities and social services lacking in many places (Bergeron and Lévesque, 2012; Hatzopoulou and Miller, 2008), low-income carless individuals may be left isolated from amenities related to health, education, and affordable housing, which are necessary to sustain and improve their quality of life (e.g., (Lu and Qiu, 2015; McNeil et al., 2015), and thus compelled to walk longer distances than more advantaged counterparts would tolerate (Manaugh and El-Geneidy, 2011).

These unequal outcomes call into question the social inclusion practices of designing pedestrian spaces in Canada, namely: (1) are residents permitted to collaboratively contribute to pedestrian plan development; (2) are socially-excluded residents well-represented in pedestrian plan development; and (3) are the unique needs of socially-excluded residents addressed in pedestrian plan policies? We examine the literature to assess the participatory measures and substantive policies of more than two dozen pedestrian plans. After outlining general trends, we identify best practices that should be incorporated into plan development procedures and deliverables to bolster their social inclusion and, we hope, attenuate social disparities in pedestrian outcomes over time.

6.2. Literature Review

6.2.1. Inclusive Spaces for Pedestrians

Social inclusion denotes numerous processes enabling groups to partake and prosper in the society in which they reside (Hine, 2004; Lucas, 2006; Preston and Rajé, 2007; Xia et al., 2016). With its roots in the right to access and shape urban spaces (Lefebvre, 1974/1991), social inclusion has caught the attention of transportation scholars in recent years as they strive to explain systemic inequalities relating to travel behavior, public health, and quality of life. It is distinguished from related themes like equity by situating transportation advantage as one of many conditions shaping how socially-excluded populations interact with society. Lucas (2012), for example, argues that social inclusion extends toward a more comprehensive understanding of personal circumstances, e.g., physical abilities and social capital, and their interaction with economic, social, and institutional structures impacting the delivery of services, e.g., the

conditions of the market and complementary welfare systems on well-being. As one's life circumstances and the wider world are constantly changing, she contends social inclusion measures must engage with services beyond transportation such as health, housing, and employment to ensure that socially-excluded groups are able to access "key life-enhancing opportunities" (Lucas, 2012, p. 106) while being equitably considered in the distribution of impacts from transportation decision-making across society (Jones and Lucas, 2012). Contributing a normative rationale for social inclusion, transportation justice literature argues that planning should draw from ethical principles to improve transportation opportunities for socially-excluded groups as a means to augment their capabilities (Martens, 2016; Pereira et al., 2017).

While the relationship between motorized modes and social inclusion is well-established (Casas, 2007; Delbosc and Currie, 2011; Preston and Rajé, 2007; Xia et al., 2016), the impact of pedestrian disadvantage on social inclusion is less clear. Seniors and people with disabilities face physical barriers while walking that impede their access to amenities, such as local shopping and intermodal transit transfers (Ferrari et al., 2014; Hine and Mitchell, 2001; Mackett et al., 2008); this trend may be compounded in sprawling cities like Sydney and Perth, Australia by residential self-selection into low-cost housing in auto-dependent suburbs (Delbosc and Currie, 2011; Xia et al., 2016). Walking is commonly marketed as a low-cost mode, yet low-income people continue to face pedestrian accessibility and safety challenges. For example, the majority of low-income housing units subsidized by the United States Department of Housing and Urban Development are located in low-walkability neighbourhoods (Koschinsky and Talen, 2015) while in Montreal, low-income individuals walk in low-walkability areas at far higher rates than their affluent counterparts in part because they do not have the financial means to use motorized alternatives (Manaugh and El-Geneidy, 2011). Geographic consolidation of public services such as health care and schools further compounds social exclusion for transport-disadvantaged households, especially those without automobile access (Lucas, 2006).

6.2.2. Plans and their Value

As the creation of walkable spaces depends on a diffuse web of offices and stakeholders, e.g., public works, zoning, private developers, and parks and recreation, it can be difficult to design

compressive pedestrian interventions which target social inclusion. The development and publication of pedestrian plans offers one of the strongest platforms for municipalities to weigh citizens' needs, design interlinking solutions, and articulate them such that public officials, private stakeholders, and the public can act strategically to meet social inclusion goals.

But what makes a high-quality, socially-inclusive plan? Plan evaluation scholars advocate examining structural and procedural criteria to discern the quality of a plan (Baer, 1997; Berke and Godschalk, 2009; Lyles and Stevens, 2014; Norton, 2008). Stevens (2013), for example, notes that plans should have a robust fact base with legislative context, clear goals and related policies, an implementation plan with steps for plan monitoring and evaluation, and transparent discussion of public consultation and stakeholder outreach. Norton (2008) argues that these attributes should adhere to communicative action criteria—accuracy; comprehensibility; legitimacy; and sincerity—which facilitate rational debate and consensus about plan policies (Forester, 1989; Healey, 2006). In the context of social inclusion, plan policies should clearly define socially-excluded populations and their needs before tailoring policies for them at a municipal scale or, where socially-excluded groups are spatially concentrated, at the neighbourhood level. Recent evaluations of North American transportation master plans suggest that they frequently rely on aspirational statements which poorly distinguish among socially-excluded groups in specific policies, implementation strategies, and monitoring guidelines (Lee et al., 2017; Manaugh et al., 2015).

Participation has been the focal point of much work at the intersection of planning and social inclusion. Arnstein (1969) noted that participatory exercises run the gamut from manipulation and tokenism to citizen control, and subsequent planning theorists (Forester, 1989; Healey, 2006) outline comprehensive approaches that reorient planning from a technical practice toward a collaborative one. Burby (2003) argues that participation is most successful when a wide crosssection of stakeholders and the general public can meaningfully contribute to the plan's development, as they feel invested in the process and their unique insights can shape outcomes. Socially-excluded groups, however, may not be well-represented in plan development due to their asymmetrical access to information compared to other groups, cultural and language barriers, lack of free time or transport, and other factors which structurally bar disadvantaged

groups from civic engagement (Hodgson and Turner, 2003). Among U.K. transport plans, Bickerstaff and colleagues (2002) found that stakeholder advocates in the public sector tended to represent politically-marginalized groups in plan design in lieu of generalizable participation by these groups. Broad-based surveys may provide additional insights into issues and preferences on the ground, yet in the Canadian context, low-income and older Canadians are significantly less likely to have phone or internet access (CRTC, 2015) while survey mode and incentives result in different demographic profiles in responses (Perez et al., 2013).

6.2.3. Social Inclusion and Plans in Canada: Context and Gaps

It can be difficult to characterize pedestrian planning at a national level because its associated procedures and standards are delegated to lower levels of government. The federal transportation portfolio remains limited to transport systems associated with commerce and international trade, e.g., rail, air, and marine, with its involvement in pedestrian planning primarily associated with systematic data collection, management, and dissemination and the publishing of public health and transport reports targeting provincial and municipal stakeholders (Garneau et al., 2016; Transport Canada, 2011). While the latest version of the National Transportation Policy calls for a transportation system that is "accessible without undue obstacle to the mobility of [...] persons with disabilities" (Government of Canada, 2016), this policy is not judicially enforceable to the same degree as the Americans with Disabilities Act in the United States and its applicability to pedestrians is unclear. Provinces and municipalities may enact their own standards for elements within the pedestrian realm, such as universal design principles, yet these practices are more common among larger provinces and cities. Public consultation guidelines are also fragmented across jurisdictions; Ontario's Environmental Assessment Act, Alberta's City Transportation Act, and Newfoundland and Labrador's Urban and Rural Planning Act are notable examples of provincial legislation mandating public consultation for urban or transportation planning. The Canadian Institute of Planners and regional affiliates have codes of conduct regarding the public interest, but these do not designate socially-excluded groups requiring special consideration. Succinctly put, the institutional factors which might shape social inclusion in pedestrian plans are highly contextual at a national scale.

