DOES NEIGHBOURHOOD DESIGN IMPACT SOCIAL INTERACTIONS AMONGST NEIGHBOURS?

STUDYING THE INFLUENCE OF NEIGHBOURHOOD BUILT-FORM & TYPE ON SOCIALIZATION AMONG NEIGHBOURS IN CANADIAN CITIES

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Abstract

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Urban planning has devoted significant effort to exploring the linkages between neighbourhood design and social interactions. With the increasing popularity of New Urbanism, the role New Urbanist design features play in promoting neighbourly socialization and strengthening communal bonds have become widely debated. This thesis contributes to the existing literature by researching how socialization differs between New Urbanist and traditional suburban neighbourhoods and whether the socialization difference, if any, results from differences in neighbourhood structure and design. This thesis uses a data set comprised of eight neighbourhoods - four of which are New Urbanist neighbourhoods and the other four are traditional suburban neighbourhoods. Using ordered probit regression modelling, the extent of socialization that stems from households' demographic characteristics and the housing-level and neighbourhood-level physical design features is determined. The results indicate that socialization is more likely to be influenced by the amalgamated effect of neighbourhood type, rather than design features alone.

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Chapter 1: Introduction

The need to build human connections and foster social interactions is a fundamental human need that requires fulfillment in order for humans to grow and develop. (Maslow, 1971) Apart from serving individual benefits like companionship, better self-esteem, increased cognitive functioning and the improvement of one's mental and physical health, research has also demonstrated that social interaction has wider, economic and community-level benefits. (Farber & Li, 2013a) However, in recent times, with technology allowing people to live their lives on social media and fulfill their need for socialization through digital communication, people have become dependent on their online social networks. A growing variety of social media applications are being developed for various purposes to cater to the biggest cohorts of social media users – namely, the Millennials and Generation Z. With the ability to selectively choose how to portray one's self-image online and maintain vast social networks, internet-based socialization is diluting the importance of 'real' social interactions (P. S. N. Lee, Leung, Lo, Xiong, & Wu, 2011). In light of this, promoting face-to-face interaction has become an increasingly difficult challenge in the modern digital age due to the prevalence of social media and remote socialization opportunities. One may wonder: 'Does fulfilling social needs via social networking serve the same purpose as conventional face-to-face interactions?' Online interactions are low-involvement, lack personal connectivity and transparency, allow people to misrepresent facts and have significant room for misinterpretation and ineffective communication, thereby highlighting how the importance of face-to-face interactions holds in the modern world (P. S. N. Lee et al., 2011).

Literature has looked into social interactions and social networks formed in neighbourhoods (Farber & Li, 2013b; Talen, 1999). Forming social connections in one's residential vicinity gives rise to a strong community, the importance of which is very pronounced.

Apart from social and psychological well-being, tightly-knit communities also tend to provide a safe and secure place for residents (Kasarda & Janowitz, 1974; McMillan, 1996). In addition to the benefits for residents, the pressing need to promote social cohesion in today's diverse world has made this subject matter the centre of much attention in the field of urban planning and analytics (van den Berg, Sharmeen, & Weijs-Perrée, 2017). Research in real estate has been exploring the influence of neighbourhood types and built-form on social interaction for several decades by now. A significant amount of literature has confirmed that factors like physical design and spatial structure of a residential area greatly guide human behaviour and interaction (Alahmed, Alaghbari, Ibrahim, & Salim, 2014; S. C. Brown, Lombard, Brown, & Lombard, 2014; Neutens, Farber, Delafontaine, & Boussauw, 2013).

This idea that physical neighbourhood characteristics shape residential behaviour gained momentum when the movement for New Urbanism became popular (Farber & Li, 2013). New Urbanism is an urban design movement built upon using neotraditional design features such as narrow streets and mixed land use that make the neighbourhood more well-connected, pedestrian-friendly and socially integrated (Gerrit Knaap & Emily Talen, 2005). New Urbanist developments have become increasingly popular amongst planners and residents alike in the last few decades. Researchers from different fields have gauged the popularity of New Urbanism and the 'smart growth' related claims that this form of development promises from various angles – i.e. from planners', consumers', and even policy-makers' perspectives. However, to understand the nature of New Urbanism and contextualize it according to the real world, it is worth comparing it to conventional suburban developments. It was the post-World War II period that brought about a shift in the neighbourhood built-forms as people began to move away from neotraditionally designed housing schemes. Suburban neighbourhoods came about with their larger streets and automobile dependence (Morrow-Jones, Irwin, & Roe, 2004). To date, these neighbourhoods with distinct suburban features have become a form of idealized living for many house-hunters (Morrow-Jones et al., 2004).

However, state policies and developers have supported the rise of high-density, perhaps due to the promises of positive externalities that the 'smart growth' development carries. Key features of such neighbourhoods include high-density living, mixed land use, open spaces like parks and increased walkability and accessibility in order to promote a sense of community (Gerrit Knaap & Emily Talen, 2005). The increment in such diverse residential settings has resulted in consumers having more neighbourhoods to choose amongst when deciding where to live. Previous studies have shown that socializing with neighbours leads to increased residential satisfaction and higher attachment to the neighbourhood (A. Shields, Wooden, & Wheatley Price, 2009; Farahani, 2016). Together, the constructs of satisfaction and attachment, provide the context for greater well-being, both at an individual and societal level.

Using data from New Urbanist and traditional suburban neighbourhoods via residential surveys, this research paper adds value to the existing literature by exploring how structural differences in New Urbanist and traditional suburban neighbourhoods affect people's socialization behaviour. Instead of directly attempting to question behaviours and preferences, this article shall attempt to gauge what physical factors foster social mixing amongst residents in a Canadian context. The objective is to identify design factors that may encourage neighbours to interact with one another, as those factors then become public policy and planning tools that can be used to promote societal cohesion. Using survey data previously collected by Tomalty & Haider, this paper first analyses the data set using descriptive statistics, followed by the methodology which involves running multi-level ordered probit regression models (Tomalty, Haider, & Fisher, 2009).

Incremental models are used to gauge the influence of demographic, housing-level design and neighbourhood-level design features on two chosen proxies of socialization: the number of neighbours named and the frequency of face-to-face interactions with neighbours. It is hypothesized that when demographic and individual-level factors are controlled for, the physical and structural characteristics of New Urbanist neighbourhoods will promote more socialization amongst residents as compared to the traditional suburbs. By linking neighbourhood physical design features to socialization, the study aims to bring about theoretical and practical findings that have significant and applicable implications.

Chapter 2: Literature Review

The literature is diverse and extensive when it pertains to the importance of social interactions in humans. The fields of psychology, sociology, marketing, and urban planning – all have research dedicated to understanding behavioural patterns when it comes to socialization. There is a significant amount of literature that looks at what individual factors or personal motivations people have that account for them interacting more or less. These include socioeconomic, demographic, psychological and individual attitude and preference-based factors (Blaauboer, 2011; Bruch & Mare, 2006; du Toit, Cerin, Leslie, & Owen, 2007; Jean, 2016; Quigley, 1985). However, in times of growing diversity and expanding multiculturalism, social interactions cannot be studied in a silo, and the importance of analysing them at a community level becomes heightened. As the world's cities become more ethnically diverse, the need to steer communities clear of inequalities and polarisation is dire, hence paving the path for urban planning and analytics to make a mark (Schreiber & Carius, 2016).

Research in urban planning has explored the effect of neighbourhood-related factors on socialization over the years. The neighbourhood is of vital importance to residents, and their process of choosing a home requires paying due attention to neighbourhoods (Quigley, 1985). A neighbourhood primarily consists of the immediate environment in which a house is located, as well as the surrounding amenities and public services (Clark, Deurloo, & Dieleman, 2006). Commonly researched neighbourhood-level factors that range from the age of neighbourhoods to various physical design elements to the availability of mixed land-use in the area (B. B. Brown & Cropper, 2001; Farahani, 2016, 2016; Jacobs, 1992). By gaining a deeper understanding of these factors and the practical implications they have on social interactions, it is possible to enable urban planners to plan the use of land effectively and guide the creation of inclusive communities

(Schreiber & Carius, 2016). Thus, it becomes necessary for researchers to play their part in disentangling the residential choice question and discussing the extent to which neighbourhood-related factors influence consumers' socialization patterns.

Based on the focus of this thesis, the literature review focuses on deciphering neighbourhood design factors have stood out as salient in promoting social interactions between residents. The neighbourhood design factors used are derived from two types of neighbourhoods with different defining characteristics – New Urbanist neighbourhoods and traditional suburban neighbourhoods.

2.1 The Importance of Socialization

The formation and maintenance of social ties and networks have been researched to bring about several individual-level benefits like higher self-esteem, better relationship fulfilment, psychological betterment and more life satisfaction (P. S. N. Lee et al., 2011; Putnam, 1995). At a societal level, more social interaction leads to the formation of social capital. In the words of the pronounced political scientist, Robert D. Putnam, social capital is defined as "*the development of reciprocity, social networks and trust between people*" and that is the meaning adopted in this paper (Putnam, 1995). Increasing social capital within a community comes with a variety of advantages – for instance, more economic growth, more pursuit of higher education, better physiological and psychological health, higher levels of social cohesion and better crime control, to name a few (Farber & Li, 2013; Williams, 2005).

2.1.1. Socialization in the Digital Age

In the recent decades, with the rise of social media and the constant flourishment of the digital age, online interaction seems to be construed as a complement, or in many cases – a substitute, for face-to-face interaction. With the development of social media sites and applications for an array of purposes, it is worth exploring whether the presence of online socialization opportunities reduces the need for people to socialize with one another in a face-to-face setting.

Research on internet-based socialization has linked online interaction to emotional benefits and helping counter depression and loneliness amongst users. (Shaw & Gant, 2002; Snow, 2007) However, while online interaction has been researched to raise perceived support and self-esteem, there are mixed findings on whether social media interactions and online networking can replace face-to-face interacting and account for a similar sense of community (Driskell & Lyon, 2002; Farahani, 2016; Snow, 2007). According to several researchers, 'place-less' communities that are not confined by distance or spatial boundaries are becoming more common as the concept of 'place' is being diluted (Farahani, 2016; Wellman, 2005). While it is true that most people tend to have social networks that are not restricted by where they live or work, it still does not undermine the importance that such grounded and face-to-face interactions hold.

One of the main critiques of social media interactions is perhaps the low involvement, low engagement and lack of personal connectivity and transparency with members of one's social networks. The 'detached from reality' element of online interactions makes internet-based relationships rather impersonal and shallow (P. S. N. Lee et al., 2011). On the other hand, the element of 'warmth' and the fostering of emotions is present in face-to-face interactions where, according to research, 65% of the contextual meaning in conversations is derived non-verbally (P. S. N. Lee et al., 2011). Additionally, another huge issue that the use of social media brings with it is the ability for users to choose what to disclose about themselves – and in many cases, carve out an identity or portray themselves as someone they are not (Becker & Stamp, 2005; Snow, 2007). Such opportunities for impression management can genuinely affect the quality of interactions and create psychological dissonance for many users (Gross, 2004; P. S. N. Lee et al., 2011). Therefore, this section concludes that while internet-based communication cannot act as a substitute for face-to-face interactions, it can aid the development and maintenance of existing communities and networks (Farahani, 2016).

2.1.2. Residential Socialization

After establishing the importance of direct socializing, it is imperative to fulfil the objective of this paper by contextualizing socialization within the neighbourhood setting. 'Neighbourliness' is a concept that gained public attention in the mid 20th century, and was described as the behavioural norm of interactions between neighbours, i.e. the people who live within proximity to one's residence (Mann, 1954). According to Mann (1954), neighbourliness was a manifestation of social support, which came about from residents in a neighbourhood having a strong sense of belonging and sense of community (Mann, 1954; Talen, 2000; Wilkerson, Carlson, Yen, & Michael, 2012). Since then, the concept of a 'sense of community' and being attached to one's community became commonly studied in the fields of urban planning, sociology and community psychology (Farahani, 2016).

Neighbourliness is a product of proximity which enables people living close to one another to form communal bonds and aid one another in a manner that non-community members would not be able to (Farahani, 2016). Such networks are part of 'bonding networks' which help people to 'get by' on a day-to-day basis (Stanley, Stanley, & Hensher, 2012; Stone, Gray, & Hughes, 2003). Good relationships amongst neighbours provide residents with several advantages like immediate emotional support, material help and a sense of security that comes with being surrounded by a community (Farahani, 2016; Kusenbach, 2006). Amongst the array of identity-defining mechanisms people use to paint a self-portrait, neighbourhood-based identity is one type that serves as a bonding point for many.

However, practically speaking, one must realize that neighbourhoods are heterogenous communities with people of different ages, cultures, occupations and personalities occupying them. Thus, they may not always foster mutual closeness and place-attachment may not necessarily be derived from the social aspect of one's neighbourhood (Farahani, 2016; Talen, 2000).

More details regarding the elaborate relationship between neighbourhoods and social interaction are discussed in Section 2.4

2.2. Understanding 'Neighbourhoods'

2.2.1. Defining Neighbourhoods

Before delving into comparisons between neighbourhood types and the people occupying them, it is of utmost importance to define a 'neighbourhood'. The Oxford Dictionary defines the neighbourhood as "a district or community within a town or city" ("neighbourhood | Definition of neighbourhood in English by Oxford Dictionaries,"). However, that does not undermine the subjectivity that surrounds the discussion on neighbourhood boundaries (Weiss et al., 2007). The conceptual understanding of neighbourhood boundaries can be different in the minds of residents and other non-specialists who are not aware of the existence of definite boundaries. Common schools, malls, markets, and the physical structure of an area itself may affect how differently people view neighbourhoods (Coulton, 2012; Weiss et al., 2007). As a matter of fact, with the high frequency of local travel and commuting in the Canadian context, the lines demarcating different neighbourhoods are often blurred (Weiss et al., 2007).

Research has also looked at the effect of more intangible social and psychological factors that shape neighbourhoods. Interactions between residents are a product of their social and individual preferences and hence, shape the way they attach meaning to their neighbourhoods (Weiss et al., 2007). Thus, from a behavioural aspect, it can be said that neighbourhoods are socially constructed and not definitively marked as individuals are free to choose what becomes an integral part of their neighbourhood and what is irrelevant (Coulton, 2012; Sampson, Morenoff, & Gannon-Rowley, 2002). In fact, according to recent research, even the age of residents can influence their perceptions of their neighbourhoods, with older people attaching higher importance to neighbourhood boundaries (Alldoust, Bosman, Holden, Shearer, & Shutter, 2017).

Despite the development of more detailed ways to define neighbourhoods, this paper shall define and use neighbourhoods that have been categorized according to census data and resort to the traditional definition as per housing literature. In this paper, 'neighbourhood' shall refer to census-defined units which have homogenous housing type and value, similar physical structures, residents with similar socioeconomic characteristics and common school districts and municipalities (Clapp & Wang, 2006; Weiss et al., 2007).

2.2.2. The Importance of Neighbourhoods for Home-hunters

It is also vital to establish the importance of neighbourhoods for residents and home-hunters. While much research discusses different factors that influence people to choose one place of residence over another, not many researchers have looked into how consumers go about making their decision regarding where to reside. That is, what takes precedence for most home-hunters, i.e. do they choose a house first or the neighbourhood first? Answering this question is relevant and critical because it allows researchers in the field to gauge an idea of the value consumers in real estate attach to picking a neighbourhood that suits them and fulfils their preferences.

One way that consumers go about the residential decision-making process is that they select a neighbourhood before choosing a house. The rationale behind this is that the place, otherwise known as the 'location,' holds vital importance for them due to their preference to reside near their workplace or children's schools, or around family and friends or even merely live in an area with a positive 'feel' (Hayes, 2006; Peugh, 2010). Such consumers have strong opinions about where they would like to live and thus choose from the options of housing available within their desired neighbourhood (Clark et al., 2006; Quigley, 1985).

The second way consumers make their decision is the opposite – that is, if they like a particular house, they tend to go for it irrespective of the neighbourhood. For such a consumer, the neighbourhood does not hold much significance. Quigley (1985) discussed the stark preference households showed for less dense forms of housing like detached houses over townhouses and townhouses over apartments (Quigley, 1985). For such households, the choice of a neighbourhood would be contingent upon where they can find their desired type of housing. This preference could be a result of their lifestyle or just their adherence to an ideal house they want, irrespective of their neighbourhood (Frenkel, Bendit, & Kaplan, 2013).

However, according to the literature, the majority of people tend to choose the neighbourhood first. While they may not pick a specific neighbourhood, they tend to decide on the type of neighbourhood or the area in which they would like a neighbourhood – whether consciously or subconsciously (Alison Parkes, Ade Kearns, & Rowland Atkinson, 2002). Clark, Deurloo & Dieleman (2006) made a case surrounding the fact that households have 'neighbourhood careers' which they wish to ascend in and are independent of their 'housing careers'. To be specific, 'neighbourhood careers' refer to individuals' progression to what they perceive as higher status neighbourhoods and 'housing careers' refer to household capacity to buy larger and costlier houses with improved income sources over time (Clark et al., 2006). They found that "14 percent of movers made improvements in the socioeconomic status of the neighbourhood and 16 percent in the environmental quality of the area they live in, without a significant gain in size of the dwelling or a move from renting to owning" (Clark et al., 2006, p. 337). Thus, this points towards the importance that neighbourhoods hold for households, perhaps even beyond the house itself.

Furthermore, the importance of neighbourhoods can be inferred by looking at the fact that there is some degree homogeneity found in neighbourhoods. People residing in the same neighbourhood tend to share similar demographics, ethnicities or lifestyles and even state their preference for living close to 'people like them' (Bruch & Mare, 2006). One of the most apparent manifestations of this is seen in neighbourhoods where people from similar races or people with stark similarities reside close to one another (Boschman, Kleinhans, & Ham, 2017; Francis A. Pearman & Walker A. Swain, 2017). At times, while deciding to relocate, even if one is not consciously looking to locate near similar people, they still may end up locating there for several reasons (Bruch & Mare, 2006). For instance, while it may seem like they are locating close to people from a similar race, race may be correlated with other variables like income and affordability and thus end up making the same pool of options available to people from that specific race (Bruch & Mare, 2006; Francis A. Pearman & Walker A. Swain, 2017). However, these similarities do not undermine the heterogeneity found amongst neighbourhoods due to two reasons – firstly, similar people do not always live together, and secondly, no two households can realistically be homogenous.

Similarly, studies have been conducted to solely analyze factors that people consider when choosing which city or which location to pick for their new houses - thereby implies how the choice of neighbourhood or location is of paramount weight in decision-making model (Shtudiner, Zwilling, & Kantor, 2017). Thus, it is sound to infer that the neighbourhood is a construct that is important for residents and potential residents alike. For the sake of this thesis, the establishment of the neighbourhood as a chief concern for people is essential in order to understand the magnitude of influence planners can have on people's socialization patterns in designing neighbourhoods.

2.2.3. New Urbanist and Conventional Suburban Neighbourhoods

As established in the last section, the location of the neighbourhood area within the city and the type of neighbourhood one resides is notably valuable for residents. Self-sufficient, densely populated, walkable with a pronounced ‘street life’ and the presence of residential, commercial and municipal services at a walking distance – that is the picture urban planners, historians, sociologists and political scientists paint of a classical neotraditional village found in North America before the world-changing World War II (Morrow-Jones et al., 2004; Nasar, 2003). With the war signifying changes of all sorts, it also bought about a change in ideologies and lifestyles. The post-World War II era gave rise to the socially and economically burgeoning middle classes who moved away from city centers and into the suburbs located away from inner city hubs (Tzaninis & Boterman, 2018). Behaviourally speaking, this phenomenon of moving to the suburbs was best described as a “collective effort to live a private life” (Fishman, 2008; Mumford, 1938). From an 'urban planning' perspective, suburbs are defined as communities located away from city centers and tend to be defined majorly by low-density living, wider streets and more automobile dependence (Tzaninis & Boterman, 2018). Often, suburbs are taken to be the opposite of the classic neotraditional developments – the latter of which now have the prime goal of taming urban sprawl (Nechyba & Walsh, 2004). With the existence of contrasting neighbourhood choices, some people prefer urban or inner-city neighbourhoods, while others prefer to reside in traditional suburbs and lead a more family-oriented life. However, there is a stark preference and demand for suburban housing above and beyond higher-density forms of housing (Morrow-Jones et al., 2004). Even those who cannot currently afford the suburban life, consider it an idealized type of living which they would like to move to, given the opportunity and affordability (Morrow-Jones et al., 2004).

With neighbourhoods now existing in city centers, as well as in the suburbs, the housing markets in developed countries are facing a mismatch in demand and supply. While many people occupy urban city centers with higher-density living, a clear majority shows a preference for suburban housing, but with the added feature of improved accessibility (Tian, Ewing, & Greene, 2015). With increased suburbanization, the early onset of urban sprawl has become a widely debated topic. Urban sprawl refers to the expansion of the population into low-rise developments, 'edge cities' or planned areas that exist as separate communities from the main city (Nechyba & Walsh, 2004). The loss of green spaces, various forms of pollution, lack of a community-feeling, waste of land space and congestion are all negative externalities bought about by urban sprawl, which is also called suburban sprawl (Nechyba & Walsh, 2004).

The rise in urban sprawl over the years has raised environmental concerns which gave birth to different movements that proposed an increase in higher-density living developments. One such movement that has been around since the beginning of the 21st century is 'Smart Growth' which is the environment-friendly and pro-community development of neighbourhoods, which forms the basis of several policy frameworks in developed countries (Gerrit Knaap & Emily Talen, 2005). Higher density living, mixed land use, the presence of open spaces, increased walkability and greater accessibility are some of the key features of 'Smart Growth' (Gerrit Knaap & Emily Talen, 2005). The rising support for 'smart growth' brought about the wave of 'New Urbanism' that has been gaining popularity, particularly amongst urban planners and architects in the last few decades. New Urbanist neighbourhoods are a product of planners rediscovering and reapplying the pre-WWII principles of neotraditional living. The key goals and features of the 'New Urbanist' movement are quite similar to those of 'Smart Growth' but instead, stem from architectural origins. However, the two constructs now tend to be used interchangeably to quite an extent, and this too is the case throughout this paper (Gerrit Knaap & Emily Talen, 2005; Trudeau, 2013). While such 'smart' neighbourhoods have started to increase in supply, the demand from home-occupants falls short. Morrow-Jones, Irwin and Roe (2004) discuss how potential home-occupants would need to be educated to attract them to such developments and divert their preference from traditional suburbs (Morrow-Jones et al., 2004). A study conducted on home-occupants' demand for 'smart growth', found that while people found several features like closer proximity to work, shopping centers and better accessibility attractive, they still preferred suburban housing. (Tian et al., 2015). In fact, according to an interesting finding, consumers even differentiate between the features various New Urbanist developments offer and express a particular distaste towards higher density-living (Morrow-Jones et al., 2004). Such revelations can have important takeaways for developers and planners, i.e. perhaps it is better to include and highlight features that consumers show a preference for in New Urbanist developments while cutting down on the features they dislike.

