AALBORG UNIVERSITY
STUDENT REPORT

Master's Thesis

Impact of social capital on the adherence to governmental directives

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LIST OF ABBREVIATION:

ABBREVIATION	DEFINITION
CDN-NDG	Côtes-des-Neiges – Notre-Dame-de-Grâce
DRSP	Direction Regional de Santé Publique
HEC MONTREAL	Ecole des Hautes Etudes Commerciales de Montréal
LS	LaSalle
MN	Montréal-Nord
N/A	Not Applicable or Not Answered
NFR	Not Follow Regulations and recommendation
NPI	Non-Pharmaceutical Intervention
PR	Pierrefonds-Roxborro
SL	Saint-Léonard
UQAM	Université du Québec à Montréal
VM	Ville-Marie
WHO	World Health Organization

SUMMARY

Social capital has a great impact on the recovery process post-crisis and multiple studies have shown that population holding greater social capital were able to manage crisis more efficiently than others. As such, the pandemic of COVID-19 has raised interest of cities regarding social capital. One factor that played an important role in reducing the spread of the virus was governmental directives, often helped with health institution recommendations. COVID restrictions were among the strictest in recent years and have greatly impacted the interactions between people. Consequently, various research has been tried to identify if social capital would also help with the adherence to the directives put in place. Bonding social capital appeared to play an important role, mostly due to homophily, but others type of social ties should not be neglected. The aim of this thesis is therefore to explore the link between the different types of social ties and the adherence to the directives for six boroughs in the city of Montreal, Quebec. As it is part of a big project, results of a questionnaire from winter 2020 as be used. Statistical analyses were performed to find relation between the different type of social ties and the adherence to the regulations and recommendation provides by the province of Quebec.

Keywords : Social capital, Directives, Social ties

1. INTRODUCTION

In 2020, the world was hit by an unprecedent event, a global pandemic. The Covid-19 started in Wuhan, China in December 2019. The WHO was formally notified of the first cluster of cases on December 31, 2019. The first death was reported on January 11 and by January 14, the possible human-to-human transmission was suggested by the WHO, which was confirmed by the Chinese authorities by January 21. Wuhan was the first city to be placed in lockdown due to COVID-19. By January 31st, the COVID-19 had spread in multiples countries and the WHO's International Regulation Emergency Committee classify the COVID-19 outbreak a Public Health Emergency of International Concern. (CDC, 2023; The Canadian Encyclopedia, n.d.). The first case of COVID-19 in Canada was reported on January 25, 2020. (*Canadian COVID-19 Intervention Timeline | CIHI*, n.d.), meanwhile the first case register in Québec was a 41 years old Montrealer, who was traveling back from Iran.(ICI.Radio-Canada.ca, n.d.). By March 5,2020, the first case of 'community case' of COVID-19 was confirmed in Canada. The woman didn't not travel prior contracting the virus and did not had known contact with anyone infested, make it the first case where health officials cannot pinpoint the source of the infection (Slaughter, 2020). On March 11, 2020, WHO declared a global pandemic. On March 12,2020, the wife of the Prime Minister Justin Trudeau was infected with COVID-19, forcing Trudeau to manage the escalading crisis while being quarantined. This is considered symbolically as the start of the pandemic in Canada. (The Canadian Encyclopedia, n.d.). It is also around this date than the Canada is slowly shutting down, each region implementing its own regulation.

The pandemic has impacted the population differently according to their socio-economic groups, the socially disadvantaged are mostly likely to be more severely impacted by the pandemic. The death rate is impacted by the variation between the socio-economic group within the country or the state, the bigger the difference, the higher the death rate is in the lower socio-economic group. Not only do disadvantaged communities have fewer financial means to recover, they also are less able to take preventive measures, such as social distancing or mask wearing. They are also more likely to live in crowded conditions and the virus is spreading faster in these groups. They were also more prone to catch the virus because there is a higher proportion of people working in low paid, manual jobs in retail, caring or service sectors because their job cannot be done at home. The economic impact is falling disproportionally harder on poor and disadvantaged groups. They were more at risk of being laid off or having a cut in pay which resulted in trouble paying bills and covering their basics needs. This crisis is estimated to have a greater impact on these groups than the 2008 financial crisis and it is estimate that disadvantaged people will need at least a decade to recover from the pandemic and regain the same amount of wealth than they had before. In contrast, it took 9 months for the top 1000 billionaires to regain their fortunes (Atske, 2020; Binns & Low, 2021; Whitehead et al., 2021).

This crisis, being unprecedented, has led to untypical regulations to reduce the spread of the virus. Social capital has been proven to be a key element in resilience while facing and recovering from a disaster. High level of social capital grants a faster and better resilience and adaptation to the events (Aldrich, 2012; Aldrich et al., 2021; Behera, 2023; Lee et al., 2022; Tammar et al., 2020). Social capital has already been studied during previous pandemic and it was proven that social capital helps to the adherence to non-pharmaceutical intervention (NPI) on short duration (Pitas & Ehmer, 2020; Wu, 2021). But with an unprecedented crisis in the contemporary time, requiring regulations for long term NPI, the role of social capital regarding adherence to NPI had to be re-examined. Multiple researches agreed that social capital has an impact on the compliance to regulations and NPI, especially social distancing, and also the spread of the virus (Alfano, 2022; Barrios et al., 2021; Bartscher et al., 2021; Fraser et al., 2022; Pitas & Ehmer, 2020; Wu, 2021). Barrios (2021) argues that, in absence of punishment, individuals will not comply unless he expects most people will comply and have enough social capital to care about collective's welfare. He also argues that social capital holds more value in the voluntary compliance to the guidelines than other characteristics such as age, education, income or even ideology. Bartscher (2021) comment that while it was expect that COVID spread faster in area with higher capital social at the beginning, due to being more connected and vibrant, the trend is reversing when the NPI were formalized. It has been proved to be a consistent pattern across Europe. He also insists that this pandemic should highlight the necessity for policymakers to not only invest in the health system but also in improving the social capital of more vulnerable communities. Fraser (2022) claim that their models where able to predict up to 90% of the variation of COVID-19 spread in specific cases, while measuring the relation between social capital and COVID-19 spread, using the argument that high social capital communities were more likely to follows NPI. He also mentions that while vulnerable communities such as minorities, women and single parents, families facing unemployment or poverty, or disabled are less resilient because of their levels of social vulnerability, some communities with high social vulnerability where able to successfully manage the pandemic due to their social capital. Alfano (2022) states that COVID-19 pandemic is "the perfect setting in which to study the relationship between social capital and policy compliance" (p. 841). He also mentions that social capital influences the way people interact with each other but also access resources which make it easy to see its impact on an airborne disease, but also explain the adherence to the NPI. Adherence depends on their view of the communities, the degree of trust and reciprocity they have within it and their trust in the authorities. He also argues that all types of social capital are equal and the ties with people that individuals consider to be close relations are more impactful. This is corroborate by Pitas and Ehmer (2020) who mentions that the three types of social capital (Bonding, Bridging and Linking) are necessary to achieve an effective response. While having access to one or two types can achieve a partial benefit, the response will be diminished. They consider the three types of social capital to be interdependent and that strong ties with close network are the basis, but not enough in itself, and the lack of one social capital will result in less compliance with NPI.