Canadian scholars have examined this geographic and institutional fragmentation, concluding that it negatively impacts the design and implementation of broad-based planning interventions relating to complex themes like sustainability and equity (Bergeron and Lévesque, 2012; Clark et al., 2010; Hatzopoulou and Miller, 2008). Few local studies have uniquely examined transportation plans despite their importance in visioning solutions and coordinating actions among disparate stakeholders (Manaugh et al., 2015; Scanu, 2014). This absence of scholarship is particularly apparent regarding pedestrian issues and social inclusion, respectively, offering practitioners little guidance from which to prescribe strategic interventions for walking among socially-excluded groups. If pedestrian planning is to address inequitable behavioral and health outcomes faced by socially-excluded groups, stemming concurrently from their exposure to transportation and personal disadvantages according to social inclusion in transport scholarship, it is necessary to start by examining the current state of plan design practice: determining broad trends; identifying innovative practices, and ultimately; proposing approaches to operationalize social inclusion concepts considering fragmentation among stakeholders in strategic pedestrian planning and among institutions in Canadian more broadly.

6.3. Method

We chose to examine this state of practice by analyzing the content of a systematic sample of pedestrian-oriented plans. We begin this section by describing our document selection criteria, which sought to balance population representativeness with geographic coverage to encompass the wide scope of municipalities engaging in strategic pedestrian planning. We follow with our analytical framework, including criteria formulation and analysis, before noting trade-offs associated with our approach as framed through previous plan evaluation studies.

6.3.1. Document Selection

First, we identified criteria for document selection. We established a hierarchy for plan selection: (a) pedestrian plans or, if unavailable; (b) active transportation plans; (c) transportation master plans, and ultimately; (d) municipal plans with transportation elements. We excluded plans more than 10 years old as of January 2017 to bracket our findings to current plan design practices. Furthermore, to bracket our analysis to comparable longer-term strategic plans, we excluded all

plans with scheduling horizons ≤ 5 years. With these criteria established, we began document selection with a systematic search of websites representing municipalities with at least 200,000 residents. This was followed by sampling the largest cities in not-yet-represented provinces for which there were plans which met our criteria. Our search strategy yielded 29 documents from 27 cities that, in sum, housed approximately one-half of Canada's urban-designated population in 2016 (Table 7).

6.3.2. Analytical Framework

We developed an analytical framework only after a preliminary reading of the selected plans. This reading was done in ATLAS.ti (ATLAS.ti GmbH, 2016) and focused on plan sections devoted to public consultation and pedestrian policies; goals and implementation guidelines were not examined due to their varying specificity from plan to plan. We derived social inclusion criteria for participation and policies during this reading using a coding schema based on consultation instruments and socially-excluded populations identified in Elvy (2014). These criteria and their presence throughout plans can be viewed in the Results section. In brief, we

- Cut the number of participation instrument criteria from 31 to 19, removing those not present in the Canadian plans and consolidating others into larger criteria,
- Identified nine recurring criteria and three subcriteria of policies relating to sociallyexcluded groups, with each criterion applicable to one or more groups, e.g., "improving sidewalk snow removal" applies to both seniors and people with disabilities, and
- Added criteria for nine stakeholder advocate groups, given that more collaborative or engaged public consultation do not mean socially-excluded groups will participate, but rather that all participants are able to proactively contribute to plan development.

After designating these social inclusion criteria, we undertook the content analysis of the plans' participatory and policy characteristics (Krippendorff, 1980). We drew participation statements from plan sections devoted to consultation and affiliated documents cited therein, e.g., City of Oshawa ITMP Technical Memorandum #6. We drew policy statements from sections devoted to "policies," "actions," "recommendations," and similar language. Stakeholder advocates were identified within these document, including sections devoted to consultation and "lists of engaged stakeholders" at the end of some plans. Relevant statements were tabulated in Excel
(Microsoft, 2013) alongside source material in the pre-established criteria columns. This process was repeated to verify the (non)presence of criteria-relevant statements.

#	City	Pop. (2016)	Plan Title	Plan Voor	Plan
1	Toronto, ON	2,731,571	Toronto Walking Strategy	2009	PP
2	Montreal, QC	1,704,694	Transportation Plan	2008	TMP
3	Calgary, AB	1.239.220	Step Forward: A strategic plan for improving	2016	РР
-		-,,	walking in Calgary		
4	Ottawa, ON	934,243	Ottawa Pedestrian Plan	2013	PP
5	Edmonton, AB	932,546	(1) The Way We Move(2) The Way We Grow	(1) 2009(2) 2010	(1) TMP (2) MP
6	Winnipeg, MB	705,224	Winnipeg Pedestrian and Cycling Strategies	2014	ATMP
7	Vancouver, BC	631,486	Vancouver 2040	2012	TMP
8	Hamilton, ON	536,917	Step Forward: Hamilton Pedestrian Mobility Plan	2012	PP
9	Quebec, QC	531,902	Alternative: Transportation for Better Living	2011	TMP
10	Surrey, BC	517,887	City of Surrey Walking Plan: Creating walkable neighbourhoods	2011	PP
11	Laval, QC	422,993	Plan de mobilité active de Laval	2013	ATMP
12	London, ON	383,822	2030 Transportation Master Plan: SmartMoves	2013	TMP
13	Markham, ON	328,966	Markham Official Plan	2014	MP
14	Vaughan, ON	306,233	Pedestrian and Bicycle Master Plan Study: Final Report	2007	ATMP
15	Gatineau, QC	276,245	Plan de déplacements durables	2013	ТМР
16	Longueuil, QC	246,376	Plan de mobilité active	2013	ATMP
17	Kitchener, ON	232,755	Kitchener Integrated Transportation Master Plan	2013	TMP
18	Regina, SK	215,106	Transportation Master Plan	2015	TMP
19	Oakville, ON	193,832	Active Transportation Master Plan	2009	ATMP
20	Oshawa, ON	159,458	City of Oshawa Active Transportation Master Plan, with consultation strategy described in the Integrated Transportation Master Plan	2015	ATMP
21	Kelowna, BC	127,380	Kelowna on the Move	2016	ATMP
22	St John's, NL	108,860	Envision St. John's	2014	MP
23	Kamloops, BC	90,280	Pedestrian Master Plan	2013	PP
24	Victoria, BC	85,792	Pedestrian Master Plan: Final Report	2008	PP
25	Sault Ste. Marie, ON	73,368	Transportation Master Plan	2015	TMP
26	Saint John, NB	67,575	Municipal Plan	2011	MP
27	Charlottetown, PE and environs	56,905	Regional Active Transportation Plan	2012	ATMP

Table 7. Sampled Canadian Pedestrian Plans and their Jurisdictional Characteristics

Note. Plan types denoted by acronyms: pedestrian plan (PP), active transportation master plan (ATMP), transportation master plan (TMP), and municipal plan (MP). Edmonton and Oshawa each produced multiple plan documents from unified plan development procedures. As such, we treat the two documents in each city as one plan. The population of Charlottetown and environs is the sum of the three municipalities listed in the plan.

6.3.3. Limitations

There are epistemological trade-offs to our approach. Our document selection criteria may have excluded plan documents integral to pedestrian planning in some municipalities. The language of some plan statements may be unclear, e.g., without supporting language, a "public information centre" may denote an informational meeting or an open house. A handful of plans did not sufficiently discuss, or cite documents which discuss, public and stakeholder engagement in the plan development process to draw complete comparisons with other plans-an issue discussed in depth by Bickerstaff and colleagues (2002). Some scholars argue that ambiguities should be addressed through multiple independent coders and statistical validation of their findings (Berke and Godschalk, 2009; Lyles and Stevens, 2014). We did not employ this strategy for several reasons: we grounded our criteria in the plans before conducting the content analysis; we provided commentary relating to points of ambiguity in all initial tables, distilling results for public and stakeholder participation due to publication constraints, and; for social inclusion policies, we cited the specific policy number or page for review. We contend that our transparent representation of the method and results offers accountability as qualitative research increasingly embraces the researcher as constituent to, rather than detached from, qualitative analysis and its outcomes (Charmaz, 2014; Corbin and Strauss, 2008). Furthermore, we argue that this degree of transparently normative interpretation is beneficial, and indeed necessary to inform future debates on social inclusion and pedestrian planning. Baer (1997) speaks to the value of normative plan evaluation: "[T]he critic's approach has some virtues. Its very individuality has the flexibility to form the critique to fit the occasion, and to introduce new concerns" (p. 330).