Moreover, while the environmental impact of urban sprawl may be less of a concern for most people looking for houses, life satisfaction plays a huge role in shaping their preferences to reside in one or the other place. In a Chicago-based case study, researchers assessed the quality of life and the satisfaction attained from living in a downtown high-rise location versus a suburban low-rise home (Du, Wood, Ditchman, & Stephens, 2017). They used five criteria to measure life satisfaction: 'travel, accessibility, social interaction, safety and overall residential environment'. The case study concluded that downtown life garnered more life satisfaction than the suburban life – a finding that was statistically significant (Du et al., 2017). However, the criteria selected to measure life satisfaction was limited and ignored an array of factors that have been proved to have a result on life-satisfaction, e.g. affordability (Du et al., 2017). Hence, considering the breadth of elements contained within neighbourhoods, it is essential to establish the role these elements play in impacting neighbourly interactions.

2.3. The Role of Personal-Level Factors in Shaping Residential Socialization

At an individual level, many factors that influence the frequency and depth of social interactions that residents have with their neighbours. The most commonly studied factors are the 'quantifiable' ones. There is plenty of research that discusses how rational factors like age cohort, family size, number of young children, socioeconomic status, number of cars, number of bikes, whether they own or rent the residence – are important determinants of the consumer's socialization behaviour (Levy & Lee, 2011; Lundgren & Wallentin, 2016; Vera-Toscano & Ateca-Amestoy, 2007).

Often, home-hunters are constrained by their socioeconomically imposed affordability when choosing their housing location. The higher an individual or household's income gets, the higher the probability of them moving into a neighbourhood that is perceived to have higher status (William Clark & Regan Maas, 2016). On the other hand, those living in lower socioeconomic status neighbourhoods are seen to hold negative neighbourhood associations and are therefore likely to socialize less with fellow residents too (Shields & Price, 2005).

Furthermore, research has shown that when couples living in urban neighbourhoods have one or more children, they move up the ‘family career’ ladder and thus, tend to move into bigger houses where they can lead a family-oriented suburban life (Blaauboer, 2011). This finding depicts various motivations that could potentially explain socialization patterns. Firstly, single-member households or couples living together may prefer urban neighbourhoods due to proximity to work and ease of accessibility and multiple services within a walkable distance. However, previous research found that once those families have children, school choice becomes a more important determinant of where they choose to reside (Francis A. Pearman & Walker A. Swain, 2017; Todd L. Ely & Paul Teske, 2015). Additionally, the fulfilment of children's needs and proximity to services essential for them - like schools and nurseries - takes precedence over their socialization preferences. Once couples with children move to areas suiting their needs, one could infer that their children are likely to befriend other children in the neighbourhood – provided sufficient opportunities are present, for instance, in the shape of public parks. Thus, the presence of children in a house redefines and raises the odds of those households socializing with those around them (du Toit et al., 2007).

Secondly, as suburban housing is considered an ideal setting for family-living by many, it creates a considerable pull for families with children (Jean, 2016). Such families end up rearranging their priorities and attaching more importance to children’s needs than to their lifestyle preferences or personal identities. This may be the reason that many families with income-earners from high-tech or creative occupations tend to locate in the suburbs, rather than in urban city centres which may be closer to their workplace or more technologically or culturally rich (Jae Hong Kim, Francesca Pagliara, & John Preston, 2005; Kwon, Lee, & Beamish, 2016; Shtudiner et al., 2017; Tian et al., 2015).

Furthermore, several studies corroborate the finding that individuals in their late thirties to fifties mostly live in traditional suburbs, while the older age cohort that comprises of senior citizens prefers higher-density living with people like themselves in their surroundings (Du et al., 2017). The most salient and likely reason for the latter's preferences changing with old age is the ease of transportation and accessibility of city centers which is missing in the suburbs (Anneli Kährik, Jana Temelová, Kati Kadarik, & Jan Kubeš, 2016; Du et al., 2017). Increased accessibility and pedestrian-friendliness allows the elderly to mobilize themselves within the neighbourhood and interact with others in the same life stages and circumstances as them. A study conducted on the US Boomers found that age-targeted communities, which share design features with New Urbanist developments, are highly valued amongst the older aged residents due to their social interaction opportunities and the fact that they hold frequent social events (Kwon et al., 2016). The older age cohort is thus, more likely to make residential location choices based on socialization opportunities than middle-aged cohorts (du Toit et al., 2007).

Moreover, consumers' residential location and socialization preferences have also been linked to where they are in terms of stage of life and lifestyles. Yuppies, students, young couples, newly-weds at a transitional stage in their lives, artists and even some middle-income families have started to populate inner cities that support high-density living (Alan Evans & Rachael Unsworth, 2012; Anneli Kährik et al., 2016). More often than not, their occupation of high-density neighbourhoods arises from cheaper rents, proximity to work, the availability of affordable transit and even the ample social and entertainment opportunities (Blaauboer, 2011; Faessen, 2002). From this, we can gather that in younger ages and early years of married life, people can locate in city cores due to their wish to socialize and be closer to the city bustle. However, this decision is also a product of economic constraints. Several studies have analyzed the correlation between age and individuals' residential location preferences and have found that while much of the younger population does reside in higher-density metropolitan areas, most of them aspire to own traditional detached houses in the suburbs when they transition on to their next life stages (Alan Evans & Rachael Unsworth, 2012; Jae Hong Kim et al., 2005). However, for those people living in metropolitan areas with higher-density living, there is higher public transit dependency and lower automobile usage – both of which are exogenous variables that are discussed in the next section (Kauko, 2006).

Apart from the likely role of 'accessibility' and 'transit availability' in shaping social interactions, tenure is another commonly studied household-related factor that could influence socialization patterns of residents is their tenure – i.e. do residents own or rent their house? Research has proven that home-owners are more likely to socialize with their neighbours and consequently, feel more satisfied with their neighbourhoods as compared to renters (Rohe & Basolo, 1997; Vera-Toscano & Ateca-Amestoy, 2007). Even the duration of stay in one's house has been linked to socialization, with high social engagement levels seen for those who have lived in their houses longer (du Toit et al., 2007). While these are not design-related factors, they can have policy-level implications for the state which could make the process of home ownership easier in order to raise socialization and satisfaction levels. However, more research in this area would be useful to quantify the impact of home ownership on socialization.

Moreover, the literature has also explored the role of social networks in impacting consumers' decisions to stay in their current location or move to a new location. Several studies found that the likelihood of moving was higher amongst younger adults and lower amongst those with children, a steady job or social connections in their area (B. H. Y. Lee & Waddell, 2010). This finding indicated the willingness, or the lack thereof, to move due to social connections and bonds in one's neighbourhood highlight the significance that the sense of community holds for several people.

Delving into the reasons residents choose a particular neighbourhood to reside in can be quite revealing in terms of their psychosocial, attitudinal and preferential characteristics (Quigley, 1985). Such personal factors are usually unobservable and not easily measurable, but still affect the consumers' decision to locate in a certain setting (Walker & Li, 2007). These factors have to do with the ‘feel', ‘identity', ‘image' of a place and the ‘lifestyle', ‘cultural capital' and ‘identity' of individuals within households – all of which impact individuals' preferences to socialize with their community (Kauko, 2006; Lundgren & Wallentin, 2016). Since we know that neighbourhood choice is not a random variable and that there are factors beyond rational ones, it is safe to infer that unobservable characteristics play an important role in portraying personal traits which in turn determine neighbourhood choices.

Firstly, the role of past experiences in one's life is a factor that impacts individuals' choice to form social bonds with those around them. Individuals who previously lived in either urban or suburban neighbourhoods have a high probability of returning to the same types of neighbourhoods and replicating the same socialization patterns they had before (Blaauboer, 2011; Peteke Feijten, Pieter Hooimeijer, & Clara H. Mulder, 2008; van Dam, Heins, & Elbersen, 2002). As a matter of fact, ‘location-specific capital' builds up in the form of social connections and cultural capital from one's childhood, thereby pulling those individuals to return to the same areas later in life (Blaauboer, 2011). Similarly, in families where the parents and siblings have strong bonds with one another, individuals have higher odds of choosing a location that is proximal to their close ones. However, for such residents, social interactions are mostly constrained within the family and do not extend to other residents (Blaauboer, 2011; Malmberg & Pettersson, 2007).

Another important construct that defines one's residential preferences is 'place attachment' and the identities people attach to places. Individuals' identities become closely tied with the greater identity that a certain place has – thereby, positively influencing residents' socialization behaviour in the place they are attached to (Jean, 2016). The social concept of living amongst 'people like us' also acts as an incentive for residents to invest more time and effort into socializing with one another (Bruch & Mare, 2006). Some research has suggested that there is more resonance amongst people living in the suburbs because they are similar in terms of socioeconomic status, values and lifestyles as compared to those living in city centers (Bruch & Mare, 2006; Jean, 2016). By living in a neighbourhood that is somewhat homogenous, it is likely that residents will be more motivated to interact with one another.

However, there are still many people who prefer city life due to the social identities they have carved out for themselves. As mentioned earlier, the place and community of residence contribute to forming the social identities of residents. The diverse range of people and the culturally rich environment found in city centers gives many people a 'feel' they want to experience and be close to (Frank, Kershaw, Chapman, Campbell, & Swinkels, 2014; Jean, 2016). Many metropolitan residents found that the city had a feel of 'pleasantness' which they valued as much as the high accessibility the city provided (Kauko, 2006).

Additionally, households' lifestyles also dictate their residential choices in terms of neighbourhood and housing choice, as well as in the socialization behaviours adopted (Frenkel et al., 2013). While lifestyle is a latent construct itself, many studies have attempted to use other variables to categorize lifestyles (Walker & Li, 2007). A study classified knowledge-workers into five categories – namely 'nest-builders', 'bon-vivants', 'careerists', 'entrepreneurs' and 'laid-back'. A study classified knowledge-workers into five categories – namely 'nest-builders', 'bon-vivants', 'careerists', 'entrepreneurs' and 'laid-back'. Location preferences, dwelling type and size, their work role and need for leisure and their socioeconomic constraints formed the basis of sorting respondents into the categories (Frenkel et al., 2013). The findings of the study revealed important socialization preferences of the workers in these groups. For instance, the bon-vivants were found to rank residing in the inner-city core as being most important to them due to proximity to cultural diversity and entertainment opportunities – both of which are indicative of their preferences to socialize and engage in social events. Entrepreneurs share many similarities with bon-vivants but are not bound by socioeconomic constraints. On the other hand, nest-builders are synonymous with family-oriented living, and they have a salient preference to locate in traditional suburbs and live a home-centric life. For them, like the careerists who view residence as a status symbol, socialization opportunities not a priority (Frenkel et al., 2013).

Another study looked at the lifestyles of individuals with the 'Baby Boomers' generation (Kwon et al., 2016). The authors came up with similar findings that depicted how those with different lifestyles – 'family-centric', 'economical, 'beautiful home' and 'engaged' – showed neighbourhood preferences that were somewhat homogenous within the lifestyle groups (Kwon et al., 2016). Such classification of lifestyles into various types, enable researchers to study an unobservable factor in detail by making quantitative factors a proxy. The findings delineated that it was residents with a desire to lead an 'engaged' lifestyle who resided in higher-density living and preferred living closer to the places with mixed-land use, outdoor activities and a strong sense of community that provided them with a supportive environment (Kwon et al., 2016). This paper was important because it highlighted how people within a generation can have different socialization preferences and that such preferences go beyond age-restrictions too.

Moreover, an essential and influential intangible factor in shaping individuals' socialization and residential preferences is that of cultural capital, a concept that has roots grounded in consumer behaviour theories. Cultural capital pertains to 'soft factors' which stem from, not only one's lifestyle but from one's type of education and occupation (Bereitschaft, 2017). As per the extensive literature, these 'soft factors' include elements like the quality of a place, or the "people climate" or "creative milieu" (Bereitschaft, 2017; Florida, 2002). For instance, the surrounding environment, diversity and social opportunities, rich culture, creative events and recreational life – all are factors that are important to a certain class of people (Bereitschaft, 2017; Florida, 2002). Since such factors depict a residential preference for socialization, it is crucial to uncover the types of people who hold such preferences. In 2002, Richard Florida's 'creative class theory' gained much imminence in the area of socioeconomic classes and their behavioural intricacies (Florida, 2002). According to Florida, the working class included the following three groups:

i. The '*Super-Creative Core'* which includes occupations that require creativity and innovation. Examples of such occupations include those in the science, computer programming, research, arts and design fields (Florida, 2002).

ii. The '*Creative Professionals'* which includes workers who use existing knowledge for problem-solving in their occupations. Examples of such occupations include those in the business and finance, healthcare and legal fields (Florida, 2002).

iii. The '*Bohemians*' who mainly include artists, journalists, actors and musicians (Florida, 2002).

According to Florida, individuals in these 'creative classes' valued pedestrian-friendly facilities like cafes and restaurants, and charming bohemian street shops. These classes tended to prize urban areas and city centres not only for such facilities, but also for the great diversity they provided (Bereitschaft, 2017; Florida, 2002; Lawton, Murphy, & Redmond, 2013). Florida's theory became a guiding light for urban developments in the years after his book was published. From the perspective of socialization, categorizing people according to their occupations proved useful for urban planners in making urban areas attractive for the young and technologically-advanced creative classes. Implemented properly, this categorization of the creative classes aimed to capitalize on the like-mindedness of people within classes and encourage socialization amongst them to foster a wider sense of cohesion and sharing of ideas at a larger scale. However, it was in 2017 that Richard Florida published another book titled "*The New Urban Crisis*" in which he explored themes of inequality and inequity between and within cities, social gentrification and growing spatial and regional disparities (Florida, 2017). The argument made by Florida in his latest book stated that the inflow of the creative classes into urban centres created a new economic problem as it increased the disparity of income and wealth (Wetherell, 2017). With the 'high-talented' class moving into urbanized cities, these urban hubs became increasingly expensive and only affordable by the rising elite classes, leaving the working classes to be displaced (Dorling, 2017). In essence, Florida's new book says that the problems that define urban city centres are now being projected on to suburban neighbourhoods (Florida, 2017). One may ponder, how severe are the implications on community cohesion and social integration within cities? Several authors have argued gentrification does not lead to more social mixing and does not increase the social capital or cohesion within inner-city neighbourhoods, even though residents of middle-classes have stated preferences for a more diverse neighbourhood (Kohn, 2013; Lees, 2008; Robson & Butler, 2001). A Canada-based study done on the social effects of gentrification found that gentrification of the cities has led to lower social mixing between different classes and groups of people, reduced ethnic diversity and social interactions in those urban neighbourhoods, as well as increased income polarization at a larger scale (Walks & Maaranen, 2008). Earlier studies have also referred to residents' preference to be affiliated and interact with people like themselves in terms of social standing and their avoidance towards heterogenous mixing (Talen, 1999). Hence, it is safe to deduce that the theory of the creative classes that attracted high-talent to inner-city cores has created somewhat of a social divide in the cities, contrary to popular belief that it would lead to social mixing at a macro-level. Now that a detailed analysis of the individual-level factors and their effect on socialization has been discussed, the next section proceeds to take a look at the role of neighbourhood built-form and design features in influencing socialization amongst neighbours.

2.4. The Relationship between Neighbourhood Design & Neighbourly Socialization

2.4.1. Background

Jane Jacobs, one of the pioneers of urban neighbourhoods as we see them today, opened the door to a plethora of research on neighbourhoods and social interaction in 1961 with her greatly successful hugely titled '*The Death and Life of Great American Cities'* (S. Brown & Lombard, 2014; Jacobs, 1992). Jacob's work was based on her personal, real-life observation of cities where she noticed that the urban shift towards growing suburbia was leading to a lack of mixed land use and population diversity, which was leading to the "loss of street life" and hence, a loss of social interaction, connectedness and even perceived safety levels amongst neighbourhoods (S. Brown & Lombard, 2014; Lund, 2003). She closely observed the features of neighbourhoods that promoted socialization amongst residents, as well as curtailed it, with the goal of urging city governments and planners to revise plans to incorporate her findings. The presence of sufficient sidewalks, safe streets, mixed land-use, accessibility and connectivity, shorter blocks and diversity of things to do for residents – all were some of the features that Jacobs cited as necessary to foster social interaction. The indispensability of such local social interactions was made clear, with neighbourhood social networks being labelled "a city's irreplaceable social capital" (S. Brown & Lombard, 2014; Jacobs, 1992, p. 138). Kenneth Jackson further reinstated the points made by Jacob and emphasized how the loss of community-based living would erode the social fabric of cities (Jackson, 1987; Lund, 2003). Gehl (2010) stated that planning city development with the goal to foster local relationships and bonds is humane and in line with the current day need to have 'cities for people' (Gehl, 2013; Middleton, 2018). Aligned with all the features that Jacobs stated as necessary for residential interaction, Brown and Cropper (2001) found more socializing and neighbourliness in New Urbanist neighbourhoods as compared to the conventional suburban neighbourhoods in their study (B. B. Brown & Cropper, 2001).

While many researchers built on the foundations laid by Jacobs, there have also been researchers who have not found the design and structure of the neighbourhood to have such an integral role in shaping the community. Some researchers believed that the increased automobile-dependency and detached lives Americans were leading were a product of their evolving preferences and revised lifestyle aspirations, not urban design flaws (Audirac & Shermyen, 1994). Several authors researching this particular subject matter also express disagreement with the idea that a 'sense of community' is a product of neighbourhood connectedness and believe that physical distance or geographical boundaries do not define the concept of a community (A. Shields et al., 2009; Talen, 2000; Wellman & Leighton, 1979). Wellman (2005) argued that while place-based communities might have been of social importance in the past, the modern world is more dependent on place-less communities (Wellman, 2005). However, despite these claims by several academics, a significant amount of literature looked at this so-called shift of the 'sense of community' as 'community lost' – thus drawing attention to the fact that community is a construct that can be 'lost' and has negative repercussions (Farahani, 2016). However, it is vital to be mindful of the fact that while physical boundaries do not limit modern-day communities, the role of physical design in shaping communities should not be undermined (Farahani, 2016). Thus, urban planning and designing may be considered useful tools in shaping, if not directly impacting, the neighbourly interactions between residents. The advantages and effects of physical design features can be capitalized upon to encourage community-building activities and discourage others like crimes (Swapan et al., 2018). Since 'physical proximity' is one of the central features that characterize neighbourhoods, it would make sense for planners to aim to reap the benefits of the 'mere exposure effect' by ensuring that neighbourhoods are designed in such a way to ensure residents get ample opportunities to familiarize themselves with others in the area (Swapan et al., 2018).

2.4.2. Exploring the Important Factors

The role of the built environment in promoting or deterring interactions between neighbourhoods has been studied across several disciplines ranging from sociology and psychology to urban planning and architecture and even public policy and health (Wilkerson et al., 2012). The depth of study into the built environment has highlighted the role various physical design features play in influencing social interactions in the area. This section of the literature review explores such relevant factors while contextualizing them according to neighbourhood types – i.e. New Urbanist and traditional suburban neighbourhoods.

The findings of many articles have discussed the bearing of neighbourhood 'walkability' as a key factor in cultivating pro-community behaviour. The idea goes back to 1961 when Jane

Jacobs emphasized the need to rebuild cities in a more ‘walkable' manner (Wilkerson et al., 2012). The argument made by many authors like Jacobs since then is that neighbourhoods ought to be designed to be pedestrian-friendly as that would encourage residents to walk around more, consequently increasing the odds of them running into other residents and having casual interactions (Alfonzo, 2005; Leyden, 2003; Wilkerson et al., 2012). One study drew a link between neighbourhood design, walkability and neighbourhood interactions and found that leisure-walking was associated with a more acute sense of community (Wood, Frank, & Giles-Corti, 2010). Another study found that neighbourhood walkability positively and significantly impacted one's likelihood of knowing neighbours, feeling of being connected to one's neighbourhood and trusting neighbours – all of which are measures of social capital (Leyden, 2003). There are multiple ways neighbourhood walkability can be enhanced using design features like streets, shared pathways, sidewalks and a more connected road network.

Firstly, streets are considered an important tool in urban planning as it plays a pivotal role in shaping neighbourhood interactions. An Australian study reinforced the theory that social proximity and closeness is a product of the actual physical distance using the presence of streets and pathways in a neighbourhood. The researchers found that connected, shared and safe streets and pathways lead to more residential interaction and the development of a ‘street life' which creates bonds between the residents and strengthens the communal bond (Middleton, 2018). Moreover, street width is an important consideration too. The narrower the width of the street, the less the between the front yards of two houses facing one another – thus, making it easier for neighbours to feel connected by proximity. The more the street width, the less connected neighbours would feel, thereby lessening their chances to interact and limiting the existing interactions to a superficial level (Swapan et al., 2018).

Similarly, social connectedness can be enhanced through the strategic development of sidewalk networks too. According to Jacobs, sidewalks play an essential role in building trust in the community as they increase the frequency of interaction (S. Brown & Lombard, 2014; Jacobs, 1992). Neighbourhoods with a sidewalk-to-street that is closer to one tend to have higher levels of pedestrian activity and thus more chances for socialization to occur too (Wilkerson et al., 2012). However, it must be noted that in order for these physical design features to have an impact on residential behaviour, they must be favourably perceived by them too. Residents are found to walk around the environment more frequently and engage with neighbours more if they have a positive perception of the neighbourhood's walkability. For instance, if the street networks are present, but not well-maintained or cleaned, the odds of residents walking around will drastically fall (Lund, 2003).

Walkability is a complex factor because often, the reason one happens to walk around plays an integral role in deciding whether he/she will socialize on the way. Those who stroll around their neighbourhood without any specific destination location are more likely to engage in neighbourliness in the form of social interactions with those around them. Many a time, strollers may even step outside with the intent to chat with neighbours they meet on their walk (du Toit et al., 2007; Lund, 2003). On the other hand, those who walk with a destination in mind, termed as destination-walkers, are walking to fulfil a specific objective and may be on a time restraint. Destination-walkers may perceive neighbourly interactions as a hindrance or waste of time; hence they are less likely to socialize in this scenario. One example is that of residents who are walking to get to the nearest transit station or stop. For such walkers, a negative correlation has been noticed between walking and socialization with neighbours (du Toit et al., 2007).