(Binns & Low, 2021) mention "Without moving toward equity in economic development and in public health, it will be impossible to achieve the health components of the Sustainable Development Goals" (p.185). The regulations that were implemented during the pandemic to diminish the spread of COVID-19 were essential to mitigate its consequences. Since the infographic for Goal 3 : Good Health and Well-being was modified to include and make COVID-19 one of the key aspects, there is an interest to see the influence of social ties on the compliance with the regulations. The Goal 11 : Sustainable Cities and Communities also have multiple goals related to disaster and crisis that need to consider the pandemic, such as goal 11.5 or goal 11.b.

This thesis is part of another project, which provides data that is analyzed in this project. This project is named *Liens sociaux et COVID-19 – Etude dans six arrondissements de Montréal*, it was performed by CITE-ID LIVING LAB which is a research lab of the Ecole Nationale d'Administration Publique. This project is part of a 5-year long analysis of the social capital of 6 boroughs during and post COVID-19 pandemic. A particular interest is given to whether social ties improved individual and collective resilience during the pandemic. The study has three axes of analysis : Adherence to public health directive, effects of pandemic lockdowns on individual mental health and quality of life, and collective resilience. It was the first project of the study, and the main goal was data collection and having a starting point during the pandemic. For this study, six disadvantaged boroughs were selected : Montréal-Nord, St Leonard, Ville-Marie, Côte-des-Neiges–Notre-Dame-de-Grâce, LaSalle, Pierrefonds-Roxboro. The selection was based on the impact of the pandemic rather than geographically. The measure of social capital within these boroughs was done by a survey.

2. PROBLEM FORMULATION

Considering the importance of resilience facing crisis to achieve more sustainable cities and the relation between social capital and resilience to crisis, there is an interest in studying social capital in Montréal. The data used for this project was collected during the winter 2020, during the second wave, experts were already planning on multiple waves. Therefore, it would be interesting to look at the impact of social capital regarding the compliance with the regulations. It would also provide important knowledge in case of a similar crisis happening in the future. This led to the following research question :

To what extent does social capital play a role in adherence to the regulation and recommendations during crisis period?

To answer this question, two hypotheses were made based on literature :

- As social capital increases, people are more likely to agree on the necessity of following the government directive. This hypothesis is based on Barrios et al. (2021)
- While bonding social capital has greater impact on reducing the spread of the COVID-19, a lack of one form of social capital results in a reduction of adherence to NPI. This hypothesis is based on Pitas & Ehmer (2020) and Alfano (2022)

3. THEORIES

3.1 Definition of Social Capital

3.1.1 Individualism vs Pluralism

There is no consensus on how to define social capital but rather multiple definitions coexisting. The definition is often revised and evolving. The two mains' theories stand out, on one hand the social capital is defined as characteristic of the individual, supported by Bourdieu and on the other hand there is the social capital defined by collective outcome, supported by Putnam.

While the notion of social capital can find as early as the beginning of 20th with Hanifan defining the social capital as

> Rather to that in life which tends to make these tangible substances count for most in the daily lives of a people, namely, goodwill, fellowship, mutual sympathy and social intercourse amount a group of individuals and families who make up a social unit, the rural community, whose logical center is the school. (Hanifan, 1916, p.130)

The first author offering a definition is often considered to be Bourdieu. He laid the foundation for the individualist's definitions. In his book The Forms of Capital, he defines the social capital as

> The aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition – or in other words, to membership in a group – […] These relationships may only exist only in the practical state, in material and/or symbolic exchanges which help to maintain them. (Bourdieu, 2002, p.287).

According to Bourdieu, the social capital of an individual depends on the network of connections and relationships he is able to mobilize. While some social structures can bring one individual a network, it does not grant relationships with his peer. As such, the relationship can be inherited by your family name or the university you graduated from for example. Social capital therefore depends on the volume of connections one individual is able to create and maintain as well as the volume of capital these relations can bring. Therefore, people can achieve a high social capital either by building extensive networks or by having smaller networks but with powerful people in it, holding high economic, cultural and/or symbolic capital. Concentrating social capital such as sport club or associations benefits from the multiplier effect and profits from the membership of a group which is the basis of solidarity. By joining a group, one individual access collective capital. The increase of social capital is then benefiting for an individual because as his social capital increases, more people will want to know you so they can increase their social network and the individual will have less effort to maintain the connection. Possessors of important social capital will eventually be able "transform all circumstantial relationships into lasting

connection" (Bourdieu, 2002). Bourdieu also states that "The network of relationships is the product of investment strategies, individual or collective, consciously or unconsciously aimed at establishing or reproducing social relationships that are directly usable in the short or long term". Each member of a group is at stake in defining the limit of this group because criteria of entry is redefined at each new entry and the members are the ones responsible for defining the boundaries in which an exchange of recognition can happen. Since the definition of the group is at stake at each new entry, there is often a hierarchy that is created in large groups. The delegation enables to concentrate the totality of social capital but is also responsible for managing the group and if needed expelling embarrassing individuals. As the group grows larger a 'personality cult' or creation of leader(s) is the logical step regarding the representation of the group. The spokesmen are then in charge of representing the group and its ideas, such as trade unions or political parties for example.