6.4. Results

Public engagement is almost universally discussed within our sample of plans (Table 8). Informational and conversational approaches are more common than collaborative alternatives, with many plans directly referencing provincial or municipal regulations as the template for their own engagement strategies. Most plans in Ontario, for example, refer to the province's Municipal Class Environmental Assessment guidelines and measured their approach against its minimum requirements: an official announcement within a newspaper, two public information centres, and related informational approaches. Social media is common in newer plans,

sometimes in lieu of a stand-alone website or newsletters. Surveys provided insights for the majority of plans with web surveys being most prevalent. Several plans transparently note their survey respondents are not a representative cross-section of the population, despite high numbers of responses (e.g., Sault Ste. Marie, Kelowna), while other plan-associated surveys have inadequate sample sizes given their cities' populations, e.g., Regina (n=171) and Oshawa (n=18). Event intercept surveys denote those disseminated at open houses, electronically or by paper. User intercept includes the attachment of survey notices on parked bicycles (Kelowna) and the interception of active transportation users in key locations (Vaughan); these approaches neglect individuals who may not have the physical or spatiotemporal ability to be actively mobile during daylight hours. Collaborative approaches are generally lacking for the public; while workshops are common among the plans, the majority of these were invitation-only stakeholder events.

STRATEGIES	N (cities)
Public Consultation (any)	26
Informational (any)	21
Public meetings	15
Stand-alone website	14
Newsletters / Media appearances	6
Conversational (any)	21
Open houses	19
Social media / Message boards	7
Focus groups	1
Survey (any)	19
Web	16
Phone	5
Event intercept	5
User intercept	2
Unknown	2
Collaborative (any)	7
Participatory mapping (online or on-site)	4
Workshop (indoors)	4
Workshop (walking)	1
Student engagement exercises	1

 Table 8. Public Engagement Strategies in Plan Development

Regina's plan designers held a public workshop with a walking component, though this took place in a downtown area and as such may not have broached the conditions in socially-excluded or low walkability areas. Saint John held forums with students at local schools. An additional factor to note would be the wide range in public outreach associated with plan development, from the mailing of brochures discussing procedures and future meetings to all residents of St. John's to the seemingly limited involvement of individual citizens in Montreal, which relied on discussions with community groups and other key stakeholders.

Twenty-four of the plans discussed stakeholder organizations, many of whom were brought up in vague or partial terms, e.g., "individual discussions with several key stakeholder groups" in Kamloops. Montreal and Quebec provide comprehensive lists with no elaboration regarding the group's function without descriptive words in organizational titles. We can say with certainty that business, public health, active mobility, and school organizations are more transparently listed than organizations concerned with reduced mobility or socioeconomic disadvantage (Table 9). The method of engaging these stakeholders ran the gamut from meeting individually with group representatives to receiving policy briefs (e.g., Quebec), conducting interviews and focus groups with stakeholder advocates (e.g., Charlottetown), visioning workshops, dedicated advisory committees (e.g., Kitchener, Saint John, London, Victoria), and various permutations of these strategies. Longueuil's *Plan de mobilité active* makes no reference to stakeholder engagement, though it extensively cites stakeholder publications.

STAKEHOLDER ORGANIZATIONS	N (cities)
Stakeholder Organizations (any)	24
Business / Development	16
Public health / Healthy living	16
Active mobility	15
Education / Children	15
People with Disabilities	11
Seniors	9
Low-income	6
New Canadians / Visible minorities / Aboriginals	5
Unknown	3

Table 9. Stakeholder Organizations Engaged in Plan Development

Table 10 displays social inclusion policies as tailored to the Canadian context. Seniors and people with disabilities are well-represented among Canadian plans: retrofitting sidewalks (n=27); retrofitting crossings (n=24), and; improving sidewalk snow removal (n=21). Three subcriteria of "retrofitting crossings" and their associated socially-excluded groups are not shown in Table 10: countdown and phasing adjustments for seniors and people with disabilities (n=18); audible signals for people with disabilities (n=14), and; tactile signage and surfaces for people with disabilities (n=9). There is variable consideration for reconciling social inclusion amenities with walkable spaces, either through retrofitting the walking environment or placing amenities in walkable neighbourhoods: schools (n=26); senior housing and eldercare (n=13); affordable housing (n=8); and childcare (n=5). Most plans did not have policies to consider New Canadians, aboriginals, or visible minorities (n=6) or population equity in general (p=6) in future consultation and planning.

6.5. Discussion

Canadian municipalities share similar concerns about inclusion in pedestrian plan design, despite few guiding principles at the federal level. Universal design policies are widespread and frequently accompanied by social service policies bridging accessibility gaps for all ages and abilities. Conversely, the sampled plans seldom address the needs of low-income and minority groups for whom affordable housing near employment and social services, such as daycare, can enhance capabilities over the long term. Stakeholder engagement likewise caters to ages and abilities more than socioeconomic status, though business and public health advocates contribute to plan development more than both categories of socially-excluded groups. Few cities offer public opportunities to genuinely contribute to plan policies, instead endorsing one-way informational approaches and surveys of questionable validity to glean information from everyday residents. So, while there are exceptions to the rule, we conclude that current plan design practices are not sufficient to augment social inclusion through pedestrian planning.

Acknowledging that plan analysis merely scratches the surface, our sample illuminates many transferable practices which, according to previous studies, amplify consideration of socially-