However, not all authors are supportive of the importance of walkability in fostering interactions between neighbours and that while running into one another more frequently will raise the probability of interactions, these interactions will be quite superficial. More intense and deeper social connections with one another are dependent on an array of other factors which include overall neighbourhood perception, demographics, the degree of similarity with neighbours and one's attitudes towards socializing within the community (Lund, 2003). Talen (1999) argued that while spatial arrangements can increase the probability that residents interact with one another, they are merely a medium and more than physical design is needed to cultivate a sense of community (Talen, 1999). Hence, this suggests that merely creating walkable neighbourhoods is not enough. To complement walkability, it is necessary for planners and local bodies to ensure that neighbourhoods are safe, well-protected and that residents find it comfortable to walk around. The literature has been clear on the heightened sense of security and emotional safety that comes with a well-connected neighbourhood (Farahani, 2016). An informal means of crime control and neighbourhood surveillance is in place for such closely-knit communities due to the high degree of neighbourliness in the form of mutual relationships and trust (Middleton, 2018; Williams, 2005). The more comfortable residents feel walking around the neighbourhood, the higher the frequencies of them walking and the more positive regard they are to hold for their neighbourhood (Lund, 2003; van den Berg et al., 2017). A research paper based on two Canadian metropolitan cities showed that many households stated that they had a stark preference for walkability (Frank et al., 2014). It would be worth exploring how much of a role physical neighbourhood design played in shaping this preference and whether preference translated into actual behaviour.

Furthermore, proponents of New Urbanism are steadfast in their belief that home-hunters attach much weight to mixed land-use. There has been more than sufficient research in the field on the presence of public spaces like parks and community centers, retail outlets, stores and similar diverse land-uses. The presence of a variety of different uses of space in the neighbourhood provides residents with increased chances for social mixing. As discussed earlier, despite the elevated role of social media in people's lives, these differently utilized uses of space allow people to socialize within the context of their community and 'on neutral ground' (Berg, Kemperman, & Timmermans, 2014). Public places like parks have been a point of particular interest for researchers due to their suggested importance in moulding a better social life for residents. A study found that in order to reap the full social benefits of public parks they need to be accessible, easily visible and appealing to residents (Moulay, Ujang, & Said, 2016). A paper testing the claims of New Urbanism found that residents in areas which had well-maintained parks in their vicinity were more likely to visit these parks and engage in impromptu interactions with neighbours. A similar increase in unplanned socialization opportunities was found in neighbourhoods with proximity to retail outlets, stores or malls (Lund, 2003). One paper found that for a specific group of people, stores and shops play a more central role in harbouring social interactions than do community centers or schools (Berg et al., 2014). Parks and community centers are considered to be more influential for people who lead more home-centric lifestyles and could include families with children, retired or unemployed people and senior citizens (Berg et al., 2014). Here it is necessary to be cognizant of the fact that such places act as a point of contact for residents, regardless of whether they walked there or not (Lund, 2003). However, while retail stores themselves may be points of contact for residents, those residents whose homes are within walkable distance of retail outlets are less likely to stroll around their neighbourhoods. Walking to the stores is considered destination-walking and is less likely to foster socialization amongst the residents (Lund, 2003).

Additionally, socialization times were found to be of the shortest duration at stores, schools and outlets – perhaps because residents come to these places with a purpose in mind(Berg et al., 2014).

It is also important to look at the cases in which communal spaces do not serve as efficient interaction and socialization points. If one space, like a park, is shared amongst a high number of residents, actual use of the space may diminish. Additionally, socialization may not take place effectively in an area that feels like it is too public. Therefore, residents are more likely to actually use communal spaces that are shared amongst a smaller number of residents (Williams, 2005). The use of semi-public space keeps the element of privacy intact while giving residents more of an opportunity to socialize. In order to do this, planners may sort the houses into clusters, and give each cluster its own communal space, e.g. a park (Williams, 2005).

Another core feature of New Urbanist development is its high-density living, which has received much attention since it helps counter urban sprawl. Despite the increased interaction potential in high-density living, research has found that residents living in multi-story apartments and high-rise buildings interact with one another less than those living in other forms of housing (Williams, 2005). The reason for lower interactions in high-density living could be the amount of time and effort it would take residents to mingle with those on other floors or for the residents in top-storeys who could find it too cumbersome to come all the way down and make use of the public spaces. Research has suggested that the role of elevators and hallways as socialization spots is also mostly superficial and lasts for brief time durations (Brueckner & Largey, 2008). Additionally, like with crowded public places like parks, high-density living could make residents feel like their privacy is not being kept intact and that may cause people to pull away or feel detached from other residents. This negative-density effect could be considered a critique of New Urbanist developments. In fact, some authors have stated that the presence of a diverse range of activities and entertainment opportunities actually reduce the residents' need to engage in social interaction with their own neighbours (Brueckner & Largey, 2008).

Moreover, there are also various design features pertinent to houses and residential structures that influence interactions between neighbours. Houses can be designed in such a way that people are motivated to step out of their houses and interact with their surroundings. For instance, the presence of porches and front yards has proved constructive in aiding social interactions. More prominent front porches that serve a functional purpose are traditionally found in older detached houses and tend to have a positive correlation with neighbourhood socialization (Talen, 1999; Wilkerson et al., 2012). Similarly, the presence of front yards, commonly found in suburban residential areas, is conducive to creating opportunities for residents to interact with others when passing-by (B. B. Brown & Cropper, 2001). Shorter setbacks have also been researched to be favourably impact interaction potential by facilitating interactions between residents and pedestrians (B. B. Brown & Cropper, 2001; Talen, 1999). Lastly, research has also demonstrated how litter and graffiti affect people's perceptions of a neighbourhood negatively as they depict a lack of order and could signify social disruption (Wilkerson et al., 2012).

2.5. The Relationship between neighbourhood socialization, satisfaction and attachment

While housing is a long-term investment, people still tend to change houses or relocate for various reasons. A hierarchical model of residential mobility was developed back in 1970, which formed the basis of much research in the area (L. A. Brown & Moore, 1970). It stated that the decision to move came about in two stages; the first stage was the push that came from household dissatisfaction with their current house or location and the second stage involved deciding whether to stay or move, depending on the availability of viable alternatives (L. A. Brown & Moore, 1970; B. H. Y. Lee & Waddell, 2010). Thus, it becomes necessary to study residential satisfaction and attachment to their neighbourhoods. Since the earlier sections have established the role of socialization and the continuous attempt by planners and policy-makers to inculcate deeper societal bonds between residents, it is now worth determining whether socialization is also instrumental in raising residents' satisfaction and attachment to their neighbourhoods.

Social interactions and community-level activities have been researched to improve individuals' perceived quality of life and their overall physical and mental well-being (Helliwell & Putnam, 2004; van den Berg et al., 2017). There is research in urban planning that credits the increment in community-oriented behaviours like walking to New Urbanist designing. The rationale used by proponents of New Urbanism is that the built environment promotes feelings of belonging and results in a hike in community-based activities, which in turn increase pro-community attitudes like neighbourhood satisfaction and attachment (Helliwell & Putnam, 2004; Middleton, 2018). By inculcating positive feelings towards one's community, the spatial design and structure of an area can create many social benefits for residents including feelings of safety and security, crime prevention, distinct community identity and local participation, to name a few (Farahani, 2016).

Residential satisfaction is primarily a measure of the residents' dissonance that arises from the difference between a household's actual versus desired housing and neighbourhood situation. The lower the dissonance, the closer their actual state is to their aspired residential state – thereby, raising their satisfaction levels (Vera-Toscano & Ateca-Amestoy, 2007). Several papers have critiqued the idea that more neighbourhood relationships lead to more satisfaction, as other factors could undermine the utility gained from socializing (Vera-Toscano & Ateca-Amestoy, 2007).

However, there are a large number of papers that have endorsed that the role of socialization in impacting life satisfaction seems to be positive and significant, in fact, even more so for males (A. Shields et al., 2009; Farahani, 2016).

2.6. Empirical Methodologies used in the Past

Research on residential choice has employed several methods to uncover and understand consumer rationale when it comes to decision-making. Researchers have used both, quantitative and qualitative techniques as part of their methodologies to decipher variables considered important by different house-hunters. Majority of the literature in the field adopts a quantitative focus in analyzing relevant data. Techniques used range from regression models and probabilistic estimation methods to choice-based conjoint analyses (Du et al., 2017; Jae Hong Kim et al., 2005; B. H. Y. Lee & Waddell, 2010; Morrow-Jones et al., 2004; Shtudiner et al., 2017). One of the most dominantly used methods throughout the literature has been regression modelling, with papers drawing on different types of regressions to suit their analytical needs. Many papers have employed the use of discrete choice models, with some using logistic regression models with binary dependent variables. Such methodologies focus on either revealed or stated consumer preferences to come up with a list of attributes deemed important (Jae Hong Kim et al., 2005). Multinomial models have also been frequently used to investigate residential choice decisions due to their efficient computations and consistent estimations (B. H. Y. Lee & Waddell, 2010; Quigley, 1985). One paper focused on deciphering locations that foster more interaction and made use of a multi-level latent-class multinomial logit model. However, while looking to the literature for practical findings, it is essential to be mindful of studies that attained their data and findings by giving respondents hypothetical scenarios. Such studies could garner consumer responses that are biased due to the non-commitment factor from the respondents' end (Jae Hong Kim et al., 2005).

One article explored consumer preferences for neotraditional neighbourhood characteristics using a choice-based conjoint analysis. Potential house-hunters were given the option to pick between two hypothetical neighbourhoods with different structural characteristics. The responses were then analyzed using a standard probit regression model to estimate the probabilities of households choosing one neighbourhood over another given the perceived utility each neighbourhood created for them. Amongst the revealed choices were the socialization preferences of residents (Morrow-Jones et al., 2004). However, regression models come with the inbuilt limitation that the estimated coefficients may be influenced by omitted or unaccounted for variables (Lundgren & Wallentin, 2016). Another paper looking at personal preferences and attributes that shaped consumers' choice of a city used a methodology that combined conjoint analysis with dummy variable regression. This particular paper was able to gauge the value consumers attach to various features in the city of residence and found that 'quality' of education was the most critical factor for most families surveyed (Shtudiner et al., 2017).

Moreover, there is also qualitative research that aims to analyze the role of intangible variables (Anneli Kährik et al., 2016; Lundgren & Wallentin, 2016). Researchers have employed the use of qualitative techniques like structural equation modelling and latent class analysis to signify the importance of such unobservable variables (B. H. Y. Lee & Waddell, 2010; Liao, Farber, & Ewing, 2015; Lundgren & Wallentin, 2016). A study conducted on the social interaction potential within areas facing urban sprawl issues used factor analysis to group together variables depicting the spatial and design element of the residential areas. A cluster analysis was then used to group regions which similar factor scores (Farber & Li, 2013). It would be worthwhile exploring more potential methodologies that could be used to analyze the role of intangible factors so that a more accurate representation of the role of individual characters and design features in impacting neighbourly socialization can be studied.

In conclusion, according to most existing research, the role of neighbourhood design and built-form is notable in influencing interactions between neighbours. As discussed above, there is an abundance of factors that shape the way residents interact with one another – ranging from demographics to psychosocial to design-related factors. After studying the comprehensive repository of literature that studies the relationship between neighbourhood built-form and socialization, the next section proceeds to discuss the methodology. Data collected from the residents of eight neighbourhoods – four of which are New Urbanist and four of which are conventional suburban ones - is utilized to answer the following research question: Do neighbourhood type and neighbourhood built-form influence social interactions between neighbours? Following the New Urbanist style of argument, the ensuing section investigates the hypothesis that design features associated with New Urbanist developments cultivate social interactions between neighbours.

Chapter 3: Methodology

This research aims to explore the role of neighbourhood physical design elements and neighbourhood type in cultivating social interactions between neighbours. It also aims to identify which design features, if any, stand out as salient in impacting neighbourly interactions.

3.1. Data Collection

The data used for this research was obtained from a report published by Dr. Ray Tomalty and Dr. Murtaza Haider in 2009. The report discussed the effect of neighbourhood built-form on residents' travel and pro-community behavior and attitudes (Tomalty et al., 2009). The researchers initially identified thirty-eight New Urbanist neighbourhoods but shortlisted it down to four New Urbanist neighbourhoods that contained most of the defining features of new urbanism. Then, they paired them with comparable traditional suburban neighbourhoods in the same city – hence, rendering a total of eight neighbourhoods in the dataset. The pairs of neighbourhoods were ensured to have similar housing types and values, residents with socioeconomic statuses and a similar distance from the city's metropolitan core. By doing this, the only features different across both neighbourhoods were the built form, the surrounding environment and the intangible differences in the residents' personal preferences and lifestyles (Tomalty et al., 2009). GIS mapping, data from local planners and municipalities and on-site surveys filled by residents were the primary means of gathering information on the physical design elements of the neighbourhoods such as the number of housing units, setbacks, street widths, etc. (Tomalty et al., 2009). Additionally, involvement from the local municipalities in the data collection process ensured smoother running and quicker responses.

A market research firm was hired to conduct quantitative questionnaires from the residents in the eight neighbourhoods, with every household member being provided a 24-hour trip diary. Two thousand three hundred household surveys were obtained using random sampling, and the survey data collected from them is used for analysis in this paper (Tomalty et al., 2009). Since this data is classifiable into either neighbourhood type, it provides a good landscape to analyze how people socialize differently based on whether they live in New Urbanist neighbourhoods or suburban neighbourhoods.

3.2. Explaining the Data Set

This section provides a detailed overview of the data set including the neighbourhoods, the relevant factors from the surveys and data from planners and municipalities.

3.2.1. The Neighbourhoods

As mentioned in the previous section, the data set consists of a total of eight neighbourhoods - comprised of four pairs, with each pair having one New Urbanist neighbourhood and one typical suburban neighbourhood from the same city to serve as a fair comparison (Tomalty et al., 2009). Refer to Table 1 below for a snapshot of the chosen neighbourhoods.

Table 1: *Chosen neighbourhoods & neighbourhood types*

No.	New Urbanist Development	Conventional Suburban Development	City	Urban Context
PAIR 1	McKenzie Towne	McKenzie Lake	Calgary	Outer City
PAIR 2	Garrison Woods	North Signal Hill	Calgary	Inner City
PAIR 3	Cornell	Woodbine North	Markham	Outer City
PAIR 4	Bois-Franc	Nouveau Saint-Laurent	Montreal	Inner City

PAIR 1

McKenzie Towne, Calgary: A New Urbanist neighbourhood, located 20 kilometres away from the city’s central business district, contains several planning features that make its neotraditional design stand out. The presence of a retail center, 16% of the total neighbourhood land comprising of open spaces for public use, 2 schools situated in the neighbourhood boundaries and a sidewalk-to-street ratio of 0.83 – McKenzie Towne is a good representative of New Urbanist development (Tomalty et al., 2009), an image and aerial map of which can be seen in *Figure 1*.

Figure 1: McKenzie Towne, Calgary: A New Urbanist Neighbourhood
(Image from Google Images and maps from Tomalty et al. 2009)

McKenzie Lake, Calgary: A traditional suburb, also located 20 kilometres away from the city's central business district has four schools within the vicinity and 19% open public spaces. However, what makes the neighbourhood different from McKenzie Towne is the fact that the area has very few commercial outlets, the sidewalk-to-street ratio is 0.40, and the dwelling density per unit of land is much lower than its New Urbanist counter-example (Tomalty et al., 2009). Refer to *Figure 2* for the visual representation of the McKenzie Lake neighbourhood.

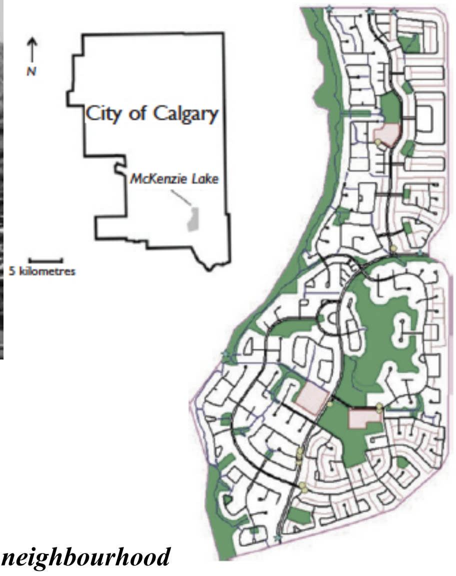

Figure 2: McKenzie Lake, Calgary: A suburban neighbourhood
(Image and maps from Tomalty et al. 2009)

PAIR 2

Garrison Woods, Calgary: Much closer to Calgary's inner-city core, this <u>New Urbanist neighbourhood</u> sports higher-density living and comprises mostly of townhouses and some apartments. The physical design of the neighbourhood has resulted in there being high-quality public open spaces, mixed-land use with lots of commercial outlets in the vicinity and 11 schools within 1 kilometre of the neighbourhood center. Lastly, the sidewalk-to-street ratio of this neighbourhood is 0.53 (Tomalty et al., 2009). Refer to *Figure 3* for a visual representation.

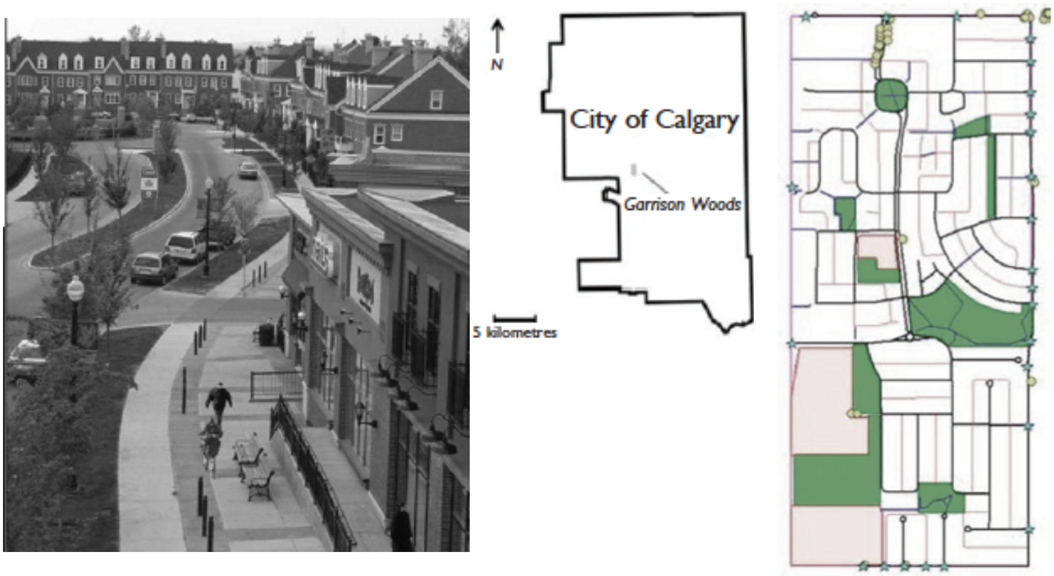

Figure 3: Garrison Woods, Calgary: New Urbanist Neighbourhood.
(Images and maps from Tomalty et al. 2009)

North Signal Hill, Calgary: On the other hand, the <u>contrasting suburb</u> has 70% detached housing, indicating the prominent low-density characteristic of suburban areas which has been said to contribute to urban sprawl. There are very few commercial uses in this neighbourhood and only one school in the area. Finally, open public spaces constitute 8% of the neighbourhood's total land area, and only 33% of the streets have curbs on both sides (Tomalty et al., 2009). A typical house in this suburb, along with an aerial map can be seen in *Figure 4*.

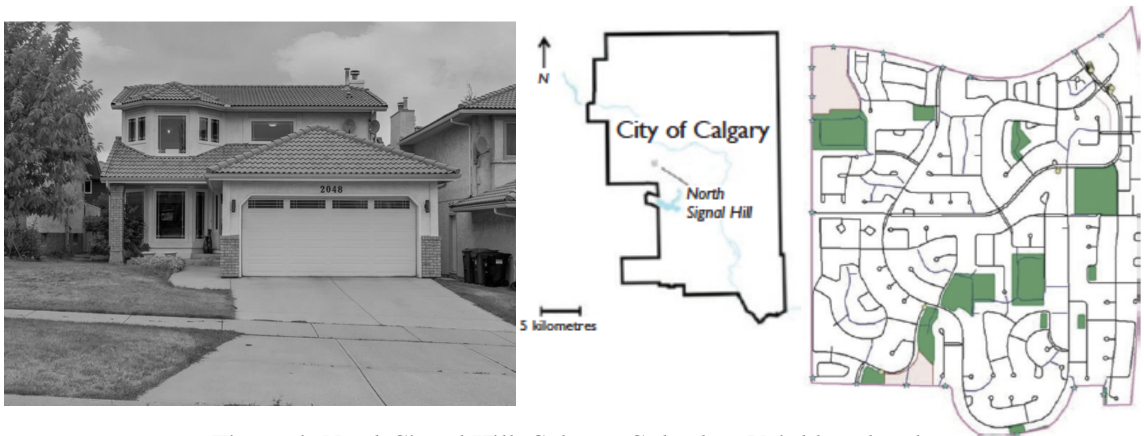

Figure 4: North Signal Hill, Calgary: Suburban Neighbourhood.
(Image from Google Images and Maps from Tomalty et al. 2009)

PAIR 3

Cornell, Markham: Cornell is a <u>New Urbanist</u> scheme, 30 kilometres away from the Toronto core. Refer to *Figure 5* for a visual representation of this neighbourhood. In this neighbourhood, only 36% of the houses are fully-detached, and all the remaining ones are townhouses or higher-density residences. 13% of the neighbourhood land is devoted to open public spaces, and the sidewalk-to-street ratio of 0.93 enhances the neighbourhood's walkability. While there is mixed-land use, the stores and commercial outlets are located only on the main street, and there is only one school in the vicinity (Tomalty et al., 2009).

Figure 5: Cornell, Toronto: New Urbanist Neighbourhood.
(Image from Google Images and Maps from Tomalty et al. 2009)

Woodbine North, Markham: This <u>traditional suburb</u>, 28 kilometres from Toronto's central district, is composed of residents living in fully-detached homes. While there is one school in the vicinity, this suburb holds significant commercial value as it is directly adjacent to a shopping center. However, at a glance, it does not seem to be very pedestrian-friendly due to a low sidewalk-to-street ratio of 0.19 (Tomalty et al., 2009). Refer to *Figure 6* for a sample photograph of the neighbourhood as well as an image of the neighbourhood plan.