This is corroborated by Coleman in Social Capital in the Creation of Human Capital, where he defined social capital as the following :

> Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common : They all consist of some aspects of social structures, and they facilitate certain actions of actions of actors – whether persons or corporate actors – within the structure (Coleman, 1988, p. S98)

In this research, his focus is on social capital as a resource for the person. He connects social capital to human capital, even if it is less tangible because social capital relies in the relations among individuals. As social capital exists through relationship between persons, Coleman insists multiple times that trust is a key element to social capital. Going further, he explains how social capital creates expectations and obligations that depend on the trustworthiness of the social structures in which the relationship happens. "If A does something for B and trusts B to reciprocate in the future this establishes an expectation in A and an obligation on the part of B" (Coleman, 1988, p. S102) can only be applicable is the social environment is considered trustworthy by its members. Taking the example of a family, Coleman explains that being part of social environment does not grant social capital to its members if they do not develop relations between them. As such, in a family, even if the parents are physically present for their children, if there is no relation between the parents and children, the family will have a lack of social capital in this environment.

To summarize, one individual inherits social capital which gives him tools to acquire more connections to increase it. Social capital will grow as the individual rejoins groups and interacts with people having a higher social capital than him. Boundaries of the group being redefined at each entry; members are at stake to keep the standard they are willing to have in the group. So, while social capital often comes from participating in a group, it is up to the individual to create and maintain the connections that are valuable for him and he will, therefore, define his own social capital through his connection.

On the other hand, Putnam argues in Bowling Alone that social capital is a factor of collective cooperation. He defines social capital as the following, " 'social capital' refers to features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (Putnam, 2000). He mentioned that :

> American social scientist of a neoTocquevillean bent have unearthed a wide range of empirical evidence that the quality of public life and the performance of social institutions (and not only in America) are indeed powerfully influenced by norms and networks of civic engagement. Researchers in such fields as education, urban poverty, unemployment, the control of crime and drug abuse, and even health have discovered that successful outcomes are more likely in civically engaged communities. (Putnam, 2000, p.224).

He also argues that based on his research on governments, civic engagement and social connectedness boost the effectiveness of a region. They create an environment that promotes generalized reciprocity and social trust, which facilitates communication within the community and allows dilemmas of collective actions to be resolved while at the same time reducing opportunism. Social capital is described as benefiting not to the individuals but rather to levels beyond them such as neighborhood, community, cities and beyond.

3.1.2 Social Ties

It would also be interesting to look at how researchers define social capital in post-disaster recovery. For his experience in this field, it was chosen to look at Aldrich's definition. Aldrich (2012) define social capital as "the networks and resources available to people through their connections to others" (p.2). His definition is based on the commonly agreed notion that social capital relies on social ties. Relationships are based on different types of social ties which are commonly agreed to be divided into three categories : Bonding, Bridging and Linking.

Bonding social capital describes the relation one individual has with someone he identifies as emotionally close. There is a high amount of trust in these relationships. It is characterized by high level of similarity within the network, also called homophily, such as similar demographics, socioeconomical background, similar access to information and resources, etc. These relations offer strong social support, which is often used in case of emergency as they are the closest relation one individual has. Examples can include family members, close friends, or neighbors.

Bridging social capital are weaker ties, it describes the connection that are provided by socially institutional setting, such as religious place, workplace, school, associations, sport club, etc. These types of links provide more demographic diversity. They are often form for an involvement in communities. As the connections are weaker and less direct, bridging social capital will be less likely to be used in times of need than bonding ties but they are more likely to be used on more generic requests that have more opportunities to be successful if spread to a wider network and also bring outside of the demographic of the individual such as job search.

Linking social capital describes the connection between citizens and persons in high-power positions. Contrary to the two previous ties which are more likely to be horizontal (i.e., between people with similar levels of powers), liking ties are vertical ties. The difference of power or authorities between the individuals is acknowledged by society and is not ambiguous. These kinds of ties give individuals access to resources that they cannot find through bonding and bridging ties. (Aldrich et al., 2018; Aldrich & Meyer, 2015)

3.2 Measure of Social Capital

Similarly, to the definition, the measure of social capital divides the scientists, and no consensus has been agreed upon. While both the method and the indicators vary in between studies, the use of proxies to measure social capital seems to be widely admitted within the community. (Aldrich & Meyer, 2015; Claridge, 2017; Grootaert & Van Bastelar, 2002). The combination of proxies is often chosen between the network perspective or the social structure perspective. The network perspective is looking at the different types of ties (Bonding, Bridging and Linking) while the social structure perspective is looking at the structural, cognitive, and behavioral social capital (Claridge, 2017).

3.2.1 Structural Social Capital

"'Structural social capital', refers to relatively objective and externally observable social structures such as networks, associations, and institutions, and the rules and procedures they embody" (Grootaert & Van Bastelar, 2002, p. 3). It focuses more on the network of relationship that one individual has with social organization that make up society such as clubs, neighborhood association, caritative associations, etc. Structural social capital facilitates cooperation and actions. It is also the type of social capital used by governmental organizations and institutions.

3.2.2 Cognitive social capital

"'Cognitive social capital', compromises more subjective and intangible elements such as generally accepted attitudes and norms of behavior, shared values, reciprocity, and trust" (Grootaert & Van Bastelar, 2002, p. 3). It is often related to shared language and codes, but it can be extended to shared culture or goals. Trust is a central element and can be related to the general level of trust or trust in relation to certain groups.

3.2.3 Behavioral social capital

Aldrich (2015) defined behavioral social capital as "*behavioral manisfestions* of social capital in daily life". Behavioral social capital can include some elements related to Structural social capital such as the membership in horizontal associations, but it also includes habits, such as blood donations or volunteering. It also integrates the sense of belonging, and closeness of relationships.

3.3 Previous Work Done by CITE-ID

As mentioned previously, this project is integrated in a research project of the research lab CITE-ID. The data used for this project were collected during summer 2020 and the methodology and initial results can be find in the report *Liens sociaux et COVID-19, Étude dans six arrondissements de Montréal* (Arnaud et al., 2021). The following section will be a free translation of the methodology used to collect the data.