City	Retrofitting sidewalks, obstructions for universal design (SD)	Retrofitting crossings for universal design (SD)	Improving sidewalk snow removal (SD)	Reconciling senior housing with walkable spaces (S)	Reconciling schools with walkable spaces (C)	Reconciling childcare with walkable spaces (C)	Reconciling affordable housing with walkable spaces (I)	Considering New Canadians / aboriginals / Visible minorities in consultation / planning (M)	Considering population equity in future consultation / planning (none)	Comments
Toronto, ON	3.3, 4.3	4.8	4.9		2.6		6.1, 6.2, 6.3	6.1, 6.2, 6.3	1.2, 6.1, 6.2, 6.3	"Toronto's Secondary Plans offer a more detailed level of planning policy [] such as pedestrian comfort, safety and amenities" (p. 8). Recommendation 1.1 calls for several city departments, including social services, to work together on a city-directed Walking Strategy Team. Recommendations 6.1, 6.2, and 6.3 target low-income, high immigrant tower blocks concentrated in the suburban fringes of the city.
Montreal, QC	2.5	A2 2.1, A2 2.5	A2 2.3	A2 2.4	A2 2.2, A2 2.4					Action 2.1 calls for the creation of a pedestrian charter. It's interesting to note how Montreal, Calgary, and other cities convey snow clearing as a comfort issue rather than an accessibility issue.
Calgary, AB	8, 21, 22, 44	10, 11	30, 35, 36, 49		14, 38			41		Action 44 promotes a washroom locator app. Action 41 promotes collaboration with community partners to develop pedestrian safety campaigns and translate them into other languages.
Ottawa, ON	2.1	2.1, 2.3, 4.1.3c	4.1.3d, 6.2		3.2.2, 4.1.1d, 4.2.3, 6.5					A Pedestrian Charter was already adopted at time of publication; it is included in the appendices and considers equity only by age and ability. They also made a comprehensive Pedestrian Plan in 2009, and the 2013 plan seems to be update-oriented with strategic adjustments based on experience. Recommendation 2.1 is grounded in existing design standards and provincial disability guidelines.
Edmonton, AB	TWWM 6.1; TWWG 4.1, 4.6.1, 5.6.1.13, 5.7	TWWM 6.1, 4.6.1	TWWM 6.1.f		TWWG 4.1, 4.2, 4.4	TWWG 4.2.1.10	TWWG 3.3.1.7, 4.2.1.9, 4.2.1.10, 4.4, 4.5		TWWG 3.5.2.3	Note that many urban design guidelines seem to be in <i>The Way We Grow</i> (TWWG), a land use document linked to <i>The Way We Move</i> (TWWM). Walking is largely seen as a means to reach transit in sprawling Edmonton's transport plan. Strategic Actions TWWM 6.1a and 6.1b call for the adoption of sidewalk gap and walkability strategies - perhaps a precursor to future measures.
Winnipeg, MB	1Aii, 1Aiv, 1Av	3A	4Aiv, 4Av, 4Avi, 4Avii	1Aiii, 3Avii, 3Aviii	1Aiii, 3Avii, 3Aviii, 3E, 6Biii			6Bii, 6Cii	1Avii, 6Bii	Note city-tailored equity analysis for active transport includes youth, seniors, immigrants, aboriginals, and low-income people (p. 96). Note the text associated with 6Bii: "Targeting walking and cycling education towards the City's more vulnerable and underrepresented populations (i.e. new immigrants, aboriginals, low income, seniors, and children and youth) can lead to City-wide benefits. This can include providing walking and cycling informational pamphlets, or information on skills training courses at community centres to reach underrepresented populations. The City should also work with its partners, including advocate groups, non- profit associations, and other government agencies to develop and deliver targeted outreach programs. As many of the vulnerable and underrepresented groups are concentrated in specific neighbourhoods in the City, these can also be targeted neighbourhood based campaigns to reach out to a combination of these groups" (p. 271).
Vancouver, BC	W 1.1, W 1.2, W 1.3, W 1.7	W 1.1, W 1.3			E 1.1.2		L 1.1	W 1.7		Note importance of restroom access and wayfinding (W 1.3.5). Note L 1.1 - the walkable mixed-use TOD policy - includes affordability in passing but may not be sufficient to make a right to the city. Note snow removal is only codified for bike lanes (C 1.3).
Hamilton, ON	3, 31	6, 17, 20, 22, 24, 26		6, 11, 20, 22, 26, 30	10, 11, 20, 22, 26, 30					This plan is unique in that, after much examination of possibilities, it lists urban features, e.g., "High Visibility Crosswalks," and recommends policy changes. Operational details are less consistently described: snow removal on sidewalks is discussed (p. 89, p. 104). However, the only codified recommendation refers to Street Buffers (29) as places for street snow to be plowed into without blocking the sidewalk.

Table 10. Social Inclusion Policies in Canadian Plans, Classified Alongside Socially-excluded Populations

City	Retrofitting sidewalks, obstructions for universal design (SD)	Retrofitting crossings for universal design (SD)	Improving sidewalk snow removal (SD)	Reconciling senior housing with walkable spaces (S)	Reconciling schools with walkable spaces (C)	Reconciling childcare with walkable spaces (C)	Reconciling affordable housing with walkable spaces (I)	Considering New Canadians / aboriginals / Visible minorities in consultation / planning (M)	Considering population equity in future consultation / planning (none)	Comments
Quebec, QC	39	41	39	10	38	5	6			Recommendation #4 advocates revisions to the Urban Development Plan to incorporate accessibility zoning. Demographic trends like aging and immigration (and intra-Quebec moves) are noted in support of senior housing and affordable family housing, but this discussion does not translate into for New Canadian consultation and planning policies.
Surrey, BC	p. 35, p. 53, p. 54	p. 29, p. 35	p.39	p. 35	p. 27, p. 28, p. 51					"Actions for Change" provided in unordered lists; we provide page numbers for reference.
Laval, QC	7, 8	4			2					The topic of snow removal is discussed on p. 32 (right before Action 1) as something brought up during public consultation, but it is not linked to an action. Seniors and people with disabilities are discussed on p. 17. Seniors are seen as a demographic force to consider in the coming years, while people with disabilities are related to the need for motorized wheelchairs to be considered in the provincial safety code
London, ON	1, 18		19		12, 13					Numbers denote "Priority Actions" in Table 12 (p. 3-25). Note much of the plan is focused on TDM, modal shift, and the viability of BRT. Transportation Goal #1 - provide safe, affordable, efficient transportation for everyone [who cannot own their own vehicle] - was derived from the study input, but are poorly integrated into pedestrian policy direction (transit comes first, then cycling). There's ad hoc consideration of certain contexts, e.g., the 250m walk between the hospital and the closest existing bus stop. Intersection measures seem to focus on maximizing transit efficiency rather than pedestrian access.
Markham, ON	7.1.3.6a, 7.2.4.2b			4.1.3.1, 4.1.3.6	4.2.3.1b	8.13.2.1b	4.1.3.6	4.1.3.1c		Note that immigrants, low income people, seniors are all considered in housing stock for affordable and shared housing (4.1.3). Note that active transport and TDM are in the same section of the plan (7.1.4). Note that daycare centres are considered for several residential and commercial zoning types, but NOT on lands "designated 'General Employment' (8.5.5.4m); however, the listed plan considers "encouraging active transportation" in the approval for daycare placement. Like London, ON, intersections are mentioned in terms of transit efficiency with no special consideration of universal design. The promotion of all-year walking is mentioned, but not snow removal (7.1.4.2a).
Vaughan, ON	5.3		4.3		6.2.2.iii, 6.3.3.v					Note that cycling is featured for school access (6.3.2.ii) and teaching cycling to special groups like women and non-English speakers (6.2.3.v), but these concerns are not carried over to walking, "The CS [i.e., the primary pedestrian network] should be maintained year round and regularly cleared of debris, as well as snow where usage levels and location warrant" (4.3).
Gatineau, QC	TA 1, TA 8, TA 9, DA 15	TA 8, TA 9	TA 8, TA 18		TA 3, TA 8, TA 13, TA 17, DA 15					TA 1 is to "elaborate pedestrian plans for downtown and activity centres". Note accommodation of wheelchairs, etc., in TA 9. Note developing a pedestrian charter in TA 12. Note TA 15 is not about affordable housing so much as "raise awareness to the quality of life benefit to living close to work and activity centres."
Longueuil, QC	24, 25, 27	4	26, 27	7	7, 8					Income acknowledged, but not taken into consideration in specific policies. Vision impairment related to cyclist-pedestrian conflict, but not predestrian conflict, but not predestrian conflict.
Kitchener, ON	5.2.3, 5.3.1, 5.3.2.2	5.2.3, 5.3.1, 5.3.2.2	5.3.7	5.3.2	5.3.2.1, 5.3.6		5.3.1		5.3.1	Implementation Measure 5.3.1 discusses town's own pedestrian charter. Implementation Measure 5.3.2 is preceded by discussion that prioritize improvements within certain distances of schools (120m), senior housing (50m), and other amenity types. Audible signals discussed but new measures not recommended (p. 78, 5.8.1)