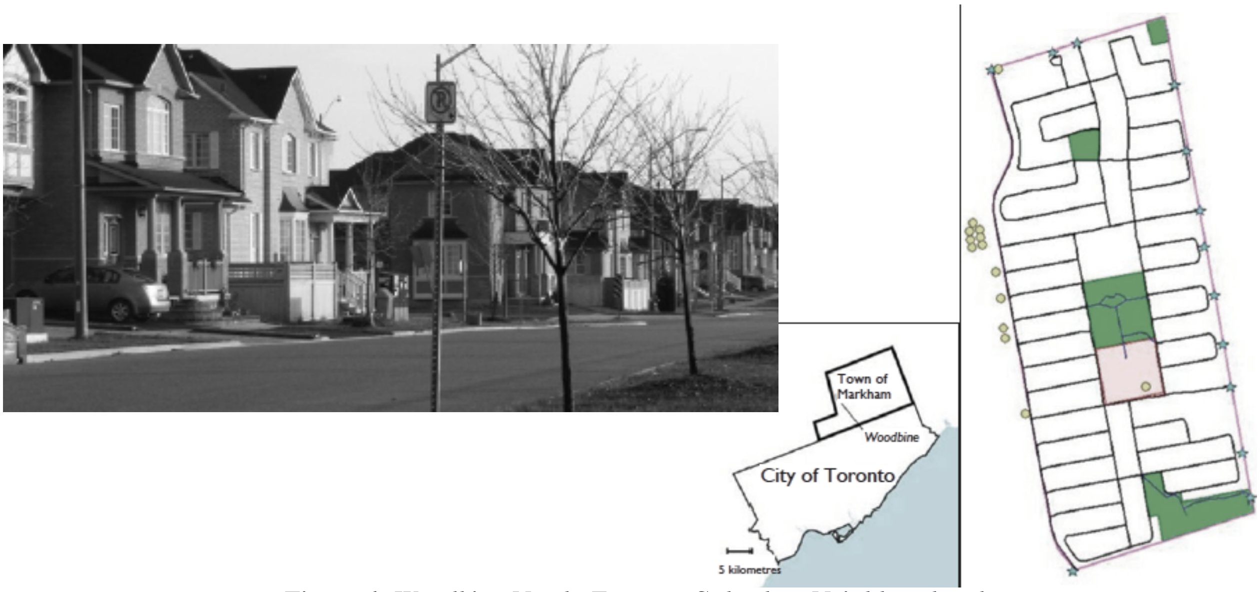

Figure 6: Woodbine North, Toronto: Suburban Neighbourhood.
(Image and Maps from Tomalty et al. 2009)

PAIR 4

Bois-Franc, Montreal: Eleven kilometres from the Montreal core, Bois-Franc is a good representative of <u>New Urbanist neighbourhoods</u>. The neighbourhood is comprised mostly of townhouses and multi-family housing, has a small commercial center, four schools within a kilometre of the center, 13% land dedicated to high-quality parks for the public and lastly, a sidewalk-to-street ratio of 0.81 (Tomalty et al., 2009). Refer to *Figure 7* for an image of the neighbourhood and the neighbourhood plan.

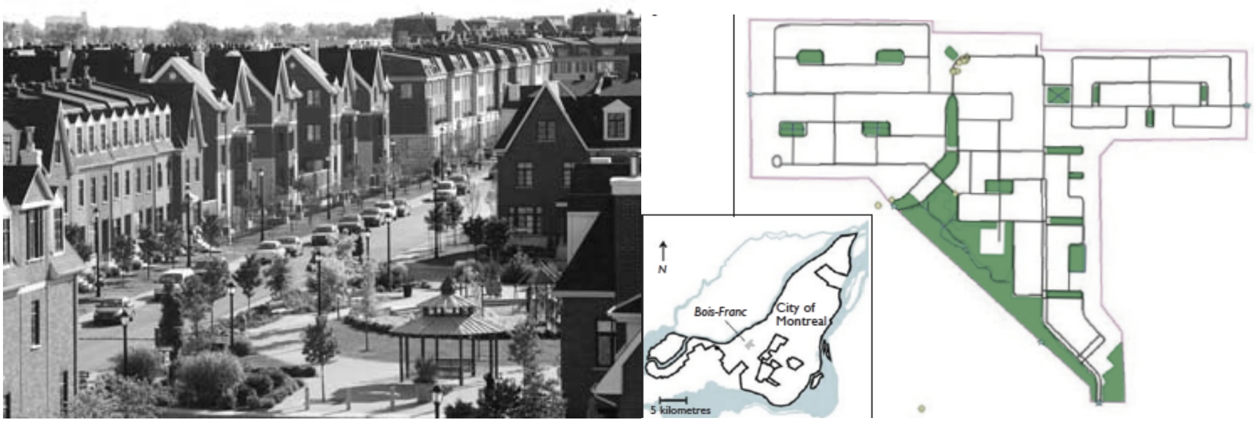

Figure 7: Bois-Franc, Montreal: New Urbanist Neighbourhood
(Image and Maps from Tomalty et al. 2009)

Nouveau Saint-Laurent, Montreal: Also 11 kilometres from central Montreal, more than half the houses in this <u>suburban neighbourhood</u> are fully-detached, with very few commercial availabilities, no schools in the vicinity and 10% land usage dedicated to open public spaces. In contrast to Bois-Franc, its sidewalk-to-street ratio of 0.21 indicates how it is not very conducive to resident walkability (Tomalty et al., 2009). An image of a street in the neighbourhood can be seen in *Figure 8*, along with the neighbourhood plan.

Figure 8: Nouveau Saint Lauren, Montreal: New Urbanist Neighbourhood (Image and Maps from Tomalty et al. 2009)

<u>*3.2.2 Household-Level/Demographic Variables*</u>

The data set includes several variables that are specific to households and will be different for every household, depending on their circumstances, lifestyles and personal preferences. The most basic variables include *total household income, household size, number of children under the age of 10 in the house, number of cars owned* and whether they *own or rent their current residence*. However, it is important to note that these individual-level variables are more demographic and do not include housing-level design variables as those form another category.

3.2.3 Housing-Level Design Variables

There are design-specific factors that vary from household to household and are distinct from individual-level variables in that they focus mainly on built-form and physical structure. The first housing-level design variable in this data set is *the number of parking spots* a house has, which includes garage spaces as well as room on the driveway. It is hypothesized that more parking spots can increase the distance between the front of the house and the sidewalk, perhaps impacting the perceived proximity of passersby to residents of the house. Secondly, more parking spaces could mean that residents have more garage space where they can park their cars and reduce their chances for social interactions. Another house-specific characteristic includes the *type of house* that the households are occupying currently, i.e. a detached single-family house, semi-detached house, townhouse or apartment. Moreover, the *street widths* in front of houses and the *setbacks* of the houses and the presence of *sidewalks* are all housing-level or street-level design characteristics – i.e., variables that shall be different for residents in each house, depending on the location and positioning of the house within the neighbourhood.

3.2.4 Neighbourhood-Level Design Variables

Neighbourhood-level factors that shall be accounted for in this study comprise of variables that are related to or indicative of the neighbourhoods' overall design and physical structure. These include *pathways, green spaces* including parks and playgrounds, and *retail outlets* in the neighbourhood vicinity. It is expected that the neighbourhood-level design variables, coupled with the housing or street-level design variables will impact neighbourly interactions.

3.2.5 Neighborhood type

The data set includes a binary variable for *neighbourhood type*, which classifies residents' neighbourhood either as a New Urbanist neighbourhood or a traditional suburb. This variable is a 'fixed effect' variable that captures the holistic and collective effect of residing in that area. Apart from encompassing design-related variables, *neighbourhood type* also accounts for the personality differences, lifestyle intricacies and other intangible and unobservable characteristics within a particular type of neighbourhood.

3.2.6 Social Interaction Variables

The collective effect of individual-level and design factors on behaviours is gauged using two primary measures:

- *The number of neighbours that residents can name*:

This variable is important as it depicts how many neighbours' residents are familiar with on a 'names' basis. It is indicative of a more personal connection with neighbours, as compared to just exchanging superficial greetings without knowing one another.

- *The frequency of face-to-face interactions with neighbours*:

Face-to-face interactions illustrate the frequency of physical meetings between neighbours. It is an important construct to explore because neighbourhoods' physical structure and design can play an integral role in encouraging neighbours to meet with one another. Compared to the number of neighbours named, this is a more superficial measure of socialization and does not necessitate. However, it is reasonable to infer that the more neighbours run into one another, the higher the likelihood there is of them getting to know one another and forming relationships.

Lastly, a list of all these variables and their definitions can be found below in Table 2:

Table 2: *List of Variables in the data set*

Variable Name	Variable Description
Neighborhood	The neighbourhood (out of 8) which you reside in
Neighborhood type	Fixed effect binary variable: 1 for New Urbanist neighbourhoods, 0 for suburban neighbourhoods
No. of Neighbors Named	Neighbours you can name/know by name
Face-to-Face Interactions	Frequency of face-to-face interactions with neighbours
Tenure	Residence rented or owned
Household Income	Total household income categories
No. of Household Members	Categorical variable for household size
No. of children	Children in the household under the age of 10
The type of house	Structural categorization of the house type: Detached, Semi-Detached, Duplex/Triplex, Townhouse, Apartment
No. of bikes	Number of bikes in the household
No. of cars	Number of cars in the household
Duration lived in the current house	Number of years lived in the current residence
No. of Parking Spots	Number of parking spots including the garage and driveway
No. of Retail Outlets	Number of retail outlets within 500 metres
Greenspaces	Area devoted to greenspaces in the neighbourhood (in m^2)
Pathways	Pathways in the neighbourhood (in metres)
Street Width	Street width in front of the house (in feet)
Setback	Setback distance in front of the house(in feet)
Sidewalks	Number of sidewalks in front of the house

3.3. The Hierarchy of Influence of the Explanatory Variables

Establishing a hierarchy in terms of variables allows researchers to isolate the effect of variables and gauge their significance more accurately. For the purpose of this paper, a hierarchy of factors that affect socialization amongst neighbours is established. When it comes to residents socializing with people around them, several factors are at play which have been divided into four basic levels – individual or demographic factors, housing-level design factors and neighbourhood-level design factors and a fixed effect variable accounting for overall neighbourhood type. The composition of variables within each of these levels has been discussed in Sections 3.2.2 to 3.2.5 respectively Categorizing the variables into levels allows the hierarchical influence of each level to be studied. By running incremental probit regression models, with an added hierarchy of variables in each model, it becomes possible to discuss and understand the influence of different explanatory variable categories on socialization.

3.4. Study Method

Socialization acts as a proxy of social cohesion in neighbourhoods and has often been linked to individual well-being and quality of living. The modern-age New Urbanist movement has principles rooted in connectivity and community-building and thus, should practically translate to residents having higher levels of socialization. Hence, it is worth exploring whether New Urbanist neighbourhoods contribute towards the establishment of a social fabric more than traditional suburban neighbourhoods or whether socialization is more dependent on individual behavioural characteristics that are independent of design factors. By running incremental probit regressions to study the influence of hierarchical levels of data, both resident-level and neighbourhood-level become a focus of analysis in assessing their effect on social interactions within a community. The overall goal is to decipher which design variables play a significant part in actuating interactions between neighbours and uncover if the neighbourhood type, as a whole, has a cohesive effect on inter-neighbour socialization. The ordered probit regression models are estimated using R as the statistical software.

There are a few salient reasons why ordered probit regression modelling was deemed the best analysis choice in this case. Firstly, the variables were mostly ordered in nature, thereby supporting the use of ordinal regressions which rely on probabilistic interpretations that are easier to understand in terms of the magnitude of the effects. Secondly, it is important to note that the dependent variables in this paper – namely, face-to-face interactions with neighbours and the number of neighbours named – are both ordinal too. As suggested in earlier research, it is not possible to opt for linear regression since ordered dependent variables violate the assumptions of linear regression modelling (Long & Freese, 2014; McKelvey & Zavoina, 1975; Winship & Mare, 1984). Thus, keeping this information in mind, the models in this paper will be fitted in R, using a '`polr`' function which stands for 'proportional odds logistic regression'.

The models in this paper are arranged as follows:

Level 1: The relationship between demographic variables and socialization

The effect of the household-level demographic factors discussed in the earlier section on socialization is measured using two dependent variables – namely, the frequency of face-to-face interactions residents have with their neighbours and how many neighbours they can name. Ordered probit regressions are run to gauge the effect of individual-level and demographic variables on the two measures of socialization. A list of the explanatory variables to be used in this model can be found in *Table 4* in Section 4.1, and a table depicting the model numbers can be found in *Table 3* below.

Level 2: The relationship between demographic variables, housing-level design variables and socialization

The second level also looks at the number of neighbours named by residents and their frequency of face-to-face interactions; however, in these models, the explanatory power is derived from housing-design features along with demographic features. The housing-level design features include the type of house, the presence of sidewalks, the setback and street width distances in front of houses and the number of parking spots the house has. With both socialization metrics acting as dependent variables, two ordered probit regressions are estimated.

Level 3: The relationship between demographic variables, housing-level design variables, neighbourhood-level design and socialization

The third level of regression models also contains neighbourhood-level design features. These include the number of retail outlets, the area allocated to greenspaces and pathway density. The models account for the effect of all the factors encompassing demographic, housing-design and neighbourhood-design level factors on both socialization measures – the number of neighbours named and the frequency of face-to-face interactions. Two ordered probit regression models are run to get a clearer idea of which design variables have a more significant impact on both the chosen socialization metrics. The models have been summarized and can be found in *Table 3*.

Model Parameterizations

In all six models, each model has an additional parameterization. The neighbourhood type is controlled for in one parameterization of the model, while it is not controlled for in the other parameterization. Neighbourhood type is a binary variable which indicates whether the resident lives in a ‘new urbanist' or ‘conventional suburban' neighbourhood. It is important to note that the neighbourhood type was allocated using municipal boundaries and classification. The reason behind running a parameterization with the ‘neighbourhood type' variable is to explore the fixed effect of the neighbourhood type, as a whole. This variable is also indicative of the intangible elements that have not been controlled for using explanatory variables. While design features are controlled for using distinct design variables directly such as setback, street width, sidewalk, number of retail outlets, green spaces and pathway density - these design variables capture one variable in isolation. The amalgamated and collective effect of neighbourhood type goes beyond mere design factors. In the parameterization that controls for neighbourhood type, the significance of the variable acts as a representative of the fixed effect of neighbourhood type on socialization and could also be indicative of behavioural factors or personality-related factors of the residents in those neighbourhoods. Neighbourhood type is controlled for in only Version A of each model; Version B does not include the neighbourhood type variable to ensure that neighbourhood type is not correlated with design features that may deprive them of statistical significance. An outline of the models and their specifications can be found in *Table 3*.

Furthermore, in a similar fashion to R-squared being used to measure the goodness of fit in OLS models, the goodness of fit in ordered probit models like the ones in this paper shall be measured using pseudo-R-squared. This thesis opts for McFadden’s pseudo-R-squared, also known as rho-squared (McFadden, 1977). As a general rule of thumb, the higher the McFadden pseudo-R-squared value, the better. While the values for McFadden’s pseudo-R-squared can lie between 0 and 1, values between 0.2 and 0.4 are considered to depict an ‘excellent’ fit (McFadden, 1977).Additionally, McFadden’s pseudo-R-squared has been proven to be a useful measure for nested models which include different variations of the same model. In this case, variables have been added to the same model in increments, thus making the rho-squared a useful measure to capture the fit of the models with increasing variables.

Table 3: *Outline of the Models*

	Number of Neighbours Named		Frequency of Face-to-Face Interactions	
	Controlling for 'Neighbourhood Type'	*Not Controlling for Neighbourhood Type*	*Controlling for 'Neighbourhood Type'*	*Not Controlling for Neighbourhood Type*
Demographic Factors	Model 1A	Model 1B	Model 4A	Model 4B
Housing-level Design Factors	Model 2A	Model 2B	Model 5A	Model 5B
Neighbourhood-level Design Factors	Model 3A	Model 3B	Model 6A	Model 6B

Multilevel Modelling

In various research literature, spanning across different fields and disciplines, explanatory factors are often sorted into categories that are divided into different levels according to their influence. Thus, in addition to the models mentioned above, multilevel models were also estimated at two levels. The effect of all the variables on the two socialization metrics was first estimated at a 'neighbourhood type' level and then at the level of each neighbourhood.

The nested nature of the data allows the incremental impact at every level to be gauged – as households are nested within neighbourhoods and the neighbourhoods in this paper are of two types. There are several houses within each neighbourhood, but each house is only part of one specific neighbourhood. (Hayes, 2006; Peugh, 2010).

Chapter 4: Descriptive Statistics

A data set collected by Tomalty and Haider (2009) was used in this thesis to estimate the effect of demographic, housing-level design and neighbourhood-level design variables on the socialization between neighbours. The sample consisted of a total of 2058 households who filled out and submitted their responses (Tomalty et al., 2009). The summary statistics have been broken into categories below and provide a preliminary overview of the residents' responses sorted according to the neighbourhood type they reside within. Out of the 2058 responses, 55% of the responses were from households residing in New Urbanist neighbourhoods, while the remaining 45% were from households in traditional suburban neighbourhoods. A breakdown of the response rates per neighbourhood can be seen in *Table 4* below:

Table 4*: Response Rate per Neighbourhood*

Neighborhood Name	Neighborhood Type	Responses	% of Total Responses	Sample Size	% of Sample
McKenzie Towne	NUN	361	18%	2106	19%
McKenzie Lake	CSN	346	17%	2714	24%
Garrison Woods	NUN	159	8%	691	6%
North Signal Hill	CSN	292	14%	1791	16%
Cornell	NUN	322	16%	1164	10%
Woodbine North	CSN	185	9%	1126	10%
Bois-Franc	NUN	274	13%	1279	11%
Nouveau Saint-Laurent	CSN	104	5%	361	3%
Total		2043	100%	11232	100%
NUN Average		**1116**	**55%**	**5240**	**22%**
CSN Average		**927**	**45%**	**5992**	**19%**

4.1. Household Profiles

Table 5 gives an overview of the household profiles of the respondents, corresponding to the type of neighbourhood they live in. These include demographic characteristics of the households, as well as individual-level household characteristics.

The survey revealed that households living in conventional suburban neighbourhoods (CSNs) were more likely to have 'three or more members' in their households. Approximately 67% of the households in CSNs had 'more than three' members in their households, while 48% of the respondents from New Urbanist neighbourhoods (NUNs) had more than three' household members. Thus, it is possible that singles or couples who initially lived in NUNs move to suburban neighbourhoods when their families expand, or they have children. Using the survey, it was also possible to decipher the number of children under the age of 10 in each household. There was not a substantial difference in the number of young children in households across both neighbourhoods; those residing in New Urbanist neighbourhoods only had a slightly higher percentage of households with '1 or 2' young children. However, families that had '3 or more' young children were more common in the suburbs, perhaps due to the space constraints of housing units in high-density living neighbourhoods. Thus, the results still dictate that while more households in New Urbanist developments have one to two young children, bigger household sizes are more common in the suburbs. A plausible rationale for this could be that as married couples have more children or the older their children get, they are faced with a pressing need to have bigger housing units to meet the demands of their families. With younger children, it is easier to manage within smaller housing units than it is with older children. Thus, even if a family has two children, there is a decent likelihood that it may end up moving to the suburbs once the children grow a bit older. Additionally, the high accessibility and walkability of New Urbanist neighbourhoods may attract families with young children – especially more so if the availability of schooling is proximal. Furthermore, as discussed in the Literature Review, families have ‘career ladders,' and as they grow in size and maturity, they also wish to ascend their housing and neighbourhood careers (Blaauboer, 2011). Since existing research has found how many people consider suburban living idealistic, moving to the suburbs can be seen as a progression of their neighbourhood careers (Morrow-Jones et al., 2004).

84% of the houses in CSNs were detached houses, in comparison to 44% being detached houses in the NUNs. Perhaps due to lower household sizes and less or no children, households choose to reside in NUNs due to the availability of more compact and affordable housing. The same holds for the number of cars within a household too. Following intuition, households with more members are more likely to have more cars. However, it is worth exploring whether car ownership differs across both types of neighbourhoods while controlling for household size. When limiting the household size to '4 members or more', it was observed that almost 92% of the households in CSNs had 2 or more cars, in contrast to 78% of the households in NUNs. This points towards the fact that even when household size is large, those families residing in CSNs are more likely than their NUN counterparts to be automobile-dependent. The summary of these results, controlling for household size, can be seen in *Table 6*.

Furthermore, in terms of income, while corresponding neighbourhoods had similar income levels, on an overall level out of all those respondents who disclosed their income levels, a higher percentage had a total household income of ‘$100,000 and above’ in the suburban neighbourhoods than those in New Urbanist neighbourhoods. Thus, it is possible to infer that, in accordance with existing literature, affordability could be acting as one of the potential reasons that residents at certain life stages tend to populate urbanist areas instead of suburban areas.

Moreover, there was no significant difference in home ownership in both the neighbourhoods, as the vast majority of respondents in both neighbourhoods were owners and not renters. Due to the fact that most of the respondents were homeowners, this variable was excluded from the regressions in the forthcoming section.

Lastly, it is interesting to see how most of the New Urbanist residents who submitted the survey moved into their neighbourhood more recently, compared to suburban residents who had lived in their current residences for a longer time. A plausible reason for residents in New Urbanist neighbourhoods having lived in their current residence for less time could be that it was around the early 2000s that New Urbanist schemes began to gain rapid popularity in Canada. With the rise of New Urbanist neighbourhoods and compact, affordable housing, perhaps many households found it easier to own residences there as compared to suburban neighbourhoods. Thus, the findings suggest that a more significant number of New Urbanist residents have been in their houses for 'five years or less', as compared to suburban residents.

Table 5: *Summary Statistics: Household Profiles according to Neighbourhood Type*

DEMOGRAPHIC VARIABLES			
		New Urbanist Neighbourhoods	**Conventional Suburban Neighbourhoods**
		1125	**933**
Tenure	**Own**	97.02%	98.46%
	Rent	2.98%	1.54%
Household Income	**Less than $50,000**	8.38%	6.71%
	$50,001 - $100,000	41.79%	32.03%
	$100,001 - $150,000	30.21%	32.03%
	Over $150,000	19.63%	29.23%
Household Size	**1 person**	14.21%	5.70%
	2 people	36.56%	27.20%
	3 or more people	49.23%	67.10%
Number of Children under 10	**0**	65.58%	67.13%
	1	18.48%	17.24%
	2	13.77%	13.15%
	3 or more	2.17%	2.49%

Type of Housing Unit	**Detached** **Semi-Detached** **Townhouse/Duplex/Triplex** **Apartment**	43.88% 10.83% 37.91% 7.37%	83.89% 5.85% 8.94% 1.32%
Number of Cars	**1 or less** **2 or more**	38.76% 61.24%	17.62% 82.38%
Duration Lived in Current House	**2 years or less** **3 to 6 years** **7 to 10 years** **10 years or more**	38.24% 41.92% 16.79% 3.05%	17.47% 40.72% 20.96% 20.85%

***Table 6**: Number of Cars Owned by Households with 4 or more members*

		Type of Neighbourhood	
		NUD	**CSD**
		299	**414**
Number of Cars Owned	**1 or less** **2 or more**	22% 78%	8% 92%

4.2. Physical Design Metrics

Physical design and spatial features of neighbourhoods are the key consideration in this thesis, and this section provides a synopsis for differences in responses recorded between households living in the two types of neighbourhoods. *Table 7* exhibits the summary statistics for this section.