3.3.1 Questionnaire

The data was collected through an online survey (Translated in Appendix A). The survey is derived from a study on six boroughs of New-York and Boston conducted by Daniel Aldrich from Northeastern university, Boston. The survey was modified to fit Montréal's context and the objective of the study while making sure that it would still allow inter-city comparisons later on. It is composed of 41 questions and the main elements measured have regrouped into 11 categories (Table 1). The survey includes questions about Bonding, Bridging and Linking ties. It also includes a series of questions about the sources of information regarding COVID-19 pandemics, as well as questions about individual satisfaction, perception, and compliance with the public health guidelines, activated support networks, and social capital-related actions realized since the beginning of the pandemic.
In addition, the questionnaire includes questions on the norms and values of the respondents (cognitive social capital) as well as their behaviors (structural social capital). Some questions are regarding pre-pandemics ties, while others measure the relationships in the context of the pandemic. Finally, some questions are regarding the socio-demographic profile of the respondents and more specific COVID-19 related questions (presence of a person at risk in the household, positive test, etc.) This questionnaire has been developed in collaboration with the Bureau de la transition écologique et de la résilience (BTER) and Service de la diversité et l'inclusion sociale de la Ville de Montréal as well as the DRSP of Montréal.

Table 1

Elements measure with the questionnaire

Measured éléments	Description	Interest
Network	Number of friends, family members and neighbors to whom you feel close and whom you could ask for help	Bonding social capital. Pre-pandemic and ability to mobilize the network in times of crisis
Evolution of relationship	Evolution of relationships with our network. Measure of trust in different groups	Influence of COVID-19 on social ties. Measure of social capital during pandemic
Involvement	Involvement in groups and associations and maintains involvement	Bridging social capital. Measure pre-pandemic and during pandemic
Actions realized	Social behaviors adopted during pandemic (communicating, helping loved one, etc.)	Social behaviors related to social capital. Link to community resilience
Request for assistance	Type of support network activated, and help requested from relatives, government, organization, etc.	Network activation by respondernts
Self-efficacy	Respondents' sense of satisfaction with their lives and sense of self-efficacy, i.e., abilities to take actions that influence their well-being	Individual resilience. Self-efficacy is an influential factor in behavior social capital
Vote	Vote for the last provincial and municipal election	Linking social capital pre-pandemic
Sources of information	Means of getting information (how) and source of information (who) consulted since the beginning of the pandemic	Understand how respondents are informed and can be reached. Allow to determine if respondents inform themselves through bonding, bridging (relatives), bridging (employers, organizations), or Linking (government, public health). Measure the effect of information sources on perceptions and compliance with guidelines
Trust	Trust in various sources of information about COVID-19	Bonding, Bridging and Linking social capital. Allows for exploration of the influence of trust on other measured elements
Perception of COVID-19	Fears related to COVID-19, perception of the guidelines by family members.	Factors influencing compliance with protective measures
Compliance with directives	Compliance with various public health guidelines (gathering, masking, etc.)	Behavioral changes related to COVID and links to other elements measured.

3.3.2 Choice of the boroughs

The choice of the boroughs was made in collaboration with Ville de Montréal et la DRSP de Montréal, following 5 criteria:

- Geographical positioning (assuring a representation of North-South and East-West axis of the island)
- Data on contamination rates for COVID-19
- Community support (Qualitative evaluation of the operation of Table de Quartiers (mixed collective acting with the aim of improving the borough) and the number of organizations Ssupported by Centraide du Grand Montréal)
- Socio-demographic profiles
- Ability of the survey firmed hired to have enough respondents for each borough.

Based on this criteria, 6 boroughs were selected:

- Côtes-des-Neiges-Notre-Dame-de-Grâce (CDN-NDG)
- LaSalle (LS)
- Montréal-Nord (MN)
- Pierrefonds-Roxborro (PR)
- Saint-Léonard (SL)
- Ville-Marie (VM)

3.3.3 Data collection

The survey firm Leger was contracted to distribute the questionnaire. It has been re-tested by the firm and the data collected took place through phone calls and web panel between December 15, 2020, and January 6, 2021. The questionnaire could be completed either in French or English depending on the respondent's preference. Between 250 and 300 responses were collected for each borough for a total of 1665 respondents.

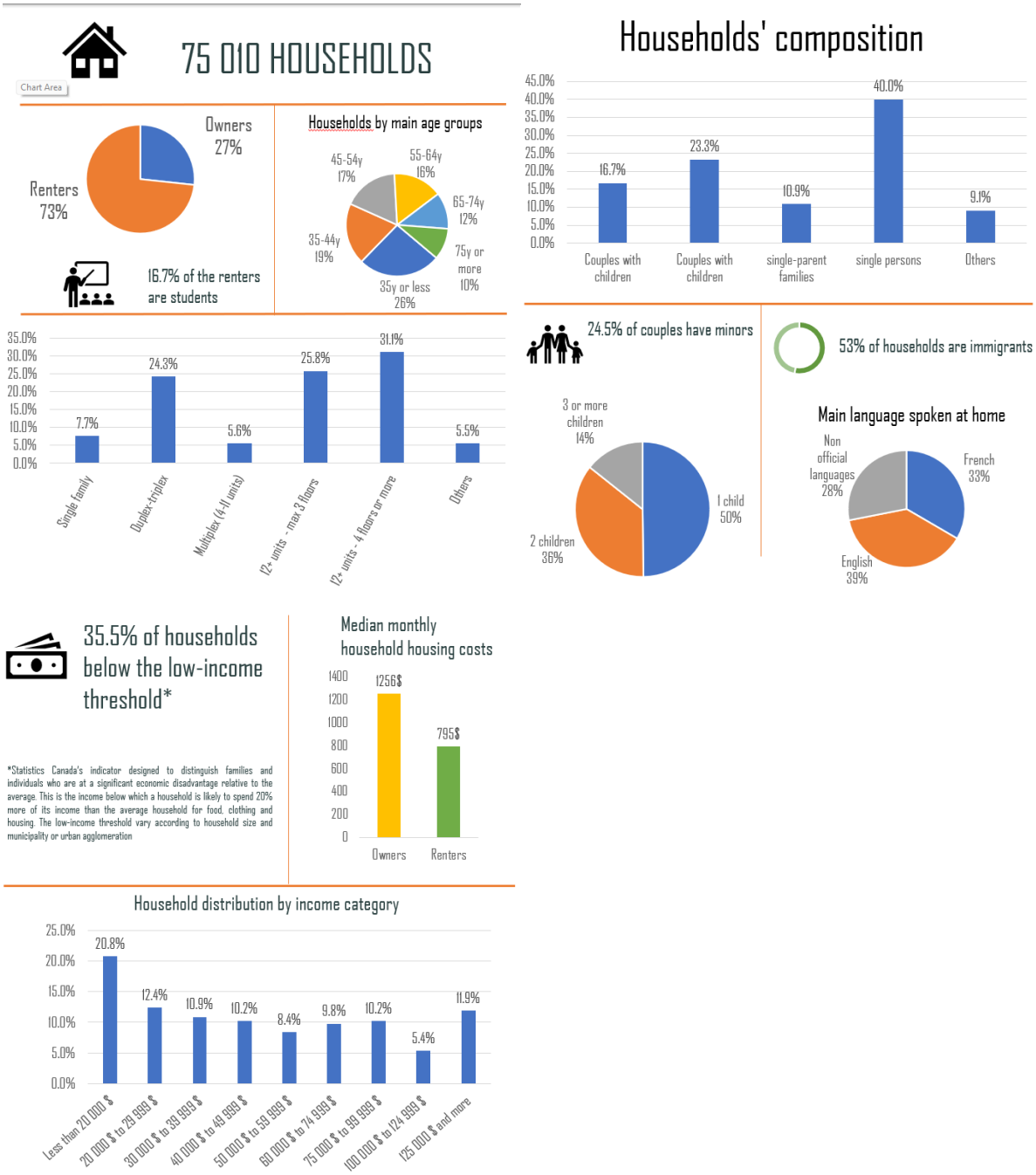
The data collected were weighed by margin, by the survey firm, in order to represent the borough's population as accurately as possible. Each response has been assigned a "weight" based on gender, age, language spoken at home, and whether they owned or rented. After weighing the data for each borough, the boroughs were reproportioned to be representative of the target population. This weighting was done based on the 2016 census. These ensure that the results obtained from these surveys represent the population of each borough surveyed and to draw better conclusions about the effects of social capital during a pandemic.