City	Retrofitting sidewalks, obstructions for universal design (SD)	Retrofitting crossings for universal design (SD)	Improving sidewalk snow removal (SD)	Reconciling senior housing with walkable spaces (S)	Reconciling schools with walkable spaces (C)	Reconciling childcare with walkable spaces (C)	Reconciling affordable housing with walkable spaces (I)	Considering New Canadians / aboriginals / Visible minorities in consultation / planning (M)	Considering population equity in future consultation / planning (none)	Comments
Regina, SK	1.10, 1.15, 2.18, 4.2	1.10, 2.18, 4.2, 4.26	4.29		4.9					Pedestrian policies are relatively light, with the plan focusing on modal shift from the automobile as it relates to transit connectivity and land use planning.
Oakville, ON	5-9	4-4, 5-9		5-12	5-12					Recommendation 3-18 notes working with partners to "promote and encourage active transportation"; this does not does not explicitly note social services, but it may be open to it. Snow removal is mentioned on several occasions, but the only policy pertains to space for snow storage that does not block bike lanes.
Oshawa, ON	5-2, 5-3, 6-8	5-2, 5-3	7-2		6-6					Seniors are mentioned as an element to consider in active transportation planning, but their needs are not explicitly considered in any policy.
Kelowna, BC	p. 89	p. A-20	p. 79		p. 31					The plan is very much dominated by cycling. Note that the city speaks to disability improvements in its existing pedestrian network including crosswalks, ramps, audible signals, and countdown timers (p. 11). Equity is discussed for funding sources (Table 5.5), but not planning and consultation.
St John's, NL	7.2.11	7.2.11		4.1.3, 4.2.2	5.4.1, 7.2.8	4.2.1	4.1.4, 4.1.6		9.3	Note that the retrofitting policies are vague (7.2.11). Section 4.1 notes that there should be incentives for re-development to include affordable housing and other government agencies should assist in planning affordable housing; while walking is not explicit mentioned, this combination of features meets the "affordable housing" criteria.
Kamloops, BC	5.4d, 5.4l*	5.4c, 5.4d, 5.4l	5.4f	4.1	4.1				5.41	Conclusions derived from "Network Evaluation Framework" whose index considers trip generators for vulnerable populations. Much of the plan focuses on neighbourhood improvements without other vulnerable populations mentioned. Policy 5.4l denotes the adoption of the Walk 21 International Charter for Walking, which includes accessibility and equity guidelines.
Victoria, BC	5.2.2, 5.2.3, 5.3.4	5.2.3, 5.2.4, 5.2.5, 5.2.8	5.3.2							Note its specificity grounded in the city: a whole section on moving wire poles out of sidewalks. Note that "Neighbourhood Transportation Management Plans (NTMPs)" already consider pedestrian elements outside of the city-wide plan, such as Safe Routes to School (Table 2.1)
Sault Ste. Marie ON	Action 24	Action 15, Table 9-4	Section 6.2.2		Table 9-4					The plan emphasizes investments necessary as new schools and other amenities are constructed in the near future
Saint John, NB	TM-21bc	TM-21d, TM-53	TM-21a	HS-18	CF-37	HS-23	HS-13	AC-33d		HS-13 encourages affordable housing near amenities; HS-18 encourages special needs housing (including seniors, group homes, shelters) near amenities and existing housing; daycare is considered (HS-23) the relationship to access is unclear; TM-21 touches on snow removal, street furniture, obstacle removal, and visible/safe street crossings; CF-37 ensures all schools are accessible to a wide range of transportation modes (vague); there is no safe routes to school program
Charlottetown, PE and environs	4.1F, 4.1G, 4.1H, 4.3C, 4.3D	4.3F	4.1C, 4.1D	4.3F	4.1D, 4.1E, 4.3F, 4.4G					Recommendation F discusses washroom wayfinding for seniors and families. 4.1G, 4.1H, 4.3C, and 4.3D are site-specific recommendations for critical arterial links in the region.

Note. Socially-excluded groups denoted next to policy criteria as seniors (S), people with disabilities (D), children (C), low-income (I), and minorities (M).

excluded groups in planning procedures and outcomes. The mailing of brochures detailing plan design procedures to all residents (St. John's) and continuous public engagement over two years at a downtown mall storefront (Saint John) are likely, according to participatory planning theorists worried about the representation of socially-excluded groups (e.g., Hillier, 2000; Maginn, 2007; Ploger, 2001), more effective means than mandated announcements in local newspapers to inform the public and invite their commentary. Social media, making its way into some of the later plans, facilitates more transparent debate about plan design than stand-alone websites and other static notices (Evans-Cowley and Griffin, 2012), particularly for sociallyexcluded groups whose personal and transport disadvantages inhibits the ability to attend physical open houses. Comprehensive strategies leveraging social media and collaborative events, such as workshops and pop-up tables with participatory visioning, offer sound foundations for soliciting input from groups underrepresented in surveys whose respondents, according to the plans which divulge descriptive statistics, skew toward those with higherincomes and active transportation use. As genuine public participation yields advantages beyond more accurate information, including promoting public buy-in and mitigating the risk of last minute surprises in plan approval (Burby, 2003), we argue that practitioners should embrace public insights wherever possible to inform inclusionary policies appropriate for their given community.

Regarding stakeholder advocates, plan designers should more deliberately gauge the opinions of stakeholder advocates for socially-excluded groups. Institutional consultation is largely confined to business associations and public institutions whose mandate covers all residents, e.g., provincial health insurers, provincial automobile insurers, and school boards. By reaching out to new partners in employment insurance, immigration and integration services, and non-profits representing cultural or neighborhood interests, practitioners can synergize the interactions between transport and social services which ultimately promote inclusion. These linkages will prove increasingly necessary for pedestrian planners as the country's demographics rapidly evolve in the coming decades, from the decreasing physical abilities of its aging population to the evolving circumstances of recent immigrants. Future research should investigate how to amplify the voices of socially-excluded groups and their advocates and, given the fragmentation of municipal decision-making in our context (Bergeron and Lévesque, 2012; Hatzopoulou and

Miller, 2008), more explicitly operationalize these voices through accountable policies that substantially improve travel behavior and quality of life outcomes.

Chapter 7: Conclusion

7.1. Introduction

I have embarked in these pages to demonstrate how contemporary pedestrian planning neglects socio-spatial features influencing users' travel behaviour and perceptions and, subsequently, to illuminate in part how planning instruments and agents can adapt their practices to incorporate social space. My research was more specifically structured according to four objectives:

- 1. Demonstrate how social space impacts pedestrians' behaviour and perceptions, and as such the ontological underpinnings of what constitutes a walkable space;
- 2. Illustrate how qualitative geographic information science can bring social space into walkability assessment;
- 3. Examine variations in professional values among transportation planners and their personal and institutional circumstances, and;
- 4. Assess the prevalence of social policies among strategic pedestrian plans, revealing inclusionary practices at a national scale.

This chapter summarizes findings and their contributions to knowledge and practice. I follow by proposing a research agenda to validate and more effectively operationalize conclusions for various pedestrian planning stakeholder groups.

7.2. Findings and their Contributions

In Chapter 3, I investigate the central premise of the dissertation: that social space impacts pedestrian travel behaviour and perceptions independently of the built environment. The spatially-grounded testimonies of residents during sedentary and walking interviews reveal recurring social factors, from language barriers to the behavioural norms of drivers, which impact the utility of amenities and streets that characterize walkability. The impact of these social factors on users' behaviours and perceptions depends on personal factors related not only to demographic characteristics and daily routines, as highlighted in previous studies, but also users' spatial familiarity and the strategies and tactics they employ to adapt to their surroundings. I use these findings to propose a "socialized walkability framework" which reconciles existing

empirical findings related to walkability with socio-spatial and personal factors uncovered in the field. I simulate socialized walkability to underscore challenges to applying the framework to practice, ultimately arguing that the built interventions currently prioritized by pedestrian planning practice must be complemented by social interventions, e.g., the provision of social services and the promotion of shared language and values, to maximize the number of opportunities that can be voluntarily and satisfactorily reached on foot by users with diverse needs and abilities.