One key differentiating factor between suburban and New Urbanist neighbourhoods is neighbourhood density, that is, the number of residential units located in a certain area. The survey found that the average gross residential density in NUNs was approximately 2000 dwellings per km^2 versus 1200 dwellings per km^2 in CSNs. This finding is in line with earlier finding that CSNs have a higher number of single-detached houses.

In addition to this, the street and pathway network was seen to differ somewhat significantly between the two neighbourhoods. Almost 82% of the streets in New Urbanist neighbourhoods had sidewalks on both sides, as compared to about 25% in the suburban neighbourhoods – hence, enhancing opportunities for residents to walk around in NUNs. This could have to do with New Urbanist principles of walkability that promote the construction and inclusion of more sidewalks within those neighbourhoods.

Furthermore, the survey responses showed a higher percentage of housing units with longer setbacks in suburban neighbourhoods than in New Urbanist ones. Technically speaking, the *setback* is the distance from the front of the house to the end of the property line. The property line ends either where the sidewalk starts or where the road starts in the case that there is no sidewalk in front of the house ("City of Toronto Draft Zoning by-law | Setbacks," n.d.). Almost 82% of the houses had setbacks greater than 18 feet in the suburban developments, which was double the proportion of units in New Urbanist developments with such long setbacks. Longer setbacks could be a result of bigger driveways or front lawns. In either case, longer front yard setbacks could act as a barrier or a hindrance for potential socialization opportunities between residents and passers-by. Similarly, increased street width in front of a house also increases the perceived proximity and decreases the possibilities for socializing with neighbours on the other side of the street. The survey depicted that in the traditional suburban neighbourhoods almost 94% of the households had streets in front of their houses that were '25 feet or wider'. On the other hand, streets in front of housing units in New Urbanist neighbourhoods were somewhat less wide, with 21% being 'less than 24 feet' wide and 79% being 'wider than 25 feet'. Additionally, 67% of the housing units from the surveyed suburban neighbourhoods had '3 or more' parking units compared to only 37% of the housing units in New Urbanist neighbourhoods with '3 or more' parking spots. Parking spots could have a dual effect on socialization. On one end, they could potentially increase the area of the driveway or garage – thereby, making socialization a more effortful process for residents and passersby. However, on the other hand, more parking spots result in residents having more room to use their garages or driveways creatively. For instance, households are likely to set up a basketball hoop in front of their house if they have more space rather than less. Similarly, residents could utilize parking spaces for activities like garage sales, storage or even working out. In this case, residents also have more opportunities for interactions with passers-by.

Furthermore, from the study neighbourhoods, it was seen that the New Urbanist neighbourhoods had a higher number of retail outlets within 500 meters of the neighbourhood center than suburban neighbourhoods. Approximately 70% of the households stated having '11 or more' shops in their neighbourhood. According to existing research, more shops and retail outlets ought to increase the likelihood of neighbourly interactions by providing residents with more avenues to socialize (Lund, 2003). In terms of greenspaces, New Urbanist neighbourhoods have a somewhat higher average of green areas like parks, compared to their conventional suburban counterparts. While New Urbanist neighbourhoods had a mean area of 68,500 km^2 allocated to greenspaces, suburban neighbourhoods had a mean area of 65,000 km^2. As discussed earlier in the literature review, green spaces in the neighbourhood like public parks provide residents with the opportunity to socialize with one another (Gerrit Knaap & Emily Talen, 2005). On the basis of such research, it is possible to infer from preliminary statistics that New Urbanist neighbourhoods could be more conducive to socialization. In terms of the meters allocated to pathways, conventional suburban neighbourhoods have a slightly higher average than New Urbanist neighbourhoods. In this thesis, pathways refer to walking or biking shortcuts for residents to access streets, parks, schools or any other nearby amenities of interest. Since pathways enhance residential accessibility, it would be worth exploring whether more pathways in suburban neighbourhoods would be linked to higher socialization amongst the residents too. From an overall glance at the preliminary statistics, it is possible to infer that New Urbanist neighbourhoods could be potentially more conducive to socialization.

Additionally, a breakdown of these physical design metrics sorted according to neighbourhoods can be found in *Table 8*. The New Urbanist neighbourhoods, represented by the shaded rows in the table – are seen to have higher gross density, higher percentages of green spaces and sidewalks, shorter setbacks and narrower streets – than their conventional suburban counterparts.

***Table** 7:Summary Statistics of Physical Design Metrics*

PHYSICAL DESIGN VARIABLES			
		New Urbanist Neighbourhoods	**Conventional Suburban Neighbourhoods**
		1125	**933**
Neighbourhood Density (dwellings per km^2)	**Mean**	2000	1200
Setback (in feet)	**Less than 6 feet**	9.96%	4.61%
	7 - 12 feet	21.33%	1.39%
	13 - 18 feet	27.11%	12.54%
	Greater than 18 feet	41.60%	81.46%
Street width in front of house (in feet)	**24 feet and under**	21.24%	7.07%
	25 - 48 feet	55.20%	79.10%
	49 feet and over	23.56%	13.83%
Sidewalks	**None**	2.11%	32.57%
	1 side of the road	13.17%	41.39%
	Both sides of the road	84.71%	26.03%
Number of Parking Spots	**1 or less**	12.41%	4.43%
	2	49.46%	27.32%
	3 or more	38.13%	68.25%
Number of Retail Outlets within 500 meters	**no shops**	12.89%	29.30%
	1 - 2 shops	21.45%	34.42%
	3 - 10 shops	28.18%	19.17%
	11 - 25 shops	28.08%	12.96%
	More than 25 shops	9.39%	4.14%
Greenspaces in the neighbourhood (Area in m^2)	**Mean**	68,500	65,000
	Standard Deviation	42,400	47,000
Pathways in the neighbourhood (in meters)	**Mean**	1,100	1,200
	Standard Deviation	580	780

Table 8: Tabulation of selected design variables sorted by neighbourhoods

Neighbourhood Name	Type	Total Area (km_2)	% of Detached Houses	Gross Density (uph)	% of Greenspaces	% of Sidewalks on both sides	% of Setbacks > 18 ft	% of Streets < 25 ft
McKenzie Towne	NUN	2.69	59%	17.2	16.2%	83.2%	31.0%	13.9%
McKenzie Lake	CSN	4.42	91%	10.5	18.6%	40.2%	78.8%	3.5%
Garrison Woods	NUN	0.77	28%	19.9	52.8%	52.8%	73.8%	4.9%
North Signal Hill	CSN	2.46	72%	12.6	33.1%	33.1%	82.5%	10.4%
Cornell	NUN	0.97	36%	19.6	12.8%	93.1%	32.4%	2.1%
Woodbine North	CSN	0.75	64%	16.3	8.9%	19.4%	76.5%	0.0%
Bois-Franc	NUN	0.85	3%	30.7	12.7%	80.7%	35.5%	24.8%
Nouveau Saint-Laurent	CSN	0.92	52%	10.5	9.6%	21.2%	97.1%	1.5%
NUN Average		**1.32**	**32%**	**21.85**	**23.6%**	**77.5%**	**43.2%**	**11.4%**
CSN Average		**2.14**	**70%**	**12.48**	**17.6%**	**28.5%**	**83.7%**	**3.9%**

4.3. Social Interaction

Before delving into analyzing the effect of individual and design factors on socialization, it is essential to explore whether there seem to be any differences in socialization between neighbourhoods at first glance. In this thesis, two main socialization metrics are chosen: the number of neighbours that residents can name and the frequency of face-to-face interactions. *Table 7* shows the summary statistics of the chosen socialization metrics, sorted according to neighbourhood types.

According to the descriptive statistics, residents living in CSNs depicted higher socialization as proxied via the two variables. Almost 57% of the respondents in CSNs could name more than ten neighbours, while the percentage came down to 51% for those living in NUNs. When it came to face-to-face interactions, the difference amongst neighbours in both types of neighbourhoods was minimal. Almost 74% of the respondents in NUNs and 72% of the respondents in CSNs met their neighbours at least once a week, which seemingly is not that significant a difference. However, this paper hypothesizes that the impact of socialization will come to light once regression modelling has been used to uncover any possible underlying linkages. The next section focuses upon exploring whether these New Urbanist residents are indeed more social and whether this is derivative of neighbourhood design features.

Table 9: *Summary Statistics of Socialization Metrics*

SOCIALIZATION VARIABLES			
		New Urbanist Neighbourhoods	**Conventional Suburban Neighbourhoods**
		1125	***933***
No. of Neighbours you can name	**2 or less**	4.65%	4.54%
	3 to 6	25.39%	23.54%
	7 to 9	18.32%	14.69%
	10 or more	51.65%	57.24%
No. of Face-to-Face Interactions	**One or more times a week**	73.51%	71.96%
	About once/few times a month	11.38%	12.57%
	Less than once a month	15.11%	15.47%

Chapter 5: Modelling & Discussion

This chapter discusses the results of the ordered probit regressions estimated to gauge the effect on the two measures of socialization: *the number of neighbours that can be named by residents* and the *frequency of face-to-face interactions between neighbours*. This chapter presents detailed tables that show estimations of all the models and elaborate analysis that interprets and contextualizes the findings in the literature in the field.

5.1. Socialization Measure 1: *Number of Neighbours Named*

The number of neighbours named by respondents was the first measure of social interaction used in this study. When residents or members within a household are able to name more neighbours, it points towards their interactions with neighbours go beyond mere smiles and greeting and that they are acquainted enough to be on a names-basis. Incremental models are used to assess the significance of various independent variables on the chosen dependent variable – the number of neighbours one knows by name. The underlying motive is to uncover the variables that are salient in shaping socialization between neighbours and identifying whether neighbourhood type and design are significant in influencing people to form connections that are somewhat intimate. The following subsections shall take a look at the incremental regression models:

5.1.1. The Effect of Individual-level variables on the No. of Neighbours Residents Named

Two models were estimated to gauge the relationship between demographic-level variables on the number of neighbours named by residents. Model 1A is an ordered probit regression model that incorporates the following independent variables: total household income level, number of total people and children within a household, the number of cars and the duration the respondent has resided in the current house. In addition to these demographic variables, Model 1A also controls for 'neighbourhood type' which is a binary variable that depicts whether the household is within a New Urbanist or typical suburban neighbourhood. 'Neighbourhood type' is essentially a fixed effects variable that controls for features that contribute to the overall feel of the neighbourhood and are not captured by the data set. It also presents a more holistic view of neighbourhood type that is best described as something more than the sum of all its parts. Model 1B includes the same demographic variables, but without controlling for 'neighbourhood type' variable. The need to run two parameterizations of this model – one with and one without the neighbourhood type variables, respectively – is to ensure that the fixed effects variable does not take away the statistical significance of the other built-form independent variables. *Table 8* shows the results for these ordered probit regression models.

Model 1A starts with the variable – 'neighbourhood type' – which depicts that those living in New Urbanist neighbourhoods (NUNs) are significantly more likely to name more neighbours than those living in conventional suburban neighbourhoods (CSNs). In this particular case, this variable also encompasses factors that are not controlled for, such as design and structural variables. Thus, this parameterization of the model shall hold more significance in the upcoming sections, once the design and structural variables are included in the model.

In terms of demographic variables, both the regressions show similar results, hence depicting that the fixed effects variable adds value to the model and does not dilute the impact of the explanatory variables on the number of neighbours named. Those in the higher income categories, namely residents earning '\$100,001 – \$150,000' or 'more than \$150,000' had higher odds of naming more neighbours than those earning 'less than \$50,000'. However, the coefficient estimate was statistically insignificant. Moreover, those households with 3 or more members, were significantly more likely to have a higher chance of naming more neighbours than single-member households – a finding that is statistically significant. The number of children in a household is also statistically significant in determining the number of neighbours named. Households with two children were more likely to know more neighbours by name as compared to those with no children; with the probability increasing even more for those households with 3 or more children. Furthermore, as the duration for which a household lived in their current house increased, so did the probability of them being able to name more neighbours. This finding is statistically significant and simple to rationalize: those who have lived in their current house for longer, are more acquainted with their surroundings and have had more time meet those around them.

In both parameterizations of the models, the McFadden pseudo-R-squared has returned a value of 0.281 and 0.279 respectively, which suggests that the model has a good fit. Next, more housing-level design variables are added to the model to gauge the effect on socialization as proxied by the number of neighbours that can be named by residents.

Table 10: Models 1A and 1B: *Analysing the relationship between demographic features of residents and the number of neighbours they can name.*

	Dependent Variable **No. of Neighbours Named**	
	Model 1A	**Model 1B**
Neighbourhood Type		
<u>*Base Category: Suburban Neighbourhood*</u>		
New Urbanist Neighbourhood	0.182*** (0.066)	
Income Levels		
<u>*Base Category: Less than $50,000*</u>		
$50,001 - $100,000	-0.175 (0.117)	-0.157 (0.117)
$100,001 - $150,000	0.193 (0.123)	0.203* (0.123)
More than $150,000	0.197 (0.129)	0.201 (0.129)
Number of People in the Household		

Base Category: 1 person		
2 people	0.062	0.064
	(0.108)	(0.108)
3 or more people	0.334***	0.307**
	(0.12)	(0.119)
Number of Children (under 10 years)		
Base Category: None		
1	0.055	0.072
	(0.095)	(0.094)
2	0.463***	0.479***
	(0.11)	(0.109)
3 or more	0.591**	0.583**
	(0.24)	(0.239)
Number of Cars in the House		
Base Category: '1 or less'		
2 or more	0.163	0.131·
	(0.076)	(0.075)
Duration lived in the Current House		
Base Category: '2 years or less'		
3 - 6 years	0.262***	0.235***
	(0.071)	(0.07)
7 - 10 years	0.783***	0.748***
	(0.093)	(0.093)
More than 10 years	0.815***	0.723***
	(0.117)	(0.112)
2 or less| 3 to 6	-0.973***	-1.116***
	(0.145)	(0.136)
3 to 6| 7 to 9	0.267*	0.118
	(0.14)	(0.129)
7 to 9| 10 or more	0.780***	0.629***
	(0.141)	(0.13)
Observations	1,579	1,579
Note:		*p < 0.01, **p < 0.05, *** p < 0.01
McFadden's Pseudo R-Squared	**0.281**	**0.279**

5.1.2. The Effect of Demographic & Housing-level Design Variables on Number of Neighbours Residents Named

This section also runs two parameterizations of an ordered probit model – Models 2A and 2B – which incorporates housing-level design variables into the model along with demographic variables to see the potential influence they have on the level of familiarity amongst neighbours. These design variables are specific to a household and may differ for different households within a neighbourhood too. The type of house, the number of parking spots, sidewalks in the area, the setback distances and the width of the street in front of the house are the variables added to the model. Model 2A also controls for fixed effects using the neighbourhood type binary variable. In an identical fashion to the last section, the results of both parameterizations, as can be seen in *Table 9*, show similar results.

Firstly, Model 2A shows that while controlling for neighbourhood type in addition to demographic factors and housing-level design variables, those residing in NUNs have a significantly higher probability of being able to name their neighbours, as compared to those residing in CSNs.

Secondly, looking at the demographic variables, the effect of '3-person or more' households, '2 or more children' within the household and duration lived in the current house on the number of neighbours named was the same as in the Section 5.1.1 in both models. Similarly, the number of cars was a statistically insignificant variable in impacting the number of neighbours residents could name.

In terms of the housing-specific design variables, a negative relationship was seen between higher-density living and the number of neighbours named by the residents within a household. While research has shown that higher-density living provides more opportunities to socialize, it is important to note that residents may not necessarily be utilizing these opportunities. (Blaauboer, 2011; Faessen, 2002) The results depict that those living in semi-detached houses, townhouses or duplexes/triplexes - all were significantly less likely to know neighbours by name than those living in detached homes. Those residents living in apartments were also seen to be less likely to know their neighbours by name than those living in detached houses. However, this finding for apartments is not statistically significant, perhaps because only a few respondents in the sample resided in apartments; the majority resided in the other given housing types. Kwon et al. 2016 found that many residents who want to lead more ‘engaged lifestyles' reside in higher-density living and thrive on a sense of community and the formation of a social support system around them (Kwon et al., 2016). The results of this regression, on the other hand, contradict this and delineate how high-density living does not lead to higher residential engagement with one another.

Furthermore, the results, as seen in *Table 9*, found that those residents living in houses with more parking spots could name more neighbours – a finding with high statistical significance. While more parking spots increase the distance between the front of the house and passersby, and hence reduce the depth of interactions, it is still possible to rationalize the positive relationship between parking spots and the number of neighbours named. While parking spots may increase the distance in front of the house, they also provide an opportunity for residents to utilize the space. For instance, many houses tend to install basketball hoops in front of their houses when they have enough area in front of the house. Residents also utilize their garages, when they have sufficient parking spaces, in a way that may create socialization opportunities. With children playing outside the house or adults utilizing their garage spaces for activities like repairs or building, the odds of them interacting with passersby could increase – thereby, providing a plausible rationale for the positive relationship seen in the model. Additionally, the possibility that the variable ‘parking spots’ may be correlated with the ‘number of cars’ was addressed too. Model 2A was run without each variable in turn to ensure that neither of the variables was impacting the statistical significance of the other. By running these variations of the models, it was found that the ‘number of cars’ remained statistically insignificant if 'parking spaces' were not controlled for and 'parking spaces' remained statistically significant if the 'number of cars' was controlled.

Moreover, as the setback increased, overall residential probability to name neighbours fell. Larger setbacks increase the actual and perceived distance between neighbours and passers-by, and hence, reduce their motivation to interact with one another. However, this finding did not have any statistical significance. Sidewalks had a similar effect on the number of neighbours named, i.e. more sidewalks lead to a lower likelihood of neighbours being able to name one another. This finding is counter-intuitive because more sidewalks mean more opportunities for interaction between neighbours walking around. Thus, streets with sidewalks on one side or both sides ought to lead to more interaction than those with none. However, this finding is statistically insignificant. Street width had a counter-intuitive effect on the number of neighbours named too, as an increase in the street width in front of the residence was seen to raise the probability of neighbours knowing one another. Although this result may warrant more investigation, it is put aside because it has no statistical significance and will not garner useful information.

In terms of the fitness, Models 2A and 2B both have higher McFadden pseudo-R-squared values than the model with only the demographic variables. Values of 0.343 and 0.345 suggest a better fit than the last model.

Table 11: Models 2A and 2B: *Analysing the relationship between demographic and housing-level design features of residents and the number of neighbours they can name.*

	Dependent variable: **No. of Neighbours Named**	
	Model 2A	**Model 2B**
Neighbourhood Type		
Base Category: Suburban Neighbourhood		
New Urbanist Neighbourhood	0.286*** (0.094)	
Income Levels		

Base Category: Less than $50,000		
$50,001 - $100,000	-0.115	-0.086
	(0.129)	(0.128)
$100,001 - $150,000	0.245*	0.279**
	(0.135)	(0.134)
More than $150,000	0.198	0.23
	(0.141)	(0.14)
Number of People in the Household		
Base Category: 1 person		
2 people	0.037	0.03
	(0.121)	(0.121)
3 or more people	0.276**	0.256*
	(0.133)	(0.133)
Number of Children (under 10 years)		
Base Category: None		
1	0.038	0.046
	(0.098)	(0.098)
2	0.437***	0.457***
	(0.114)	(0.113)
3 or more people	0.496**	0.488**
	(0.248)	(0.247)
Number of Cars in the House		
Base Category: '1 or less'		
2 or more	0.085	0.069
	(0.084)	(0.084)
Duration lived in the Current House		
Base Category: '2 years or less'		
3 - 6 years	0.275***	0.253***
	(0.075)	(0.074)
7 - 10 years	0.790***	0.754***
	(0.098)	(0.097)
More than 10 years	0.816***	0.742***
	(0.122)	(0.119)
Number of Parking Spots		
Base Category: '1 or less'		
2	0.308**	0.315**
	(0.137)	(0.137)
3 or more	0.415***	0.400***
	(0.145)	(0.145)
Type of House		
Base Category: 'Detached House'		
Semi-detached House	-0.272**	-0.241**
	(0.114)	(0.113)
Townhouse/Duplex	-0.301***	-0.255***
	(0.089)	(0.088)
Apartment	-0.219	-0.177
	(0.187)	(0.186)
Setback (in feet)		
Base Category: 'Less than 12 feet;		
7 - 12 feet	-0.038	0.042

	(0.167)	(0.165)
13 - 18 feet	0.006	0.041
	(0.177)	(0.176)
Greater than 18 feet	-0.095	-0.122
	(0.173)	(0.172)
Street Width (in feet)		
Base Category: 'Less than 25 feet'		
25 - 48 feet	0.097	0.085
	(0.13)	(0.13)
49 feet and over	0.192	0.217
	(0.151)	(0.15)
Sidewalks		
Base Category: 'Neither Side'		
One side	-0.002	0.047
	(0.101)	(0.1)
Both sides	-0.01	0.147
	(0.107)	(0.094)
2 or less | 3 to 6	-0.779***	-0.829***
	(0.246)	(0.245)
3 to 6 | 7 to 9	0.521**	0.463*
	(0.243)	(0.242)
7 to 9 | 10 or more	1.025***	0.964***
	(0.244)	(0.243)
Observations	1,489	1,489
Note:		*p < 0.01, **p < 0.05, *** p < 0.01
McFadden's Pseudo R-Squared	**0.345**	**0.343**

5.1.3. The Effect of Demographic, Housing-level and Neighbourhood-level Design Variables on the Number of Neighbours Residents Named

Next, the two final ordered probit regression models are present that control for demographic variables and housing-level variables in addition to neighbourhood-level design variables. The neighbourhood-level design variables added to the model included pathway density, number of retail outlets and the area allocated to green spaces and parks in the neighbourhood. Like previous sections, there were two parameterizations of the models with Model 3A including demographic, housing-level design, neighbourhood-level design factors and neighbourhood type as explanatory variables and Model 3B only excluding neighbourhood type as an explanatory variable. The tabulation of results is presented in *Table 10*.