3.4 Description of the Boroughs

3.4.1 Côtes-des-Neiges-Notre-Dame-de-Grâce (CDN-NDG)

The borough is located in the center of the island of Montreal. To the West, it shares borders with the Town of Mount Royal, Outremont, and Westmount, and also contains a part of Mount Royal. To the East, it shares borders with Montreal West and Hampstead. The borough is home to numerous universities, both French as a dominant language (Polytechnique Montréal, HEC Montréal, Université de Montréal) and English as a dominant language (Concordia University – Loyola Campus and McGill University Health Center). As a result, a large proportion of residents are students. A large proportion of the residents do not use French as their main language at home, and 28% use neither French nor English. 47% of the residents are immigrants, generally arriving as adults, with the Philippines, Morocco, China, France, and Iran topping the list of countries of origins. The first generation of immigrants account for 54% of the immigrant population, followed by second and third generation or more, who share the immigrant population equally. The borough is well served by public transport, with numerous bus and metro lines.

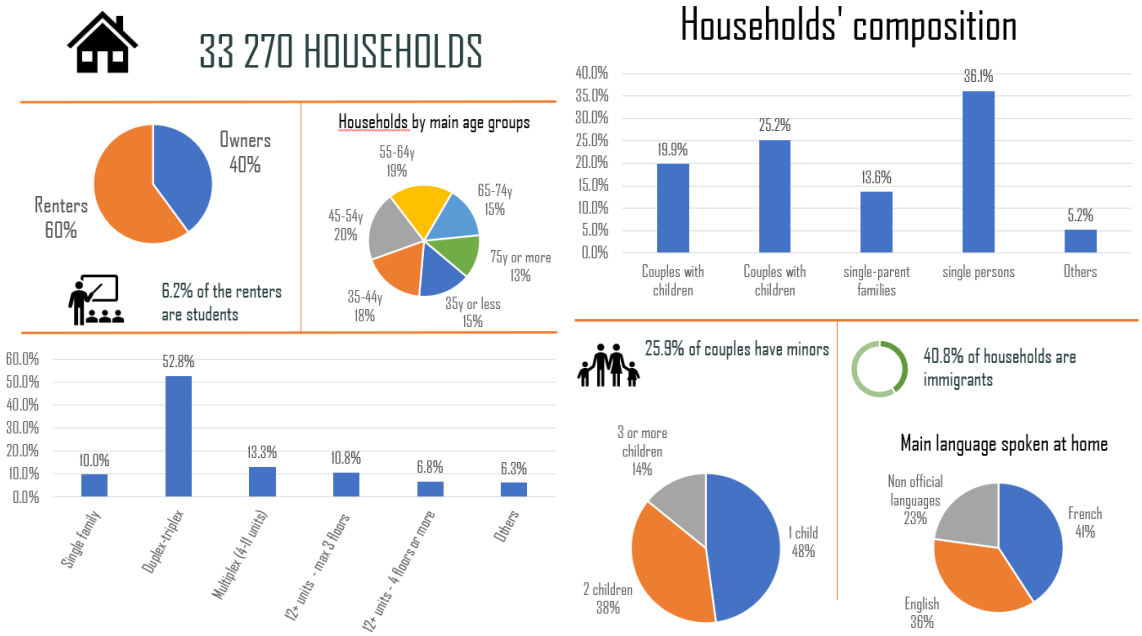
Figure 1
Sociodemographic data for the borough of CDN-NDG

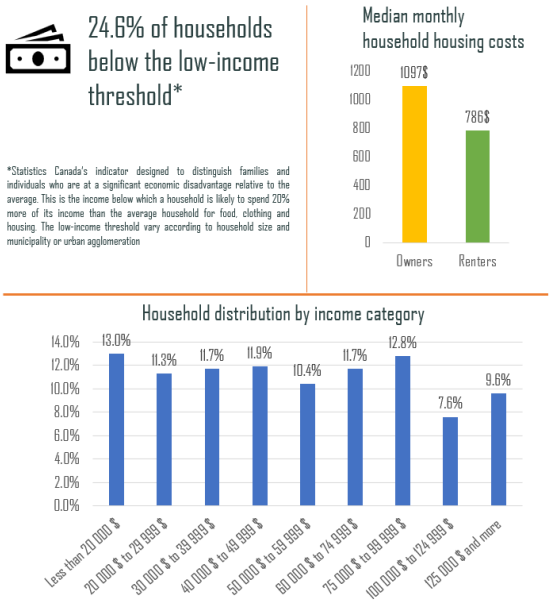


3.4.2 LaSalle (LS)

LaSalle is Montreal's southernmost borough, located in the southwestern part of the island. It shares borders with Verdun and Ville-Emard. The Northwest is bounded by a canal. It is adjacent to Agrignon Park. It has a higher proportion of children than Montreal as a whole, and a particularly high concentration of senior citizens, with proportionally fewer young adults. The borough often features large residential areas with a lack of shops. To the North, there is a sizeable industrial zone. A metro station is located in Agrignon Park, in addition to several bus routes that run through the neighborhood. Discussions with the neighborhood's Round Table highlighted a struggling community organization with a lack of dynamism. There is also little contact with academics.