To effectively tailor such interventions, it is necessary to adapt assessment procedures such that built and social factors can be more comprehensively recorded and analyzed according to users' unique frames of references. Chapter 4 details how qualitative geographic information systems (QualGIS) can operationalize social attributes of built features, as experienced by users, to derive conclusions using a fuller scope of spatial factors shaping their walking behaviour and perceptions. I outline the design of a spatial coding schema accounting for the primary components of the socialized walkability framework. These factors are introduced in the assessment of a single intersection which, despite its robust safety features from an engineering perspective, continues to be seen by some users as dangerous and unpleasant due to its uncommon light sequence, aggressive driver behaviour, and law enforcement measures targeting pedestrians. QualGIS advances from conventional geospatial- and audit-based approaches to measuring walkability by framing the pedestrian network as it is actually used, including jaywalking and informal paths, and by registering social attributes which might mediate engagement with amenities, such as religious dietary requirements. While representing the spatial underpinnings of walkability more precisely than systematic instruments, I outline factors that practitioners must consider to accurately weigh conflicting assessments, namely researchers' first-hand knowledge of the case neighbourhood and primary data. Despite these limitations, QualGIS offer an approach which brings people's perceptions of their neighbourhood to the fore of walkability assessment—an advantage over current approaches in examining demographic variations in the perception of built and social factors at a fine-grained scale while further complementing rapport-building and outreach activities espoused by contemporary planning theory.

But to what extent are transportation planners equipped for collaborative planning? Chapter 5 examines the professional attitudes of transportation planners as they negotiate their own expertise with the public consultation procedures increasingly valued in project appraisal and decision-making. Using attitudinal survey data from U.S. and Canada transportation planners, I reveal professional approaches closely resembling those from previous studies featuring certified urban planners, including for the first time in a population-generalizable survey instrument a distinct "advocate" planning style, which seeks procedural adjustments in collaborative planning to amplify the voices of socially-excluded groups. Means testing underscores significant differences in attitudinal outcomes among transportation planners depending on institutional and educational characteristics, suggesting that employers may intervene in multiple ways to derive planning attitudes in the public interest. Personal characteristics associate with few differences in professional attitudes despite a more demographically-diverse sample than previous studies. These findings ultimately provide some of the first insights into the attitudes, factors associated with these attitudes, and even demographic characteristics across the profession—information which will enable employers and professional organizations (e.g., the American Institute of Certified Planners) to more effectively foster people-centred planning attitudes conducive to incorporating social space into transportation planning.

As planners play a relatively minor role in pedestrian planning compared to other transportation modes, Chapter 6 delves into broader public and stakeholder consultation practices and resulting inclusionary policies among municipal strategic pedestrian plans. I analyze these plans using a social inclusion framework adapted for pedestrians using recent literature and recurring concerns specific to Canada. The results denote that age and abilities feature prominently in plan interventions while income, ethnicity, and nationality are understated, even though these latter groups encounter disadvantages in mobility and pedestrian safety. The findings establish a baseline from which pedestrian plans may be evaluated for social inclusion in the future—though the conclusions are limited to planning procedures and policies promoting physical proximity, respectively—and furthermore outline deficits in Canadian plan design practices which should be addressed to improve socialized walkability and access to opportunity for socially-excluded groups.

7.3. Implications for Practice

This dissertation underscores two principles for pedestrian planning practice:

- 1. Social space impacts pedestrians' engagement with amenities and streets, and as a result;
- Social space should be incorporated into pedestrian planning to maximize the number of opportunities that can be satisfactorily and voluntarily reached on foot by all members of society.

Pedestrian planning currently prioritizes built interventions which entice residents to walk. This approach has tremendous merit when it comes to changing mode share and improving safety, yet it does not sufficiently account for social distances that pedestrians navigate in everyday life. Though Parc-Extension is a dense amenity-rich neighbourhood, for example, residents' actual accessibility depends on social factors (e.g., social siloing, behavioural norms of roadway users, crime) as mediated by personal factors (e.g., socioeconomic status, personal routines, spatial familiarity and the capacity to adapt). Residents' overlapping and conflicting assessments of their neighbourhood illustrate shortcomings in contemporary planning practice to accurately measure and satisfactorily intervene to improve walkability for those whose behaviour is not necessarily a choice but a constraint linked to social and personal factors.

New approaches are needed to maximize access to opportunity such that individuals can more satisfactorily and voluntarily meet their daily needs on foot. Chapter 6 outlines current deficiencies in fostering inclusive strategic pedestrian planning relating to social inclusion (Lucas, 2012): offering transparent public engagement in planning procedures; reaching out to socially-excluded groups who oftentimes require special consideration in the design of pedestrian spaces, and; policies which promote universal design and network accessibility for these groups. Chapter 5 suggests that many planners and their organizations have the capacity to address these gaps through greater outreach to the public and, in the case of advocate planners, socially-excluded groups more specifically. However, land use and design policies in the sample plans cannot completely address the social factors shaping walkability. Chapter 3 proposes interculturalism to reduce social barriers through shared cultural values and augment individuals'

spatial familiarity and capacity to adapt through inclusive social services, yet attitudinal survey results imply that many transportation planners are ill-equipped to contribute to such policies.

7.4. Future Research

Several topics must be investigated before social space can be effectively brought into pedestrian planning, both among professional planners and associated stakeholders. The most immediate concern is validating the socialized walkability framework, which was constructed using data from a single neighbourhood characterized by built factors favourable for walking. This validation can be accomplished by applying the study's approach to different contexts, e.g., neighbourhoods more clearly divided among two or three socioeconomic groups such that their generalizable behaviour, perceptions, and preferences may be compared in similar built spaces. However, it is also necessary to validate the framework according to the factors used in walkability studies to date: body mass index (Sallis et al., 2009; Ewing et al., 2008); minutes of moderate physical activity and distance travelled on foot (Frank et al., 2005; Winters et al., 2015); time-space paths (Pierce and Lawhon, 2017; Siła-Nowicka et al., 2016), and; commuter satisfaction (Manaugh and El-Geneidy, 2013; Ye and Titheridge, 2017). Geographic information science is increasingly capable of incorporating large samples of individuals' views regarding their built and social context, including amenities and links commonly excluded from conventional walkability measures, alongside travel data to derive municipal- and regional-scale conclusions that are both statistically valid and generalizable (Schwanen, 2016a; Siła-Nowicka et al., 2016; Thakuriah et al., 2016). I surmise that the "scaling up" of socialized walkability across neighbourhoods and regions will ultimately allow practitioners to identify a robust series of socio-spatial factors explaining greater variation of individuals' travel behaviour than conventional measures alone.

Assuming the socialized walkability framework stands up to scrutiny, it is necessary to assess how planners can more effectively incorporate its core principles into practice. Chapter 5 suggests large segments of the transportation planning profession disregard public feedback as a legitimate source of information despite its relevance in precisely understanding built and social conditions on the ground. I argue that the impact of planner certification programs on planner

attitudes should be examined more closely and, depending on findings, that course and continuing education requirements be revised to instill greater appreciation of the added value of public consultation. Chapters 3 and 4 suggest new epistemologies—actively seeking out residents from all demographics, walking with them on their own terms, and grounding their testimonies in space—could augment the utility of insights gleaned from public consultation. QualGIS complements these epistemologies, though I close a recent article published in the *Journal of Geography in Higher Education* (Battista and Manaugh, 2017b) with questions that must be answered before bringing its practices into undergraduate geography and planning classrooms:

In groups, do students with unique [qualitative and GIScience] skills facilitate the transfer of their skills to others in the group; how can we effectively convey qualitative epistemology to introductory GIS courses and vice versa, among both students and instructors, and; how can we scale QualGIS to suit the variety of physical contexts and disciplines associated with GIS and qualitative research? (p. 13)

Workplace culture in transportation planning organizations also deserves additional attention to gauge how individuals, particularly those with different professional styles, collaborate and share knowledge with one another to address complex problems (e.g., Flyvbjerg, 1998; Innes and Gruber, 2005). Yet, as discussed in Chapters 3 and 6, the incorporation of social space into pedestrian planning requires engagement with topics traditionally outside the responsibilities of transportation planners: language instruction; immigration, diversity, and social inclusion; health and human services; and affordable housing. Future research must examine pathways to facilitate communication among disparate offices to maximize physical and social access to opportunity by walking.