With specific regard to Model 3A, those residing in New Urbanist neighbourhoods are seen to be more likely to name more neighbours than their counterparts residing in the suburbs. Thus, once demographic, housing-level, and neighbourhood-level design factors are controlled for, residents living in New Urbanist neighbourhoods still report higher odds of socialization as is depicted by the fixed effect 'neighbourhood design' binary variable. Not only does the 'neighbourhood type' variable account for factors that the model has not controlled for, but also captures the integrated essence of how living in a New Urbanist neighbourhood influences neighbourly interactions.

In this section, while both parameterizations of the model were mostly similar, there were differences in a few variables in both regressions. Different from previous models, income became an increasingly statistically significant variable in both parameterizations. Compared to the lowest-level income tier - '$50,000 and below' - those in the '$100,001 - $150,000' income category had a higher probability of being able to name their neighbours, as did those households whose total income 'exceeded $150,000'; both findings are statistically significant at the 1% and 5% levels. Replicating the previous regression models, '3 or more' member households had a higher likelihood of knowing neighbours by name than single-member households. Similarly, having '2 children' or '3 or more children' increased the odds of knowing more neighbours by name, compared to having 'no children.' The reason behind this could be that households with children are more likely to spend time outdoors in the neighbourhood as children may frequently play outside and befriend other children. Children are likely to each have their acquaintances in their neighbours, thus making it probable for households more children to have more neighbourly interactions. Thus, there are enhanced socialization opportunities for families with children, and one way this manifests itself is by households being able to form somewhat more intimate and name-based connections.

Additionally, the longer the time that households have lived in their current house, the more likely they are to know neighbours by name – another statistically significant result. This could perhaps be attributed to the fact that those who have lived in their house longer, have gotten more opportunities to interact with their neighbours and thus, have built more communal bonds. Moreover, while the number of cars had no statistical significance influence on this measure of socialization, more parking spots were seen to be positively related to the number of neighbours named. As explained in the previous sections, this could be due to parking spots increasing the total area of one's driveway and garage and presenting the opportunity to develop and use the area for outdoor activities, for instance, shooting hoops.

In terms of housing type, those living in semi-detached houses, townhouses, duplexes/triplexes and apartments – all had lower odds of being knowing neighbours by name than those living in detached houses. The fact that these findings hold statistical significance point towards the fact that detached houses – which are the most common housing type in suburban neighbourhoods – do not lead to residents socializing less. Based on results in this paper, and opposed to findings from literature in the field, high-density living does not support higher socialization (Blaauboer, 2011; Faessen, 2002; Kwon et al., 2016).

The setback is a housing or street-level design variable that depicts the distance from the front of the house to the street or sidewalk - whichever comes first. According to the results of the regression, with increasing setback distances the number of neighbours that can be named by residents also increases. However, it is only statistically significant for one category, i.e. houses whose setback is ‘13 – 18 feet' can name more neighbours than those whose houses have a setback of lesser than 12 feet. When the ‘fixed effect' variable depicting ‘neighbourhood' type is included in Model 3A, those with setbacks between ‘13 – 18 feet' are seen to be able to name more neighbours than those with setbacks ‘less than 12 feet' – a finding significant at the 10% level. However, in Model 3B, when ‘neighbourhood type' is removed as an explanatory variable, the significance level rises to 1%. It is important to note that in either case, the finding seems counter-intuitive. One would expect that longer setbacks increase the perceived distance between passersby and residents and reduce the likelihood of interaction.

The effect of street width on the number of neighbours named also garners a similar sort of counter-intuitive result. Intuition would dictate that narrower streets promote more interaction between residents living on either side of the street, but the results contradict this. In Model 3B, those houses who have streets '49 feet or wider' in front of their houses are found to be name more neighbours than those who have streets '24 feet and under' in front of their houses – a result significant at the 10% level. However, in Model 3A which incorporates the 'neighbourhood type' variable, none of the categories show any significance. It is simple to rationalize the insignificance of street width: while narrower streets in front of one's house may reduce interactions with those living on the opposite side, they do not impact interactions between neighbours who are living on the same side of the street. Thus, wide streets do not impact the neighbourly interactions in the form of residents' ability to name their neighbours because perhaps, residents are more well-acquainted with those living on either side of them. The last housing-level design variable is sidewalks, which represents the number of sidewalks in the household’s vicinity. Those houses with sidewalks on one side or both sides can be seen to name more neighbours than those with no sidewalks. While this is a positive and expected finding, it is not statistically significant in either of the model's parameterizations.

Moving to neighbourhood-level design variables, when there are 'more than 25' retail outlets in the neighbourhood, the presence of retail outlets has a statistically significant and positive impact on the number of neighbours named. The presence of a large number of retail outlets suggests the presence of neighbourhood strip plazas or a mall present in the vicinity. When residents roam around in these plazas or malls, they may have more opportunities to socialize due to two reasons. Firstly, when people go to locations with more outlets, they are likely to have gone with the intent of looking around and secondly, they probably have more time on hand than when they go to one retail outlet with a specific intent. Thus, with more time and place to socialize, the odds of them knowing more neighbours by name increases.

Furthermore, with an increase in the area allocated to greenspaces, there is a statistically insignificant increase in the number of neighbours residents were able to name. The same result is seen for pathways but is statistically significant in both parameterizations. Pathways, as emphasized in the literature, have been linked to more pronounced street life and the results in this paper reinstate the fact that more pathways lead to more socialization as measured by the number of neighbours named by residents.

Lastly, to test the fit of this model while incorporating neighbourhood design variables, the McFadden pseudo-R-squared value is used. A value of 0.348 and 0.347 for Models 3A and 3B is attained, respectively, which is a slight increment from the last model; thereby, making it reasonable to infer that this model has a better fit than the last model.

Table 12: Models 3A and 3B: *Analysing the relationship between demographic, housing-level design and neighbourhood-level design features of residents and the number of neighbours they can name.*

	Dependent variable: **No. of Neighbours Named**	
	Model 3A	**Model 3B**
Neighbourhood Type		
Base Category: Suburban Neighbourhood		
New Urbanist Neighbourhood	0.235**	
	(0.096)	
Income Levels		
Base Category: Less than $50,000		
$50,001 - $100,000	-0.123**	-0.102*
	(0.061)	(0.061)
$100,001 - $150,000	0.210***	0.231***
	(0.066)	(0.066)
More than $150,000	0.150**	0.168**
	(0.072)	(0.072)
Number of People in the Household		
Base Category: 1 person		
2 people	0.048	0.046
	(0.116)	(0.116)
3 or more people	0.292**	0.277**
	(0.124)	(0.124)
Number of Children (under 10 years)		
Base Category: None		
1	0.057	0.067
	(0.095)	(0.094)
2	0.455***	0.475***
	(0.111)	(0.111)
3 or more	0.498***	0.487***
	(0.031)	(0.031)
Number of Cars in the House		
Base Category: '1 or less'		
2 or more	0.072	0.059
	(0.083)	(0.083)
Duration lived in the Current House		
Base Category: '2 years or less'		
3 - 6 years	0.268***	0.245***
	(0.075)	(0.075)
7 - 10 years	0.744***	0.710***
	(0.099)	(0.098)
More than 10 years	0.784***	0.724***
	(0.122)	(0.119)
Number of Parking Spots		
Base Category: '1 or less'		
2	0.321***	0.323***
	(0.09)	(0.09)

3 or more	0.398***	0.380***
	(0.091)	(0.091)
Type of House		
Base Category: 'Detached House'		
Semi-detached House	-0.254**	-0.236**
	(0.112)	(0.111)
Townhouse/Duplex	-0.291***	-0.263***
	(0.085)	(0.084)
Apartment	-0.275**	-0.259**
	(0.12)	(0.119)
Setback (in feet)		
Base Category: 'Less than 12 feet;		
7 - 12 feet	0.059	0.137
	(0.093)	(0.09)
13 - 18 feet	0.133*	0.177**
	(0.068)	(0.068)
Greater than 18 feet	0.037	0.029
	(0.054)	(0.051)
Street Width (in feet)		
Base Category: 'Less than 25 feet'		
25 - 48 feet	0.036	0.015
	(0.081)	(0.081)
49 feet and over	0.163	0.172*
	(0.105)	(0.104)
Sidewalks		
Base Category: 'Neither Side'		
One side	0.017	0.056
	(0.1)	(0.099)
Both Sides	0.019	0.145
	(0.106)	(0.094)
Number of Retail Stores/Shops in Vicinity		
Base Category: None		
1 - 2 shops	0.081	0.086
	(0.093)	(0.093)
3 - 10 shops	0.056	0.082
	(0.097)	(0.097)
11 - 25 shops	0.098	0.151
	(0.102)	(0.1)
More than 25 shops	0.305**	0.344**
	(0.144)	(0.143)
Greenspaces in the Neighbourhood (in m2)	0.002	0.002
	(0.009)	(0.009)
Pathways in Neighbourhood (in metres)	0.0002**	0.0002***
	(0.0001)	(0.0001)
2 or lessl 3 to 6	-0.492***	-0.511***

	(0.073)	(0.071)
3 to 6| 7 to 9	0.813***	0.789***
	(0.085)	(0.083)
7 to 9| 10 or more	1.320***	1.295***
	(0.087)	(0.085)
Observations	1,489	1,489
Note:		*p < 0.01, **p < 0.05, *** p < 0.01
McFadden's Pseudo R-Squared	**0.348**	**0.347**

5.2. Socialization Measure 2: *Frequency of Face-to-Face Interactions*

The frequency of face-to-face interactions residents have with their neighbours is the second measure of social interaction used in this study. An increased frequency of interactions is indicative of more socialization with neighbours and vice versa. Face-to-face interactions are a different form of socialization than ‘naming neighbours' as meeting face-to-face does not necessitate a close bond. Such interaction may be limited to superficial conversations that may arise from neighbours running into one another while walking or leaving for a destination. In some cases, face-to-face interactions can have more depth, for instance, when neighbours are sitting together for a chat or walking around together. However, this paper does not explore in-depth face-to-face interactions and is limited to more superficial interactions that can even involve mere greetings. Furthermore, in a similar fashion to the last section, incremental models are used to assess the significance of various independent variables on the chosen dependent variable – frequency of face-to-face interactions. The underlying motive is to uncover the variables that are salient in shaping face-to-face interactions between neighbours and to identify whether neighbourhood type and design are statistically significant in influencing inter-residential socialization.

5.2.1. The Effect of Individual-level variables on Face-to-Face Interactions

The same demographic explanatory variables included in Subsection 5.1.1 are included in the ordered probit regression models: neighbourhood type, total household income level, number of people and children within a household, the number of cars and the duration the respondent has resided in the current house. In Model 4A, in specific, the ‘fixed effects' variable – neighbourhood type – was included in addition to demographic factors, while it was excluded in Model 4B. *Table 11* shows the results for both parameterizations of the probit regression.

These results are similar between both parameterizations of the model and are also broadly consistent with the results in Model 1A and 1B. Households with higher incomes, according to the results, are generally seen to interact face-to-face with their neighbours more frequently than lower-income households. However, these findings are not elaborated on because the results are statistically insignificant across all categories in both parameterizations of the model. Two-member or three-or-more member households – both – are seen to be more likely to interact with neighbours live, as compared to single-member households. Similarly, households that lie within the ‘2 children' or ‘3 or more children' categories, both have higher odds of interacting live with their neighbours than those with no children. This finding is statistically significant at the 5% level and is also simple to explain: more children within the house increase the likelihood of them stepping out to play or parents taking them to nearby parks or amenities, thereby boosting the odds of such households to interact with those living around them. Furthermore, those who had lived in their current house for either ‘3 – 6 years' or ‘7 – 10 years' saw their neighbours more often than those who had lived there ‘2 years or less'; however, these values did not garner any statistical significance. Only those who had lived in their current residence for 'more than ten' years were significantly likely to interact with neighbours more than those who had moved in within the last two years - a finding that is significant to the 5% level. However, it is also important to note that with the exclusion of the neighbourhood type in Model 4B, the duration is less significant for those who have lived in their house the longest. The difference might have arisen due to the 'neighbourhood type' variable in Model 4A that controls for fixed effect. Lastly, more cars were seen to increase the frequency of interaction. However, this finding is counter-intuitive and statistically insignificant and thus, is not used for analysis.

Furthermore, Model 4A verifies that, while controlling for demographic factors, residents living in New Urbanist neighbourhoods are seen to be more likely to interact with their neighbours than those living in traditional suburban neighbourhoods – a finding that is statistically significant. However, at this point, this variable may account for all design variables that have not been included yet, but several of which will be included in forthcoming sections.

In terms of the fit and the variables incorporated in models 4A and 4B, the McFadden R-squared are 0.273 and 0.271 respectively, which suggest a good fit. The pseudo-R-squared is higher in forthcoming models where the addition of more explanatory variables has added value to the models.

Table 13: Models 4A and 4B: *Analysing the relationship between demographic features of residents and their frequency of face-to-face interactions with neighbours.*

	Dependent Variable **Frequency of Face-to-Face Interactions**	
	Model 4A	**Model 4B**
Neighbourhood Type		
Base Category: Suburban Neighbourhood		
New Urbanist Neighbourhood	0.149**	
	(0.074)	
Income Levels		
Base Category: Less than $50,000		
$50,001 - $100,000	-0.11	-0.095
	(0.134)	(0.134)
$100,001 - $150,000	0.098	0.107
	(0.141)	(0.141)
More than $150,000	0.03	0.036
	(0.148)	(0.148)
Number of People in the Household		
Base Category: 1 person		
2 people	0.242**	0.245**
	(0.121)	(0.121)
3 or more people	0.277**	0.256*
	(0.133)	(0.133)

Number of Children (under 10 years)		
Base Category: None		
1	0.262**	0.274**
	(0.107)	(0.107)
2	0.546***	0.560***
	(0.126)	(0.125)
3 or more	1.264***	1.254***
	(0.413)	(0.41)
Number of Cars in the House		
Base Category: '1 or less'		
2 or more	0.097	0.068
	(0.088)	(0.087)
Duration lived in the Current House		
Base Category: '2 years or less'		
3 - 6 years	-0.048	-0.067
	(0.082)	(0.081)
7 - 10 years	0.168	0.142
	(0.103)	(0.102)
More than 10 years	0.296**	0.225*
	(0.13)	(0.125)
rarely| about 1-2 times a month	-0.527***	-0.645***
	(0.157)	(0.145)
about 1-2 times a month| 1 or more times a week	-0.097	-0.216
	(0.156)	(0.144)
Observations	1,584	1,584
Note:		*p < 0.01, **p < 0.05, *** p < 0.01
McFadden's Pseudo R-Squared	**0.273**	**0.271**

5.2.2. The Effect of Demographic & Housing-level Design Variables on Face-to-Face Interactions

The parameterizations of the ordered probit regression model – Models 5A and 5B – incorporate housing-level design variables into the model along with the demographic variables, to see the potential influence they have on neighbourly interactions. The housing-level design variables added to this regression model include the type of house, the number of parking spots, the setback distance and the width of the street in front of the house and sidewalks in the vicinity.

In Model 5A, just like the previous model parameterizations, neighbourhood type is also added. A visual tabulation of the models is in *Table 12*.

The results in both Model 5A and 5B are similar in terms of the relationships and their statistical significance. Firstly, looking at Model 5A, it can be seen that while controlling for demographic factors and housing-level design factors, the results depict that those residing in NUNs have a significantly higher probability of meeting their neighbours live, as compared to those residing in CSNs. A statistically significant value for New Urbanist design neighbourhoods delineates that there are factors beyond those controlled for that make residents living in those neighbourhoods more likely to interact with their neighbours.

Secondly, moving on to demographic factors, a positive relationship is seen between the 'two people' and 'three or more people' household categories and neighbourly interactions, in comparison to single-person households – findings that are significant at the 10% level. Households with more children, on the other hand, have a more significantly positive relationship with face-to-face interactions with neighbours; one that is significant at the 1% level. Those households in the ‘two children' or ‘three or more children' categories are seen to meet their neighbours more frequently than those who have no children. The rationale behind more household members and more children having more face-to-face interactions with neighbours is straightforward: when there are more members in a house, they are likely to develop their relationships with people around them and more people mean more chances for that households' members to interact with those around them. Similar reasoning applies to children too. Furthermore, while the number of cars owned by the whole household seems to have a positive relationship with face-to-face interaction, like the previous sections, this finding is statistically insignificant. Duration lived in the current house, however, is significant at the 10% level for residents who have lived in their current dwelling for '7 – 10 years'. They were found to be more likely to interact with neighbours than those who had moved into their current home over the past couple of years. More importantly, those who had lived in their current dwelling for 'more than ten years' were also seen to be more likely to interact live with their neighbours than those who had moved in within the last two years – a finding significant at the 5% level.

In terms of the housing-level design variables, more parking spots share a positive relationship with face-to-face interactions – a relationship that is similar to the one between parking spots and the number of neighbours named and could be due to the same reasons. In contrast to the effect of housing type on the number of neighbours named, higher-density living can be seen to boost the probability of face-to-face interaction. One could assume that residents living in apartments or townhouses are more likely to run into neighbours than those residing in detached homes; whether they choose to form deeper connections is up to them. However, the results for all categories of housing types are not statistically significant.

Furthermore, the relationship between the setback and the frequency of face-to-face interactions is negative. The frequency of interactions falls as the setback distances increase, a finding that is in line with one's visceral expectation. However, the relationship is statistically insignificant and thus, cannot be relied on for analysis. On the other hand, wider streets in front of houses are seen to have a positive effect on face-to-face interactions, one that was significant at the 10% level for both categories in both model parameterizations. Those who had streets in front of their houses measuring between '24 – 48 feet' and 'More than 48 feet', both were more likely to interact more often with neighbours live as compared to those who had streets in front of their houses measuring '25 feet or less'. This finding went against expectations as narrower streets were hypothesized to make it easier for people living across one another to socialize. However, it could be that residents are socializing more with people on either side of them, rather than across them. Lastly, the results show that having a sidewalk on one or both sides of the roads reduces the likelihood of face-to-face interactions as compared to those households whose vicinity had no sidewalks. Not only is this result counter-intuitive but it is also statistically insignificant. Models 5A and 5B attain McFadden R-squared values of 0.331 and 0.329 respectively, which indicates how these variables fit the data better than the model with just the demographic variables. A depiction of these pseudo-R-squared values for both models can be found in *Table 12*.

Table 14: Models 5A and 5B: *Analysing the relationship between demographic and housing-level design features of residents and their frequency of face-to-face interactions with neighbours.*

	Dependent Variable **Frequency of Face-to-Face Interactions**	
	Model 5A	**Model 5B**
Neighbourhood Type		
Base Category: Suburban Neighbourhood		
New Urbanist Neighbourhood	0.285***	
	(0.105)	
Income Levels		
Base Category: Less than $50,000		
$50,001 - $100,000	-0.199	-0.175
	(0.15)	(0.15)
$100,001 - $150,000	-0.034	-0.002
	(0.157)	(0.156)
More than $150,000	-0.103	-0.074
	(0.163)	(0.163)
Number of People in the Household		
Base Category: 1 person		
2 people	0.249*	0.242*
	(0.136)	(0.136)
3 or more people	0.285*	0.267*
	(0.148)	(0.147)
Number of Children (under 10 years)		
Base Category: None		
1	0.274**	0.280**
	(0.111)	(0.111)
2	0.559***	0.581***
	(0.131)	(0.131)
3 or more	1.208***	1.208***
	(0.418)	(0.417)

Number of Cars in the House		
Base Category: '1 or less'		
2 or more	0.047	0.032
	(0.097)	(0.097)
Duration lived in the Current House		
Base Category: '2 years or less'		
3 - 6 years	-0.037	-0.054
	(0.086)	(0.085)
7 - 10 years	0.209*	0.178*
	(0.108)	(0.107)
More than 10 years	0.347**	0.278**
	(0.136)	(0.133)
Number of Parking Spots		
Base Category: '1 or less'		
2	0.267*	0.271*
	(0.155)	(0.155)
3 or more	0.320*	0.300*
	(0.163)	(0.163)
Type of House		
Base Category: 'Detached House'		
Semi-detached House	0.051	0.08
	(0.135)	(0.134)
Townhouse/Duplex	-0.023	0.024
	(0.103)	(0.101)
Apartment	0.037	0.078
	(0.211)	(0.211)
Setback (in feet)		
Base Category: 'Less than 12 feet;		
7 - 12 feet	-0.21	-0.123
	(0.185)	(0.182)
13 - 18 feet	-0.113	-0.075
	(0.197)	(0.196)
Greater than 18 feet	-0.174	-0.199
	(0.192)	(0.192)
Street Width (in feet)		
Base Category: 'Less than 25 feet'		
25 - 48 feet	0.268*	0.257*
	(0.142)	(0.142)
49 feet and over	0.286*	0.312*
	(0.166)	(0.165)
Sidewalks		
Base Category: 'Neither Side'		
One side	-0.085	-0.038
	(0.114)	(0.113)
Both Sides	-0.169	-0.015
	(0.12)	(0.106)
rarely| about 1-2 times a month	-0.359	-0.414
	(0.274)	(0.273)

about 1-2 times a monthl 1 or more times a week	0.08 (0.274)	0.023 (0.273)
Observations	1,492	1,492
Note:	*p < 0.01, **p < 0.05, *** p < 0.01	
McFadden's Pseudo R-Squared	**0.331**	**0.329**

5.2.3. The Effect of Demographic, Housing-level & Neighbourhood-level Design Variables on Face-to-Face Interactions

This section analyses Models 6A and 6B, as can be seen in *Table 13*, both of which are the final models accounting for the effect of demographic, housing-level and neighbourhood-level design factors on the frequency of face-to-face interactions between neighbours. The neighbourhood-level design variables include the *number of retail outlets in the neighbourhood* vicinity, the area allocated to *greenspaces* and *pathway density* in the neighbourhood vicinity. Model 6A also includes *neighbourhood type* as an explanatory variable that captures the 'fixed effect.'

In Model 6A, the 'fixed effects' variable 'neighbourhood type' is included along with the other variables. The results depict that controlling for demographic factors and the chosen design and structural variables, residents living in New Urbanist neighbourhoods depict higher odds of face-to-face interactions with their neighbours than those living in the traditional suburbs – a finding that is significant at the 5% level. Design features not included in the model, the behavioural tendencies or personality differences of residents or the overall feel of the neighbourhood are captured by the 'neighbourhood type' variable. These factors could act as subtle motivations for residents in NUNs to interact more frequently with their neighbours than those living in CSNs.