Figure 2
Sociodemographic data for the borough of LaSalle

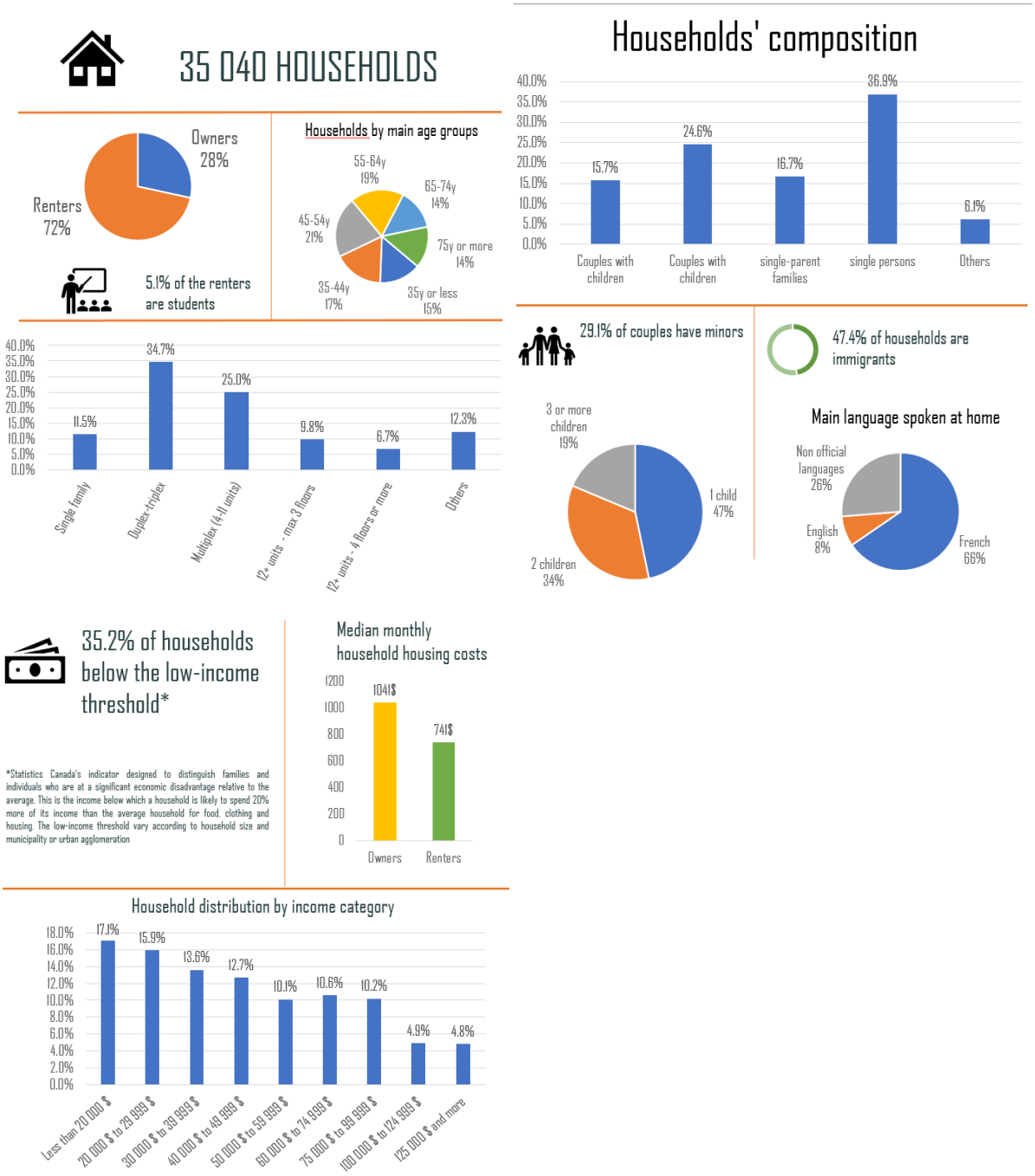




3.4.3 Montréal-Nord (MN)

Montréal-Nord was hardest hit by the first waves. Located in the northern part of the island, it borders Saint–Léonard, Ahuntsic-Cartierville and Rivière-des-Prairie – Pointe-aux-Trembles. As in LaSalle, the proportion of children and seniors is higher than in Montreal as a whole, while the proportion of young adults is lower. Two out of three residents come directly or indirectly from immigrant families. The top country of origins are Haiti, Algeria, Italy, and Morocco. 43% are first-generation immigrants, while 33% are third-generation or more. The second-generation represent only 24% of the immigrant population. Nevertheless, it should be noted that immigrants selected for their ability to contribute to the economy represent 40% of the population, and that 38% were sponsored by a family member who is already a Canadian citizen or permanent resident. The borough has a higher proportion of healthcare professionals in precarious situations. Montréal-Nord is poorly served by public transit, making it isolated and difficult to access.