Strategic plan design is certainly a focal point for this topic, and I envision lively debates in the planning offices of the future regarding which social factors should be appraised, the weight given to these social factors and public insights more broadly in decision-making, and which performance measures can best capture changes in socialized walkability following the implementation of a project or plan. Plans, however, are once-in-a-generation opportunities that

yield low resolution and oftentimes aspirational blueprints of policies and investments which may not be pursued in reality. I recommend transportation planning scholars pursue organizational case studies—more common to the *Harvard Business Review* than *Transport Policy*—to identify best practices for streamlining day-to-day communication between transportation planners and associated stakeholders such that the complete scope of stakeholders' insights can be translated into a robust delivery of transportation services in line with citizens' concerns.

7.5. Closing Thoughts

La vie parisienne est féconde en sujets poétiques et merveilleux. Le merveilleux nous enveloppe et nous abreuve comme l'atmosphère ; mais nous ne le voyons pas. (Baudelaire, 1868)

As policymakers embrace walking as a means to many ends—mobility, health, economic development, and quality of life-they must consider built and social interventions concurrently to maximize accessibility, safety, and comfort for their diverse constituents. However, sociospatial revisions pose challenges that present-day pedestrian planning seems poorly equipped to handle. Appraisal must reorient its representation of walkable space through the eyes of its users, considering non-tangible barriers and shortcuts which are more clearly understood through the minutia of residents' everyday lives. Transportation planners must more universally embrace public consultation, particularly for socially-excluded groups, or better equip themselves to work with stakeholders conventionally excluded from planning procedures. A more collaborative approach representing more segments of society must be adopted to improve our understanding of socio-spatial factors shaping users' propensity to walk and, perhaps more importantly, propel the social components of strategic pedestrian planning from tokenistic buzzwords toward accountable policies and performance measures. It is my hope that the publications and presentations associated with this dissertation enable pedestrian planning stakeholders to serve their communities more effectively and, over the long term, to foster spaces whose opportunities and governance are sufficiently inclusive such that residents' circumstances do not impede their right to shape, access, and traverse the places they call home.

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Habitez-vous à Parc-Ex?

Une équipe de géographes de l'Université McGill étudie comment les résidents perçoivent leur quartier. Nous aimerions entendre ce que vous pensez!

Exigences :

- Capable de marcher pendant 1 heure autour du quartier
- Résident du quartier pendant au moins 6 mois
- Conversationnel(le) en français ou anglais

Compensation :

\$20 Provigo carte cadeau pour 2 heures de travail

Coordonnées :

Planification Geoffrey Battista Département de géographie Université McGill (438) 228 - 4287 geoffrey.battista@mcgill.ca

Chercheur principal

Dr Kevin Manaugh Département de géographie Université McGill (514) 709-7853 kevin.manaugh@mcgill.ca A team of geographers at McGill University is studying how residents perceive their neighbourhood. We would love to hear what you think!

Requirements:

- Able to walk around the neighbourhood for 1 hour
- Resident of the neighbourhood for at least 6 months
- Conversational in English or French

Compensation:

\$20 Provigo gift card for 2 hours of work

Contact Information:

Scheduling Geoffrey Battista Department of Geography McGill University (438) 228 - 4287 geoffrey.battista@mcgill.ca

Principal Investigator

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Appendix B: Consent Form

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Participant Consent Form

Researchers:	
Kevin Manaugh, Ph.D.	Geoffrey Battista
Assistant Professor	Ph.D. Candidate
Department of Geography	Department of Geography
McGill University	McGill University
(514) 709-7853	(514) 550-0100
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Title of Project: Social Equity Implications of Active Transportation

Sponsor(s): Social Science and Humanities Research Council of Canada (# 430-2015-00897)

Purpose of the Study: We welcome you to participate in our study examining how city residents feel while walking around their neighbourhood. This study will use sitting and walking interviews to understand how personal characteristics and experiences might alter how residents feel as they navigate their neighbourhood on foot.

Study Procedures: The study is broken into two parts: a sitting interview and a walking interview. The sitting interview will take place at a location convenient for you. I will ask you questions about your walking habits and how you feel while you walk in your neighbourhood. Our discussion will last approximately one hour. The sitting interview will be recorded using a voice recorder and transcribed by a researcher. The researcher will then analyze the discussion according to the purpose of the study (above).

The walking interview will begin at a location in the neighbourhood chosen by you. You will strap a video camera to your chest so that we may record the walking interview questions, answers, and environment. The video camera will be turned on, and you will begin walking with the researcher along a mutually-convenient path while the researcher asks you questions about your walking experiences in the neighbourhood. The walking interview will last approximately 45 minutes, and you will be asked a couple questions after the walking is done, totalling approximately 1 hour of time. The video will then be analyzed by the researcher for the purpose of the study. The video – including your answers in your own voice – may also be used in published materials from the study (journal articles, presentations, media, and promotion of results on the web) as evidence to support the conclusions of the study.

Voluntary Participation: Participation in this study is voluntary, and you may decline to answer any question, and may withdraw from the study at any time, for any reason. If you choose to withdraw from the study, any record of your participation in the study will be removed. If you choose to withdraw from the study, your identifying information and evidence will be removed from the study. You will be awarded \$20 in Provigo gift cards per hour: \$10 for the hour-long sitting interview, and \$10 for the hour-long walking interview. If you choose to leave the study after the sitting interview and before the walking interview, you will only receive compensation for the sitting interview.

Potential Risks: There are some minor risks to you in participating in this research. The walking interview video will include your voice and neighbourhood. All materials will be attributed to pseudonyms and basic demographic variables, e.g., "John, a middle-aged new arrival to the neighbourhood, said..." As the videos may be included as evidence in academic journals, presentations, media, and study promotion on the web, it is possible that individuals may be able to identify your participation in the study.

Potential Benefits: Your participation in the study will help provide a detailed understanding of how personal experiences affect walking. The results will assist policymakers in designing more inclusive walking environments.

Compensation: You will be awarded \$20 in Provigo gift cards per hour: \$10 for the hour-long sitting interview, and \$10 for the hour-long walking interview. If you choose to leave the study after the sitting interview and before the walking interview, you will only receive compensation for the sitting interview.

Confidentiality: Your sitting interview will be voice-recorded and transcribed by a researcher, and the audio evidence will be deleted. The transcription will be held for 5 years in password-protected cloud storage at McGill University, accessible to Dr. Kevin Manaugh and his students Geoffrey Battista and Elizabeth Pis, during which time select statements may be used as evidence in dissemination of the study's results, including: (1) peer-reviewed publication; (2) conference proceedings; (3) media coverage of the study's publications and proceedings; and (4) promotional materials related to the study's publications and proceedings. Such statements will be attributed to pseudonyms and basic demographic variables, e.g., "John, a middle-aged man from X, said…"

The walking interviews will be audiovisually-recorded using a video camera strapped to your chest. The videos will be analyzed by a researcher and held for 5 years in password-protected cloud storage at McGill University, accessible to Dr. Kevin Manaugh and his students Geoffrey Battista and Elizabeth Pis, during which time select clips may be used as evidence in dissemination of the study's results, including: (1) peer-reviewed publication; (2) conference proceedings; (3) media coverage of the study's publications and proceedings; and (4) promotional materials related to the study's publications and proceedings. Such clips will be attributed to pseudonyms and basic demographic variables as described above. Your voice will not be altered.

Questions: Please feel free to ask any questions regarding the content of this agreement. For in-depth questions, or to request an additional, non-compensated meeting to discuss your participation in the project, please contact Geoffrey Battista or Kevin Manaugh (first page).

If you have any ethical concerns or complaints about your participation in this study, and want to speak with someone not on the research team, please contact the McGill Ethics Manager at 514-398-6831 or lynda.mcneil@mcgill.ca

Please sign below if you have read the above information and consent to participate in this study. Agreeing to participate in this study does not waive any of your rights or release the researchers from their responsibilities. A copy of this consent form will be given to you and the researcher will keep a copy.