Furthermore, with increasing income levels the likelihood of interacting physically with neighbours decreases. However, only residents whose total household income was in the '$50,001 - $100,000' category as compared to the 'below $50,000' category, were significantly less likely to interact with their neighbours face-to-face. This may be due to the fact that as people earn more, they have to put in more time at work, hence leaving less time for socialization within the neighbourhood. Furthermore, in terms of household size, those with '3 or more' members were significantly more likely to meet frequently with their neighbours. The same goes for the finding regarding children – i.e. families with two children are more likely to interact than families with no children, as are families with '3 or more' children – both results significant at the 1% level. This finding is similar to that of Models 3A and 3B, which explored the relationship between all the explanatory variables and the number of neighbours named by residents. Thus, the reasoning behind the results is also congruent, i.e. households with children are more likely to spend time outdoors in the neighbourhood as children tend to utilize the outdoors more often. They are likely to make their own neighbourhood friends, and also enhance socialization opportunities for any adult from the household that accompanies them. Moving to the 'duration lived in the current house,' those having lived there longer were seen to have a higher frequency of face-to-face interactions with neighbours than those who had moved in recently. However, in terms of statistical significance, only those residents who had lived in their current house for 'more than 10 years' were significantly more likely to interact than those who had lived '2 years or less'. This finding is also intuitive because those who have lived in their house for a more extended period have had more chances to interact with those around them.

In terms of housing-level design factors, residents whose houses had 'two' or 'three or more' parking spots were more likely to interact live with their neighbours than those who had just one or no parking spots – holding demographic and all other design factors constant. Parking spots are an important structural design factor that can shape residential behaviours. More parking spots can have a statistically significant and positive effect on the frequency of face-to-face interactions between neighbours. Like in the case of the number of neighbours that residents could name, more parking spots could be enhancing socialization by providing residents with a larger area to engage in outdoor activities. Those with bigger driveways or more garage area available, residents are likely to utilize the space. The installation of basketball hoops, chalk-based activities on the driveway, car washes and garage sales are just a few ways households can use the area and indirectly boost their chances of interacting with passersby. Furthermore, in this model, while the type of home remains statistically insignificant, it indicates that higher-density living promotes opportunities for interaction between neighbours. The relationship between high-density living and the frequency of face-to-face interactions is the opposite of that between high-density living and the number of neighbours that residents can name. While those living in high-density residences have more face-to-face interactions with their numbers, they have lower odds of being able to name them than those living in detached homes or lower-density residences. However, this relationship is not statistically significant.

Furthermore, those residents with houses that have setbacks between '7 – 12 feet' and '13 – 18 feet' interact face-to-face with their neighbours more than those whose setbacks are 'less than 12' feet. This could be due to longer setbacks providing residents with more room to develop their front yards and hence, raise chances for interaction with passers-by. However, in both parameterizations of the model, interaction is seen to fall for houses who have setbacks 'greater than 18 feet' perhaps because once a setback gets very long, it begins to impact the perceived proximity between residents and passers-by negatively. However, the findings for setback are also statistically insignificant. The width of the street in front of the house is seen to be a statistically significant factor in influencing face-to-face interactions between neighbours. Despite that, the findings seem to be counter-intuitive: an increase in the street width is seen to promote interaction as houses with wider streets in front of their houses show more probability of interaction. Intuition would dictate that narrower streets reduce the perceived distance between houses and thus, make neighbours seem within closer proximity too. However, as suggested in Section 5.2.2, it is probable that a wide street in front of one's house does not impact socialization with neighbours on the same side of the street. Thus, the effect street width on face-to-face interactions may even be statistically insignificant due to the lack of importance the variable holds in socialization.

Next, both parameterizations of the model look at the effect of the three neighbourhood-level design factors on face-to-face interaction. Firstly, as the number of retail outlets in the neighbourhood vicinity increase, so do face-to-face interactions between neighbours. Despite the intuitive finding, it does not prove to be useful due to its statistical insignificance. Secondly, an increase in neighbourhood area devoted to green spaces, which include parks, creeks and open natural areas, is negatively correlated with face-to-face interactions between residents. The opposite was expected, i.e. green spaces ought to act as hubs for neighbourly socialization. However, since the coefficient estimate is statistically insignificant, there is no relationship between the area devoted to green spaces and the frequency of face-to-face interactions. The last neighbourhood-level design variable attained from the data is ‘pathways,' which is representative of the shortcuts that enhance residential accessibility and mobility. Socialization increased when residents had more pathways within 500 meters of their residence – a finding that is significant at the 1% level in both parameterizations of the model. Residents whose neighbourhoods have pathways may utilize them to get to nearby amenities and thus, have an increased likelihood of running into their neighbours. The relationship between pathways and face-to-face interactions is congruent with that between pathways and the number of neighbours named. It could be that some residents use pathways more frequently and thus, due to repeated exposure, are acquainted with one another on a somewhat more intimate basis.

The pseudo-R-squared values of Models 6A and 6B are 0.337 and 0.335 respectively, suggesting that the models offer a good fit. In fact, Model 6A which controls for 'neighbourhood type' has a slightly better fit than the Model 6B which excludes 'neighbourhood type'.

Table 15: Models 6A and 6B: *Analysing the relationship between demographic, housing-level design and neighbourhood-level design features of residents and their frequency of face-to-face interactions with neighbours.*

	Dependent Variable **Frequency of Face-to-Face Interactions**	
	Model 6A	**Model 6B**
Neighbourhood Type		
Base Category: Suburban Neighbourhood		
New Urbanist Neighbourhood	0.257**	
	(0.108)	
Income Levels		
Base Category: Less than $50,000		
$50,001 - $100,000	-0.188***	-0.169***
	(0.064)	(0.064)
$100,001 - $150,000	-0.056	-0.036
	(0.07)	(0.069)
More than $150,000	-0.139*	-0.122
	(0.075)	(0.075)
Number of People in the Household		
Base Category: 1 person		
2 people	0.244*	0.242*
	(0.131)	(0.131)
3 or more people	0.294**	0.277**
	(0.141)	(0.141)
Number of Children (under 10 years)		
Base Category: None		
1	0.284**	0.293***
	(0.11)	(0.11)
2	0.551***	0.574***
	(0.131)	(0.13)
3 or more	1.202***	1.194***
	(0.01)	(0.01)

Number of Cars in the House		
Base Category: '1 or less'		
2 or more	0.03	0.017
	(0.096)	(0.095)
Duration lived in the Current House		
Base Category: '2 years or less'		
3 - 6 years	-0.016	-0.037
	(0.087)	(0.086)
7 - 10 years	0.189*	0.156
	(0.11)	(0.109)
More than 10 years	0.367***	0.305**
	(0.137)	(0.135)
Number of Parking Spots		
Base Category: '1 or less'		
2	0.281***	0.281***
	(0.103)	(0.103)
3 or more	0.282***	0.259**
	(0.105)	(0.104)
Type of House		
Base Category: 'Detached House'		
Semi-detached House	0.068	0.087
	(0.132)	(0.131)
Townhouse/Duplex	-0.021	0.014
	(0.097)	(0.095)
Apartment	0.013	0.031
	(0.136)	(0.134)
Setback (in feet)		
Base Category: 'Less than 12 feet;		
7 - 12 feet	-0.07	0.02
	(0.105)	(0.102)
13 - 18 feet	0.031	0.081
	(0.076)	(0.076)
Greater than 18 feet	-0.012	-0.021
	(0.061)	(0.057)
Street Width (in feet)		
Base Category: 'Less than 25 feet'		
25 - 48 feet	0.214**	0.192**
	(0.093)	(0.093)
49 feet and over	0.260**	0.271**
	(0.12)	(0.119)
Sidewalks		
Base Category: 'Neither Side'		
One side	-0.096	-0.054
	(0.114)	(0.113)
Both side	-0.152	-0.016
	(0.119)	(0.105)
Number of Retail Stores/Shops in Vicinity		
Base Category: None		
1 - 2 shops	0.033	0.042
	(0.105)	(0.105)

3 - 10 shops	0.134 (0.111)	0.16 (0.111)
11 - 25 shops	-0.054 (0.114)	0.002 (0.112)
More than 25 shops	0.21 (0.167)	0.248 (0.166)
Greenspaces in the Neighbourhood (in m2)	-0.014 (0.01)	-0.015 (0.01)
Pathways in Neighbourhood (in metres)	0.0002*** (0.0001)	0.0003*** (0.0001)
rarely| about 1-2 times a month	-0.077 (0.081)	-0.102 (0.079)
about 1-2 times a month| 1 or more times a week	0.368*** (0.084)	0.341*** (0.083)
Observations	1,492	1,492
Note:	*p < 0.01, **p < 0.05, *** p < 0.01	
McFadden's Pseudo R-Squared	**0.337**	**0.335**

5.3. Robustness of Results

Firstly, the effect of all the variables in *Level 3* on both the measures of socialization was estimated at a neighbourhood type level – i.e. the regression results were sorted according to whether the residents lived in New Urbanist developments or conventional suburban neighbourhoods. Table A entailing *Models 7A* and *7B,* exploring the effect of all the variables on which can be found in Appendix B depict these models. Secondly, the effect of all the variables in *Level* 3 on both the measures of socialization was estimated at the level of each neighbourhood. Table B entailing *Model 8A and 8B,* which can be found in Appendix B too, depict these neighbourhood-level models.

Then, another level of regressions was run at the level of each neighbourhood. The effect of all the variables on both the measures of socialization was estimated to gauge the factors that emerged as salient in shaping neighbourliness in each of the eight neighbourhoods. A tabulation of *Models 9 and 10* can be found in Appendix B.

The reason for running these ordered probit regressions at these sublevels was to ensure that the results estimated in Models 3 and 6 remained mostly consistent with those results attained at smaller levels in the data set. The coefficient estimates tallied with those attained in the results of the main regression models and hence, showed the robustness of the regression results in Model 3 and 6.

Chapter 6: Conclusions

Literature in the field of residential behaviour and urban planning has often argued for the benefits of New Urbanist schemes, including the prominently studied positive effects of such high-density, mixed land-use such as pro-community behaviour and enhanced socialization. While advocates of New Urbanist cite design as the primary influencer in shaping residential socialization, the results of this thesis present mixed findings, more of which shall be discussed through the course of this chapter, followed by potential implications and the study limitations that this research presents.

6.1 Major Findings

To state the significant findings of this paper, the results derived from Models 3A and 6A are of fundamental importance as they depict the effect of all the explanatory variables - including demographic and design variables and the neighbourhood type - on the *number of neighbours that residents named* and the *frequency of face-to-face interactions with neighbours*, respectively. It was initially hypothesized that those residents living in New Urbanist neighbourhoods would have more neighbourly interactions compared to their counterparts residing in the suburbs. Additionally, design features within New Urbanist neighbourhoods were expected to play a vital role in socialization. However, the findings in this paper are somewhat mixed.

Firstly, neighbourhood type had a statistically significant effect on both the chosen measures of socialization. Residents living in New Urbanist neighbourhoods had more frequent face-to-face interactions with neighbours and could name more of their neighbours as compared to residents from conventional suburban neighbourhoods – a finding that was consistent with previous literature (B. B. Brown & Cropper, 2001). It is important to note that the 'neighbourhood type' variable captured the 'fixed-effect' of living in a New Urbanist or traditional suburban neighbourhood. In other words, the variables captured are a range of factors and influences that are specific to residents living in each neighbourhood. These include housing-level intangible factors like lifestyle preferences, cultural capital, personal dispositions and priorities as well as other factors like the physical design and structure of the neighbourhood, the quality of amenities and the street and pathway network. The regression results indicate that residents, from the data set, living in New Urbanist neighbourhoods could name more neighbours and meet with them more frequently than those living in the suburbs.

Secondly, as mentioned earlier, the variables were sorted into three levels – demographic, housing-level design and neighbourhood-level design. At a demographic level, three variables were statistically significant in impacting both measures of socialization positively: namely, the number of household members, the number of children within a household and the duration the household has lived in the current house. An increase in the number of household members, children and duration lived in the house – all led to more residents being able to name more neighbours and meeting their neighbours face-to-face more frequently – a finding consistent with prior literature (du Toit et al., 2007).

Moving to housing-level design factors, the number of parking spots was a statistically significant influencer in positively influencing both the socialization metrics. More parking spots increased socialization opportunities for residents, perhaps by providing them with more area to develop and use – for instance, in the form of installing basketball hoops, conducting garage sales or similar activities. Secondly, the probit models uncovered an important relationship between housing density and socialization. While proponents of the New Urbanist have argued the key role of high-density living in countering urban sprawl, it is important to note how such higher-density livings may not fulfill the socialization and community-building objectives that the movement promotes. The results depicted how those living in higher-density living could name less neighbours than their counterparts living in detached houses, a finding opposed to the majority of the research which has suggested that higher-density living promotes neighbourly interactions (Blaauboer, 2011; Faessen, 2002; Kwon et al., 2016). However, this finding is consistent with the findings of some researchers who found that residents in multi-storey apartments had less interactions than those living in other housing forms (Williams, 2005). This could be due to the superficial and short socialization opportunities in elevators and hallways or the lack of privacy that residents may feel from living close to neighbours, hence causing them to avoid interacting with neighbours (Brueckner & Largey, 2008). Additionally, the relationship between housing type and face-to-face interactions was the opposite, i.e. residents living in higher-density housing had more face-to-face interactions with their neighbours than those in lower-density housing. However, since this finding was not statistically insignificant, there is no relationship between the two.

Furthermore, contrary to existing literature, this thesis found that street width negatively impacted the number of neighbours that residents could name and their frequency of face-to-face interactions with one another. While Swapan et al. 2018 found that narrower street widths in front of a house positively impacted neighbourly interactions, the results of this thesis found that increasing street width positively impacted the number of neighbours residents could name and the frequency of face-to-face interactions between neighbours. This is an important finding because it highlights the possibility that neighbours may be more likely to socialize when they live next to one another rather than across one another. The relationship between setbacks between '13 – 18 feet' and the number of neighbours one could name was the opposite the prior expectation. Those residents living in houses with setbacks measuring 13 – 18 feet could name more neighbours than their counterparts whose houses had setbacks smaller than 7 feet. However, increasing setbacks negatively affected the frequency of face-to-face interactions between neighbours, a finding that tallies with previous literature that highlights the favorable impact of shorter setbacks on neighbourly interactions (B. B. Brown & Cropper, 2001; Talen, 1999). Sidewalks, a variable that was hypothesized to boost socialization by enhancing walkability, was statistically insignificant.

Moving to neighbourhood-level design features, residents who lived in neighbourhoods that had more than 25 retail stores in the vicinity could name more neighbours than those who had no stores in their vicinity – a finding that held statistical significance. This finding is indicative of how shopping centres, malls, strip plazas or a variety of retail stores can provide residents with more opportunities to form bonds with one another, as suggested in earlier studies too (Berg et al., 2014; Lund, 2003). Additionally, while the relationship between the number of retail stores and the frequency of face-to-face interactions between neighbours is positive, it is statistically insignificant. Thus, further research focused on the impact of different types of retail stores within neighbours and their effect on neighbourly interactions is warranted. Furthermore, prior research suggested that public spaces like parks provide residents with a 'neutral ground' to socialize with their neighbours (Berg et al., 2014). However, contrary to such expectations, the results of this thesis depicted that green spaces in the neighbourhood did not have a statistically significant impact on socialization, hence indicating the lack of a relationship between the two variables. Thus, as indicated by existing research, it would have been useful to look at the accessibility, visibility and appeal of these parks in the residents' perspective as these three factors could be affecting the motivation of neighbours to interact with one another (Moulay et al., 2016). Lastly, this thesis found that a more developed network of pathways had a statistically positive impact on both the measures of the neighbourly socialization. This corroborates with research in the field that has suggested the key role of pathways in boosting walkability and thus, opportunities to socialize with one's neighbours.

Thus, it can be concluded that while design features may play a role in influencing neighbourly interactions, they are insufficient on their own. On an overall basis, however, residents living in New Urbanist neighbourhoods were seen to socialize more with their neighbours – a result that is a product of overall 'neighbourhood type' and the different elements within a neighbourhood, not just physical design.

6.2 Implications & Contributions

This dissertation has both, theoretical and practical implications, that add to the body of existing literature. In terms of theoretical contributions, this thesis studies and re-evaluates the much-debated role of neighbourhood type and design in shaping neighbourly socialization. One of the most key theoretical contributions is that neighbourhood design on its own is not a sufficient feature in shaping neighbourly interactions. However, New Urbanist neighbourhoods were found to have a positive fixed effect on socialization. This was the collective effect of the neighbourhood type on socialization between residents and included various characteristics specific to residents living in New Urbanist such as their demographics, psychographics, lifestyle preferences and cultural capital as well as neighbourhood-specific characteristics including the physical design and structure, the quality of amenities and facilities. Thus, as suggested by the findings of the probit models, the amalgamated effect of neighbourhood type is greater than the effect of individual features within a neighbourhood.

In terms of practical implications, the findings of this paper are significant for urban planning and policy-making. When urban planners and municipalities are aiming to focus on community-building and establishing more tightly-knit neighbourhoods, the fact that physical design is insufficient on its own is integral. The collective effect of 'neighbourhood type' – which includes a plethora of elements including, but not limited to physical design and structure of a neighbourhood – needs to be studied in detailed if planners and policy-makers wish to shape and guide community building in Canada.

6.3 Research Limitations & Future Research

While this dissertation furthers our understanding of the role of neighbourhood design and type in influencing socialization, it comes with certain limitations that need to be kept in mind. Firstly, the findings of this thesis are relevant to a particular data set derived from specific neighbourhoods within cities. Thus, the findings may not be extendable to the general population. Thus, the findings may not be extendable to the general population. Perhaps by replicating the study in countries other than Canada, residents in those countries would reveal different socialization preferences. Future research in the area could be conducted with various socioeconomic groups or communities as the representative data set too.

Secondly, the data set upon which this research is based was obtained in 2009, thus making it possible for future researchers to conduct surveys and conduct a cross-neighbourhood survey with similar intensive details. The evolution of social media and pervasiveness of modern technologies could have impacted residential socialization tendencies and behaviors. For instance, even live interactions between children could be negatively influenced by technological developments.

Furthermore, this thesis looks at the link between neighbourhood design and type and socialization; however, future research ought to delve further to explore the link between neighbourly interactions and the resultant effect on residents' satisfaction and attachment to their neighbourhood. Exploring the link between neighbourly bonds and residents' satisfaction levels with their neighbourhood would allow researchers to empirically establish whether residents derive satisfaction and become attached to their neighbourhoods due to socialization.

Lastly, the inclusion of a more behavioural aspect in the research would be worthwhile. The formation of personal preferences, attitudes, values and the role of cultural capital are all essential behavioural factors that can have a potentially significant impact on design. A more cerebral and psychological look into the link between design and inter-neighbour socialization behaviour could produce significant findings that shape future policies and planning decisions.

Appendices

Appendix A: Supplementary Descriptive Statistics

Table A*: % of Sidewalks in each Neighbourhood (Source: Tomalty et al. 2009)*

Neighbourhood	No sidewalks	Sidewalks one-side	Sidewalks both-sides
Bois-Franc	0.0	19.3	80.7
Nouveau Saint-Laurent	37.4	41.4	21.2
Cornell	2.1	4.8	93.1
Woodbine North	24.2	56.4	19.4
Garrison Woods	3.5	43.7	52.8
North Signal Hill	29.2	37.7	33.1
McKenzie Towne	5.6	11.2	83.2
McKenzie Lake	19.1	40.7	40.2
NUD avg.	2.8	19.7	77.4
CSD avg.	27.5	44.0	28.5

Table B*: % of Setback Categories in each Neighbourhood (Source: Tomalty et al. 2009)*

Neighbourhood	Setback ≤6 ft.	Setback 7-12 ft.	Setback 13-18 ft.	Setback >18 ft.
Bois-Franc	0.4	31.3	10.2	35.3
Nouveau Saint-Laurent	0.0	0.0	2.9	97.1
Cornell	0.0	15.5	52.1	32.4
Woodbine North	0.0	0.0	23.5	76.5
Garrison Woods	0.0	10.8	15.4	73.8
North Signal Hill	1.7	5.0	10.8	82.5
McKenzie Town	3.3	23.0	42.7	31.0
McKenzie Lake	0.0	1.0	20.2	78.8
NUD avg.	0.9	20.2	30.1	43.1
CSD avg.	0.4	1.5	14.3	83.7

***Table C**: % of Streets by Street Width Categories in each Neighbourhood (Source: Tomalty et al. 2009)*

Neighbourhood	Width ≤12 ft.	Width 13-24 ft.	Width 25-48 ft.	Width 49-72 ft.	Width >72 ft.
Bois-Franc	0.7	24.1	55.1	9.2	10.9
Nouveau Saint-Laurent	0.0	1.5	91.7	6.7	0.0
Cornell	0.0	2.1	75.8	22.0	0.0
Woodbine North	0.0	0.0	100.0	0.0	0.0
Garrison Woods	0.0	4.9	86.0	7.0	2.0
North Signal Hill	0.0	10.4	78.5	10.4	0.8
McKenzie Towne	0.0	13.9	74.4	11.6	0.0
McKenzie Lake	0.0	3.5	68.0	23.9	4.6
NUD avg.	0.2	11.3	72.9	12.4	3.2
CSD avg.	0.0	3.9	84.5	10.3	1.3

***Table D:** Mixed Land Uses within each Neighbourhood*

NUDs	**McKenzie Towne**	**Garrison Woods**	**Cornell**	**Bois-Franc**
% of Greenspaces	16.20%	12.20%	12.80%	12.70%
Work/Business	2	12	0	3
Education	2	11	1	4
Shopping & Services	30	74	19	9
Recreation & Entertainment	9	30	0	5
CSDs	**McKenzie Lake**	**North Signal Hill**	**Woodbine North**	**Nouveau Saint-Laurent**
% of Greenspaces	18.60%	8.20%	8.90%	9.60%
Work/Business	0	7	12	9
Education	4	1	1	0
Shopping & Services	9	27	23	1
Recreation & Entertainment	2	7	9	0

Appendix B: Multilevel Modelling

Table A:
***Models 7A and 7B** comparing the number of neighbours nameable between New Urbanist & Conventional Suburban Neighbourhoods*