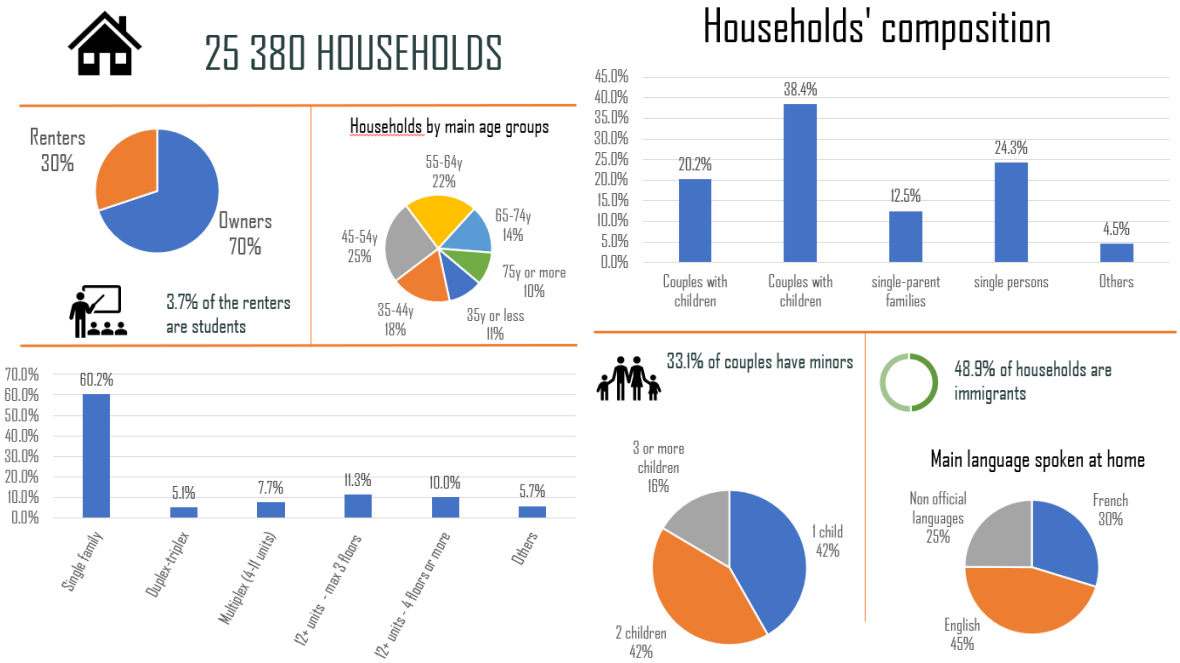
Figure 3
Sociodemographic data for the borough of Montréal-Nord

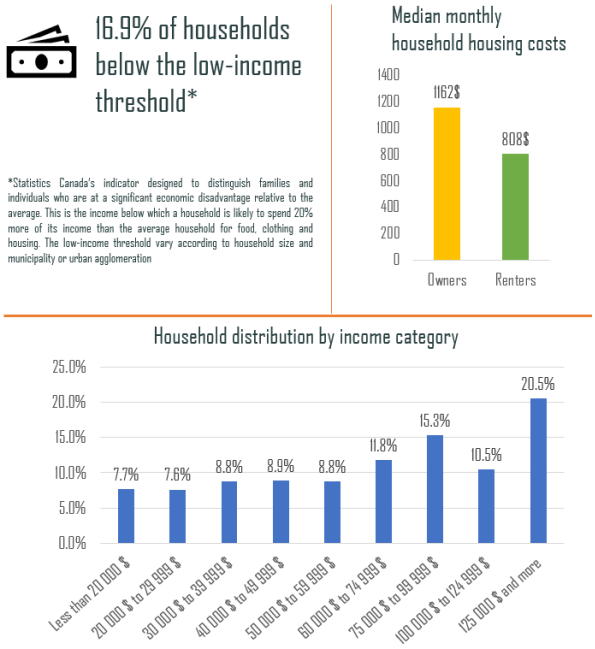


3.4.4 Pierrefonds-Roxborro (PR)

Pierrefonds-Roxborro is located in the western part of the island of Montreal. The borough is located at the western part of the island of Montreal; bordered by the boroughs of L'Île-Bizard-Sainte-Genevieve, Saint-Laurent and Ahuntsic-Cartierville. It is also bordered by the municipalities of Senneville, Sainte-Anne-de-Bellevue, Kirkland, and Dollard-des-Ormeaux. Historically an English-speaking borough, it is the only recognized as bilingual in Montreal (Commission de toponymie, n.d.). English remains the language most spoken at home. Two out of three residents have a direct or indirect immigrant background, with Egypt, Haiti, India, and the Philippines topping the list of countries of origins. 41% are first-generation of immigrants, followed by 32% of third-generation or more, and only 27% second-generation. More than half of the immigrant were selected for their ability to contribute to the economy. As it is excluded from the city of Montreal and located in the suburbs, it is poorly served and takes a long time to reach. The social side of the borough is not well developed, having only recently become a focus for the borough, and they are just starting to build meeting places.