Participant's Name: (please print)

Participant's Signature:

Date:

Appendix C: Sedentary Interview Script

(1) Introduction

Thank you for your interest in our study. This study explores how people feel when they walk through their neighbourhood, and your participation is incredibly valuable. Our discussion today will be pretty informal. We're going to chat about your experiences walking around the neighbourhood, where you go, and whether you enjoy walking around. It's an open forum, which means you can say whatever comes to your mind. However, if things go off topic, I'll pop in and steer the discussion back toward the subject on hand. I'm just going to repeat a couple things from the Consent Form that you read and signed when you arrived. I will be recording everything that we discuss today, but the recording will be destroyed after I've written the conversation down. Your participation will remain completely confidential and anonymous when the results come out, so feel free to speak your mind. Sound good? Let's get started.

(2) Discussion

The discussion will vaguely follow the outline below while remaining highly reflexive to the points of conversation brought up by discussants.

- So, how long have you lived in the neighbourhood?
- When you came to the neighbourhood (or when you were growing up here), tell me what it was like to walk around? (if prompted: safe, comfortable, calm, clean, dangerous...?)
 - Example clarification for a New Canadian discussant: "And how does this compare to where you lived before moving to Parc-Extension?"
- How do you think the ability to move around the neighbourhood has changed since you moved here?
- Do you enjoy walking to your day-to-day activities? (if prompted: shopping? work? Place of worship? Social club?) Are there activities that seem out of reach by walking?
- Do you feel like you can fully enjoy the neighborhood on foot?
- What are some things about the sidewalks and roads that you would change to get around better?

(3) Ending

Thanks for staying through the whole discussion today. If we haven't agreed already, I'll be calling you in a couple days to confirm the time and place of the interview that you wrote on the focus group consent form.

Appendix D: Abridged Survey Instrument

Preface: The North American Transportation Planner Survey was an extensive instrument designed to investigate multiple questions. This abridged version omits sections unrelated to this dissertation. I have shaded in grey questions from the remaining sections which were (a) unrelated to our study or (b) related to our study though excluded because their responses were collinear with those of other questions.

Thank you for your interest in our study. This survey explores the insights of transportation planners and decision-makers throughout the United States and Canada. Your responses will remain completely confidential, and they will be reported in such a way that you cannot be identified. The entire survey takes approximately 30 minutes. You will be prompted for an email address at the end of the survey to be randomly selected for one of ten \$50 gift cards to Amazon. The email address will only be used to notify you if you have been selected for a prize.

Please forward any questions about this survey to Dr. Kevin Manaugh of McGill University (kevin.manaugh@mcgill.ca).

By continuing, you agree to the conditions we have described. [BEGIN SURVEY]

1) BACKGROUND

Let's begin with some light questions. Please tell us a little bit about who you work for and the type of work you do. **Just a reminder:** your responses will remain confidential and will not be reported in such a way that you cannot be identified.

- 1. Which best describes your sector of work?
 - a. Public
 - b. Private
- 2. What is the geographic scale that your employer serves (click all that apply)?
 - a. National
 - b. State/Provincial
 - c. Regional (e.g., MPO)
 - d. Municipal
 - e. Sub-municipal
 - f. International
 - g. Other (fill in): _____
- 3. In what country do you live?
 - a. United States
 - b. Canada
 - c. Other (fill in)
- 4. In what state or province is your employer located?
 - a. (list of states, provinces, and territories, and "Other" at the top)
- 5. In what city is your primary office located? (fill in)
- 6. What best describes your industry? (list)
- 7. Which best describes your job title? (list)
- 8. Which of the following project categories do you address in your job? (list):

2) PERSONAL PLANNER ROLE

Let's talk about your role in the transportation process. For the following questions, please rate your feelings on a scale from 1 (strongly disagree) to 5 (strongly agree).

- 1. I leave personal beliefs aside and let the data speak for itself.
- 2. I believe an optimal outcome depends more on quantifiable data than public insight.
- 3. I find the public's input should be limited because they do not understand the "big picture."
- 4. I outline possible solutions, leaving the final decision to other people.
- 5. I lobby policy-makers to defeat harmful proposals.
- 6. I work behind the scenes to gain support for my ideas.
- 7. I go the extra mile to turn *my* vision into reality.
- 8. I steer decision-making toward what I believe is the best solution.
- 9. My expertise focuses on turning community ideas into reality.
- 10. I believe public insight is the core of transportation planning.
- 11. I strive for consensus among stakeholders about transportation decisions.
- 12. I believe public meetings are useful for decision-making.
- 13. I seek out local opinion leaders to understand the needs of the communities I serve.
- 14. I purposefully encourage politically-marginalized groups to speak out in transportation decisionmaking.
- 15. I seek the participation of communities who would not otherwise participate in decision-making.
- 16. I go above-and-beyond to attract members of the public to transport decision-making.

3) INDIVIDUAL PLANNER VALUES

The following questions will explore your values as they relate to planning and decision-making.

Social Justice Values

Please rate the following statements from 1 (strongly disagree) to 5 (strongly agree).

- 17. I believe that it is important to try to change larger social conditions that cause individual suffering and impede well-being
- 18. I believe that it is important to promote fair and equitable allocation of resources in our society
- 19. I believe that it is important to promote the physical and emotional well-being of individuals and groups
- 20. I believe that it is important to respect and appreciate people's diverse social identities

4) INSTITUTIONAL VALUES AND DYNAMICS

This section examines the characteristics of your workplace.

Please rate the following statements from 1 (strongly disagree) to 5 (strongly agree).

- 21. My employer considers social equity and justice in project decision-making.
- 22. My employer's task does not include weighing the public's needs.
- 23. My personal views coincide with my employer's views on transportation policy.
- 24. My employer is managed independently from an elected government.
- 25. Other people at work are supportive of efforts that promote social justice
- 26. Other people at work are engaged in activities that address social injustices
- 27. I am frequently at odds with co-workers about plans and strategy.
- 28. My employer stays out of political debate.
- 29. My employer will meet clients' wishes without independently considering the general public.
- 30. Other people at work are supportive of efforts to promote environmental sustainability
- 31. Other people at work are engaged in activities that address environmental sustainability
5) **DEMOGRAPHICS**

The survey is almost done! Please tell us a little more about yourself.

•	What is your highest level of education completed?High schoolSome collegeAssociate's DegreeBachelor's DegreeProfessional (MBA_MPA)Master's DegreeDoctorate
•	In what year did you finish your highest level of completed education? (fill in)
•	Which subject(s) best describes your field of study throughout your education? (Choose all that apply)
	Urban planningEngineeringPublic policy/administrationGeographyBusinessOther: (fill in)
•	What is your highest level of education completed by your parents?High schoolSome collegeAssociate'sBachelor'sProfessional (MBA, MPA)Master'sDoctorate
•	How long have you worked at your current place of employment (years)? Categorical
•	Are you an AICP or CIP Certified or Professional Planner? Yes No
•	In what year were you born? (fill in)
•	What is your gender? Male Female Non-binary Prefer Not To Answer
•	Do you identify as a racial or visible minority?
	Yes No Prefer not to say
•	How do you usually commute to work?Driving aloneCarpooling/Auto PassengerWalkingCyclingOther: (fill in)
٠	How long does it take you to get to work (minutes)? (fill in)
•	Is it possible to get from your home to work by public transportation? Yes No Don't know
٠	Is it possible to get from your home to work by walking? Yes No Don't know
٠	Is it possible to get from your home to work by cycling? Yes No Don't know
٠	Do you own or rent your home? Own Rent Neither
٠	Describe your social values.
	Very progressive Progressive Centrist Conservative Very conservative
•	Describe your values regarding taxation and public spending. Very progressive Progressive Centrist Conservative Very conservative
٠	I am a member of a walking or biking advocacy group. Yes No

[FINISH SURVEY]