	Dependent variable:	
	Number of Neighbours Named	
	NEW URBANIST	**CONVENTIONAL SUBURB**
INCOME LEVELS		
Base Category: Less than $50,000		
$50,001 - $100,000	-0.063	-0.187**
	(0.072)	(0.075)
$100,001 - $150,000	0.164**	0.291***
	(0.079)	(0.075)
$150,001 or more	0.246***	0.084
	(0.091)	(0.079)
NO. OF PEOPLE IN THE HOUSEHOLD		
Base Category: 1 person		
2 people	0.051	0.048
	(0.139)	(0.075)
3 or more people	0.243	0.341***
	(0.154)	(0.069)
NO. OF CHILDREN (under 10)		
Base Category: None		
1	0.188	-0.052
	(0.135)	(0.136)
2	0.700***	0.222
	(0.162)	(0.157)
3 or more	0.428***	0.622***
	(0.029)	(0.041)
NO. OF CARS		
Base Category: '1 or less'		
2 or more	0.072	0.079
	(0.101)	(0.129)
DURATION LIVED IN THE CURRENT HOUSE		
Base Category: '2 years or less'		
3 to 6 years	0.294***	0.316**
	(0.095)	(0.129)
7 to 10 years.	0.630***	0.982***
	(0.135)	(0.156)
More than 10 years	0.581**	0.907***
	(0.247)	(0.156)
NO. OF PARKING SPACES		
Base Category: '1 or less'		
2	0.385***	0.002
	(0.106)	(0.066)
3 or more	0.435***	0.209***
	(0.110)	(0.066)
TYPE OF HOUSE		
Base Category: 'Detached House'		
Semi-detached	-0.284**	-0.231
	(0.139)	(0.192)
Townhouse/Duplex	-0.349***	-0.125
	(0.100)	(0.175)
Apartment	-0.401***	0.237***
	(0.133)	(0.053)

SETBACK (in feet)		
Base Category: 'Less than 7 feet		
7 - 12 FT	0.238**	0.245***
	(0.103)	(0.043)
13 - 18 FT	0.219**	-0.085
	(0.087)	(0.131)
Greater than 18 FT	0.224***	-0.165*
	(0.084)	(0.086)
STREET WIDTH IN FRONT OF HOUSE (in feet)		
Base Category: 'Less than 25 feet'		
25 - 48 FT	0.083	-0.099
	(0.099)	(0.094)
49 FT AND OVER	0.189	-0.031
	(0.129)	(0.115)
SIDEWALKS		
Base Category: 'Neither Side'		
One Side	0.348***	-0.028
	(0.082)	(0.114)
Both Sides	0.393***	-0.150
	(0.069)	(0.126)
NUMBER OF RETAIL STORES/SHOPS IN VICINITY		
Base Category: None		
1 - 2 shops	-0.053	0.157
	(0.149)	(0.121)
3 - 10 shops	-0.011	0.158
	(0.144)	(0.148)
11 - 25 shops	0.130	-0.098
	(0.146)	(0.159)
More than 25 shops	0.349*	-0.006
	(0.192)	(0.221)
GREENSPACES (in m2)	-0.017	0.026**
	(0.016)	(0.013)
PATHWAYS (in metres)	0.0002**	0.0001
	(0.0001)	(0.0001)
2 or less| 3 to 6	-0.273***	-0.926***
	(0.082)	(0.064)
3 to 6| 7 to 9	1.090***	0.366***
	(0.102)	(0.097)
7 to 9| 10 or more	1.628***	0.856***
	(0.105)	(0.102)
Observations	818	671
Note:		*p<0.1; **p<0.05; ***p<0.01

Table B:
***Model 8A and 8B** comparing the frequency of face-to-face interactions between New Urbanist & Conventional Suburban Neighbourhoods*

	Dependent variable: Frequency of Face-to-Face Interactions with Neighbours	
	NEW URBANIST	**CONVENTIONAL SUBURB**
INCOME LEVELS		
<u>*Base Category: Less than $50,000*</u>		
$50,001 - $100,000	-0.096	-0.249***
	(0.079)	(0.082)
$100,000 - $150,000	0.015	-0.094
	(0.089)	(0.081)
More than $150,000	-0.127	-0.141
	(0.099)	(0.087)
NO. OF PEOPLE IN THE HOUSEHOLD		
<u>*Base Category: 1 person*</u>		
2 people	0.214	0.300***
	(0.157)	(0.082)
3 or more people	0.172	0.465***
	(0.175)	(0.074)
NO. OF CHILDREN (under 10)		
<u>*Base Category: None*</u>		
1	0.440***	0.122
	(0.162)	(0.152)
2	0.803***	0.300*
	(0.198)	(0.179)
3 or more	4.340***	1.046***
	(0.00002)	(0.021)
NO. OF CARS		
<u>*Base Category: '1 or less'*</u>		
2 or more	0.089	-0.095
	(0.118)	(0.144)
DURATION LIVED IN THE CURRENT HOUSE		
<u>*Base Category: '2 years or less'*</u>		
3 to 6 years	-0.052	0.093
	(0.112)	(0.141)
7 to 10 years	0.127	0.410**
	(0.152)	(0.165)
More than 10 years	0.100	0.535***
	(0.271)	(0.169)
NO. OF PARKING SPACES		
<u>*Base Category: '1 or less'*</u>		
2	0.336***	-0.031
	(0.124)	(0.069)
3 or more	0.316**	0.010
	(0.132)	(0.074)
TYPE OF HOUSE		
<u>*Base Category: 'Detached House'*</u>		
Semi-detached	0.098	-0.047
	(0.168)	(0.217)
Townhouse/Duplex	-0.095	0.285
	(0.117)	(0.189)
Apartment	-0.071	0.282***
	(0.155)	(0.069)

SETBACK (in feet)		
Base Category: 'Less than 7 feet'		
7 - 12 FT	0.087	0.048
	(0.118)	(0.049)
13 - 18 FT	0.148	-0.117
	(0.099)	(0.153)
Greater than 18 FT	0.167*	-0.178*
	(0.095)	(0.099)
STREET WIDTH IN FRONT OF HOUSE (in feet)		
Base Category: 'Less than 25 feet'		
25 - 48 FT	0.077	0.423***
	(0.116)	(0.109)
49 FT AND OVER	0.157	0.343**
	(0.152)	(0.137)
SIDEWALKS		
Base Category: 'Neither Side'		
One side	-0.059	-0.149
	(0.096)	(0.128)
Both sides	-0.129	-0.173
	(0.079)	(0.137)
NUMBER OF RETAIL STORES/SHOPS IN VICINITY		
Base Category: None		
1 - 2 shops	0.046	0.057
	(0.167)	(0.133)
3 - 10 shops	0.240	-0.004
	(0.167)	(0.162)
11 - 25 shops	0.079	-0.246
	(0.165)	(0.169)
More than 25 shops	0.310	-0.118
	(0.223)	(0.247)
GREENSPACES (in m2)	-0.045**	-0.002
	(0.019)	(0.013)
PATHWAYS (in metres)	0.0005***	0.0001*
	(0.0001)	(0.0001)
rarely| about 1-2 times a month	-0.099	-0.359***
	(0.087)	(0.071)
about 1-2 times a month| 1 or more times a week	0.371***	0.073
	(0.094)	(0.080)
Observations	819	673
Note:	*p<0.1; **p<0.05; ***p<0.01	

Table C:

***Models 9A to 9G** showing the number of neighbours nameable in each neighbourhood*

[Note: Nouveau Saint-Laurent missing as it did not converge]

	Dependent variable: No. of Neighbours Nameable						
	BF	CO	WN	GW	NSH	MT	ML
INCOME LEVELS							
Base Category: Less than $50,000							
$50,001 - $100,000	−0.110	0.365**	−0.468	−1.166***	−0.847***	−0.420***	0.535***
	(0.386)	(0.163)	(0.408)	(0.239)	(0.171)	(0.131)	(0.137)
$100,000 - $150,000	0.373	0.683***	0.202	−1.334***	−0.989***	−0.355**	1.090***
	(0.408)	(0.185)	(0.421)	(0.224)	(0.138)	(0.158)	(0.149)
More than $150,000	0.135	0.879***	−0.199	−1.519***	−0.914***	−0.291	0.988***
	(0.431)	(0.218)	(0.466)	(0.255)	(0.134)	(0.181)	(0.146)
NO. OF PEOPLE IN THE HOUSEHOLD							
Base Category: 1 person							
2 people	0.167	−0.276	0.262	0.287	0.248*	0.123	0.383***
	(0.293)	(0.328)	(0.605)	(0.292)	(0.143)	(0.209)	(0.129)
3 or more people	0.434	0.054	−0.079	0.661***	0.744***	0.432***	0.824***
	(0.319)	(0.330)	(0.585)	(0.230)	(0.120)	(0.126)	(0.104)
NO. OF CHILDREN (under 10)							
Base Category: None							
1	0.057	0.183	0.272	0.290	−0.307	0.237	−0.082
	(0.314)	(0.230)	(0.285)	(0.337)	(0.276)	(0.214)	(0.269)
2	1.280***	0.396	0.322	1.143***	0.024	0.459*	0.254
	(0.479)	(0.267)	(0.314)	(0.366)	(0.323)	(0.241)	(0.306)
3 or more	0.392	0.486***	0.956	3.187***	0.445***	−0.392***	0.307***
	(0.743)	(0.084)	(0.615)	(0.0004)	(0.059)	(0.043)	(0.033)
NO. OF CARS							
Base Category: '1 or less'							
2 or more	0.526**	−0.642***	−0.162	0.363	0.351	0.207	−0.079
	(0.224)	(0.188)	(0.288)	(0.288)	(0.243)	(0.201)	(0.230)
DURATION LIVED IN THE CURRENT HOUSE							
Base Category: '2 years or less'							
3 to 6 years	0.287	0.232	1.083***	0.412	0.683***	0.448**	0.574**
	(0.224)	(0.196)	(0.386)	(0.251)	(0.246)	(0.183)	(0.243)
7 to 10 years	0.689**	0.815***		0.762	0.702***	0.484*	1.273***
	(0.318)	(0.245)		(0.523)	(0.265)	(0.279)	(0.245)
More than 10 years	0.849**	0.095***		−3.374***	0.901***	1.151***	1.213***
	(0.379)	(0.021)		(0.071)	(0.253)	(0.066)	(0.251)

NO. OF PARKING SPACES							
Base Category: '1 or less'							
2	-0.027	0.573***	-0.521	0.082	0.729***	0.525***	-0.017
	(0.266)	(0.167)	(0.772)	(0.291)	(0.146)	(0.196)	(0.122)
3 or more	-0.140	1.139***	-0.137	0.381	0.925***	0.216	0.468***
	(0.374)	(0.163)	(0.791)	(0.326)	(0.137)	(0.187)	(0.112)
TYPE OF HOUSE							
Base Category: 'Detached House'							
Semi-detached	-0.188	-0.502**	-0.038	0.256	0.721***	0.521	-0.886***
	(0.346)	(0.241)	(0.341)	(0.448)	(0.115)	(0.334)	(0.076)
Townhouse/Duplex	-0.179	-0.638***	-0.808*	-0.037	-0.073	-0.488**	-0.531***
	(0.320)	(0.211)	(0.441)	(0.277)	(0.244)	(0.247)	(0.062)
Apartment	-0.127	-5.561***		-2.356***	1.011***	0.159	
	(0.343)	(0.0002)		(0.379)	(0.120)	(0.254)	
SETBACK (in feet)							
Base Category: 'Less than 7 feet'							
7 - 12 FT	0.666	4.763***		1.538***	-0.179	0.066	
	(0.430)	(0.224)		(0.310)	(0.215)	(0.166)	
13 - 18 FT	1.190*	4.969***	0.809**	1.400***	-0.190	-0.209	-0.380
	(0.650)	(0.172)	(0.354)	(0.338)	(0.251)	(0.163)	(0.240)
Greater than 18 FT	0.678	4.510***		1.148***	-0.215	-0.041	-0.267
	(0.517)	(0.191)		(0.254)	(0.206)	(0.162)	(0.174)
STREET WIDTH IN FRONT OF HOUSE (in feet)							
Base Category: 'Less than 25 feet'							
25 - 48 FT	-0.206	-4.731***	-1.416	-0.086	-0.065	0.152	0.298*
	(0.421)	(0.185)	(0.877)	(0.306)	(0.235)	(0.219)	(0.173)
49 FT AND OVER	0.416	-4.641***		0.966***	-0.371**	0.504	0.081
	(0.410)	(0.212)		(0.215)	(0.184)	(0.333)	(0.208)
SIDEWALKS							
Base Category: 'Neither Side'							
One side.	0.243	0.268	0.127	-0.649**	-0.249	0.151	-0.671***
	(0.321)	(0.250)	(0.265)	(0.276)	(0.203)	(0.186)	(0.241)
Both sides		0.371*	0.104		-0.531**	0.695***	-0.770***
		(0.206)	(0.335)		(0.224)	(0.161)	(0.231)
NUMBER OF RETAIL STORES/SHOPS IN VICINITY							
Base Category: None							
1 - 2 shops	-0.667	-0.438*	-0.179		0.417**	0.183	0.295
	(0.418)	(0.242)	(0.597)		(0.202)	(0.197)	(0.199)
3 - 10 shops	0.123	-0.467***	0.214	-1.078***	0.512***	0.131	0.399*
	(0.434)	(0.151)	(0.562)	(0.295)	(0.053)	(0.262)	(0.238)
11 - 25 shops	-0.043	-0.736***	0.081	-1.710***	0.146	0.210	0.469***
	(0.350)	(0.189)	(0.564)	(0.317)	(0.154)	(0.238)	(0.049)
More than 25 shops					0.033	0.106	
					(0.267)	(0.259)	

GREENSPACES (in m2)	−0.072	−0.049	0.227	0.084	−0.069	0.015	0.009
	(0.117)	(0.069)	(0.367)	(0.098)	(0.047)	(0.032)	(0.017)
PATHWAYS (in metres)	0.001	0.00003	−0.001	0.0005	0.0001	0.0003	−0.0001
	(0.001)	(0.0005)	(0.002)	(0.0004)	(0.0002)	(0.0002)	(0.0001)
2 or less| 3 to 6	−0.208	−1.783***	−2.117***	−2.590***	−1.503***	0.080	−0.057
	(0.342)	(0.202)	(0.452)	(0.320)	(0.129)	(0.182)	(0.092)
3 to 6| 7 to 9	1.322***	−0.153	−0.338	−0.543	0.126	1.343***	0.945***
	(0.361)	(0.231)	(0.483)	(0.385)	(0.223)	(0.210)	(0.169)
7 to 9| 10 or more	1.840***	0.517**	0.241	0.166	0.692***	1.872***	1.516***
	(0.367)	(0.231)	(0.486)	(0.396)	(0.228)	(0.217)	(0.181)
Observations	175	255	133	131	206	259	270
Note:					*p<0.1;	**p<0.05;	***p<0.01

Table D:

***Models 10A to 10H** showing the frequency of face-to-face interactions between neighbours in each neighbourhood*

	Dependent variable:							
	Frequency of Face-to-Face Interactions							
	BF	NSL	CO	WN	GW	NSH	MT	ML
INCOME LEVELS								
Base Category: Less than $50,000								
$50,000 - $100,000	0.453	-7.509***	-0.244	-0.678	-5.803***	0.165	-0.187	-0.605***
	(0.428)	(0.416)	(0.185)	(0.511)	(0.305)	(0.197)	(0.151)	(0.142)
$100,001 - $150,000	0.289	-6.831***	0.040	-0.403	-5.272***	-0.124	-0.102	-0.459***
	(0.445)	(0.392)	(0.204)	(0.522)	(0.259)	(0.159)	(0.182)	(0.145)
More than $150,000	-0.198	-7.743***	0.065	0.039	-6.084***	-0.005	-0.526***	-0.647***
	(0.474)	(0.482)	(0.218)	(0.571)	(0.325)	(0.156)	(0.202)	(0.156)
NO. OF PEOPLE IN THE HOUSEHOLD								
Base Category: 1 person								
2 people	0.362	-0.596	0.116	2.178***	-0.080	-0.288*	0.389	0.342**
	(0.321)	(0.791)	(0.212)	(0.655)	(0.415)	(0.152)	(0.266)	(0.144)
3 or more people	0.878**	-0.222	-0.379*	1.997***	-0.653*	0.195	0.355	0.496***
	(0.349)	(0.687)	(0.208)	(0.653)	(0.348)	(0.134)	(0.221)	(0.112)
NO. OF CHILDREN (under 10)								
Base Category: None								
1	0.145	1.315*	0.445	0.362	1.662***	-0.408	0.417*	0.227
	(0.377)	(0.710)	(0.291)	(0.311)	(0.481)	(0.310)	(0.246)	(0.303)
2	0.819	1.967***	1.092***	0.052	1.459***	0.083	0.393	0.474
	(0.580)	(0.735)	(0.403)	(0.343)	(0.545)	(0.379)	(0.268)	(0.365)
3 or more	5.348***	7.026***	4.895***	4.999***	3.395***	0.003	4.765***	5.115***
	(0.00000)	(0.000)	(0.00000)	(0.00002)	(0.001)	(0.082)	(0.00002)	(0.00000)
NO. OF CARS								
Base Category: '1 or less'								
2 or more	0.714***	0.135	-0.269	-0.726**	-0.270	0.220	0.210	0.135
	(0.261)	(0.618)	(0.236)	(0.352)	(0.388)	(0.269)	(0.236)	(0.257)
DURATION LIVED IN THE CURRENT HOUSE								
Base Category: '2 years or less'								
3 to 6 years	0.282	-0.885	-0.122	0.168	0.384	0.162	0.001	0.412*
	(0.257)	(0.677)	(0.246)	(0.397)	(0.321)	(0.273)	(0.205)	(0.247)
7 to 10 years	0.191	-2.445***	0.343		0.242	-0.027	0.192	0.917***
	(0.352)	(0.534)	(0.304)		(0.585)	(0.280)	(0.320)	(0.250)
More than 10 years	0.582	-3.761***	4.106***		-19.880***	0.640**	0.222*	0.648***
	(0.425)	(0.740)	(0.00000)		(0.000)	(0.288)	(0.119)	(0.211)

NO. OF PARKING SPACES								
Base Category: '1 or less'								
2	-0.173	12.635***	1.874***	1.045	0.713	0.062	-0.076	-0.264**
	(0.311)	(0.377)	(0.160)	(0.859)	(0.437)	(0.154)	(0.193)	(0.129)
3 or more	-0.033	11.720***	2.086***	0.987	0.501	0.358**	-0.300*	-0.281**
	(0.426)	(0.507)	(0.145)	(0.868)	(0.447)	(0.146)	(0.180)	(0.133)
TYPE OF HOUSE								
Base Category: 'Detached House'								
Semi-detached	0.773**	-0.182	0.312	0.197	3.867***	0.656***	0.526	-0.040
	(0.362)	(0.885)	(0.316)	(0.392)	(0.0002)	(0.137)	(0.380)	(0.062)
Townhouse/Duplex	0.801**	0.256	-0.014	1.143**	-1.077***	0.788***	-0.468*	-0.603***
	(0.343)	(0.767)	(0.271)	(0.553)	(0.356)	(0.269)	(0.270)	(0.093)
Apartment	0.627*	4.115***	5.158***		-1.156**	0.315*	-0.620**	
	(0.364)	(0.000)	(0.00001)		(0.523)	(0.162)	(0.272)	
SETBACK (in feet)								
Base Category: 'Less than 7 feet'								
7 - 12 FT	0.166		-0.854***		1.100***	-0.786***	-0.229	
	(0.498)		(0.283)		(0.333)	(0.231)	(0.176)	
13 - 18 FT	0.615		-0.302	0.227	8.141***	-1.691***	-0.228	-0.858***
	(0.710)		(0.207)	(0.400)	(0.00000)	(0.250)	(0.180)	(0.282)
Greater than 18 FT	0.186	3.778***	-0.022		1.428***	-0.671***	-0.271	-1.224***
	(0.576)	(1.026)	(0.230)		(0.310)	(0.230)	(0.177)	(0.193)
STREET WIDTH IN FRONT OF HOUSE (in feet)								
Base Category: 'Less than 25 feet'								
25 - 48 FT	-0.215	1.574*	0.995***	-11.097***	-0.808**	0.189	-0.271	1.230***
	(0.465)	(0.850)	(0.233)	(0.310)	(0.393)	(0.260)	(0.267)	(0.181)
49 FT AND OVER	0.512		0.104		6.240***	0.238	0.130	1.090***
	(0.459)		(0.258)		(0.00000)	(0.216)	(0.359)	(0.216)
SIDEWALKS								
Base Category: 'Neither Side'								
One Side	-0.673*	-1.751**	-2.908***	-0.256	0.760**	-0.515**	-0.500**	-0.659**
	(0.366)	(0.815)	(0.303)	(0.291)	(0.374)	(0.237)	(0.212)	(0.262)
Both Side		2.355***	-2.817***	-0.161		-0.595**	-0.059	-0.790***
		(0.000)	(0.225)	(0.371)		(0.251)	(0.182)	(0.247)
NUMBER OF RETAIL STORES/SHOPS IN VICINITY								
Base Category: None								
1 - 2 shops	-0.743		-2.967***	0.771		0.043	0.313	0.041
	(0.476)		(0.324)	(0.652)		(0.224)	(0.216)	(0.210)
3 - 10 shops	0.472	11.653***	-3.452***	0.495	-0.437	-0.808***	0.178	-0.046
	(0.489)	(0.000)	(0.183)	(0.617)	(0.407)	(0.079)	(0.281)	(0.240)
11 - 25 shops	-0.676*	-1.196	-3.899***	0.696	-1.648***	-0.599***	0.337	-0.405*
	(0.401)	(1.075)	(0.256)	(0.612)	(0.374)	(0.177)	(0.267)	(0.227)
More than 25 shops						-0.310	0.390	
						(0.301)	(0.302)	

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GREENSPACES (in m2)	-0.324**	-0.534	-0.238**	0.454	-0.052	-0.105**	-0.010	-0.031*
	(0.130)	(0.677)	(0.097)	(0.412)	(0.129)	(0.052)	(0.036)	(0.017)
PATHWAYS (in metres)	0.002**	0.003	0.001**	-0.002	0.001*	0.0004	0.001**	0.0001
	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.0003)	(0.0003)	(0.0001)
rarely| about 1-2 times a month	0.511	5.734***	-5.648***	-8.624***	-6.037***	-1.314***	-0.595***	-1.775***
	(0.356)	(0.629)	(0.182)	(0.310)	(0.415)	(0.131)	(0.188)	(0.087)
about 1-2 times a month| 1 or more times a week	1.082***	6.717***	-5.067***	-7.964***	-5.632***	-0.913***	-0.088	-1.389***
	(0.360)	(0.687)	(0.203)	(0.322)	(0.430)	(0.149)	(0.199)	(0.112)
Observations	176	60	255	134	131	207	259	270
Note:						*p<0.1; **p<0.05; ***p<0.01		

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