Figure 4
Sociodemographic data for the borough of Pierrefonds-Roxborro

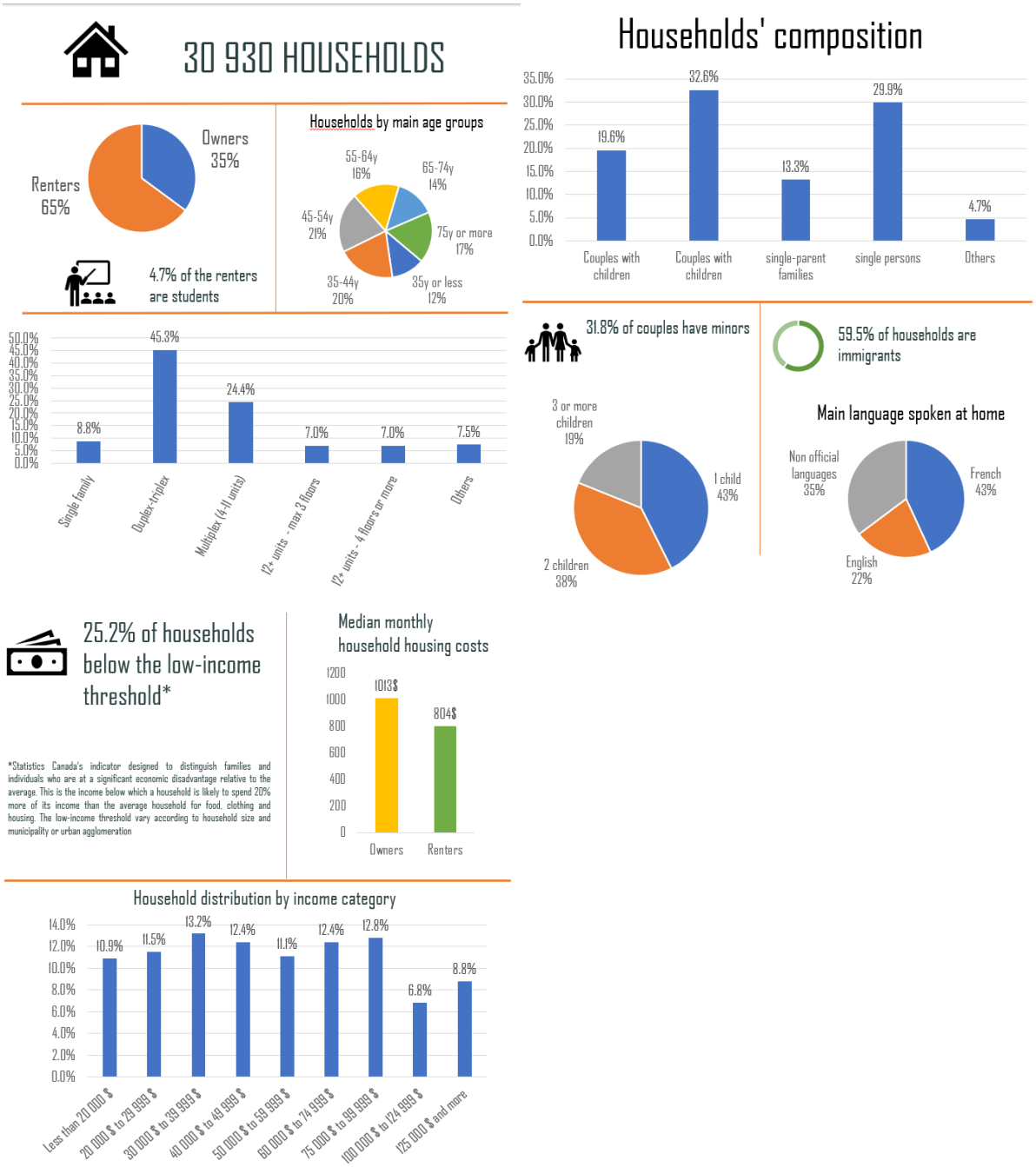




3.4.5 Saint-Léonard (SL)

Saint-Leonard is located next to Montreal Nord, and is also bordered by Anjou, Mercier-Hochelaga-Maisonneuve, Rosemont-La-Petite-Patrie, Villeray-Saint-Michel-Parc-Extension. A highway runs through the borough. The proportion of children and seniors is higher than in Montreal as a whole, while the proportion of young adults is lower. Eight out of ten residents are immigrants. Italy, Algeria, Haiti, Morocco, and Viet Nam are at the top of the countries of origin. The borough bears two names: Little Italy and Little Maghreb. The Italian population is predominantly elderly, while the younger generation of Maghrebians is beginning to settle in. The borough has an industrial area to the north. Saint-Léonard is also poorly served by public transport, although there are plans to connect it to the metro.

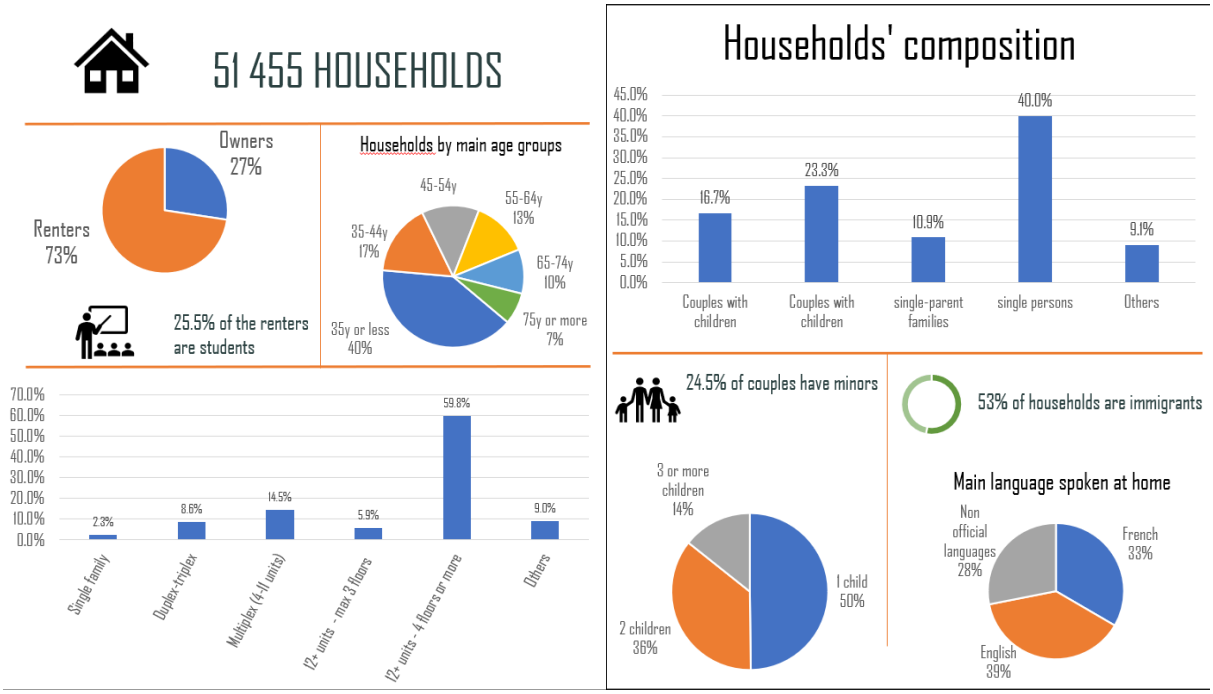
Figure 5
Sociodemographic data for the borough of Saint-Léonard



3.4.6 Ville-Marie (VM)

Ville-Marie is the largest borough in the study. It is bordered by Westmount, Le Sud-Ouest, Mercier-Hochelaga-Maisonneuve, Le Plateau-Mont-Royal, Outremont, and Côtes-des-Neiges-Notre-Dame-de-Grâce. It is bounded on the east by the St Lawrence River. It includes Old Montreal, Downtown Montreal, Chinatown, Sainte-Marie, Le Quartier Latin, a part of the Mount Royal as well as the Village, Montreal's LGBTQ+ neighborhood. It is also an important university borough, hosting UQAM for the French dominant language and the main campuses of Concordia University and McGill University for the English dominant language. Because of its location and the universities, the dominant population is the young adults. There are issues with social mix, gentrification, and itinerancy. The borough has a high frequency of people living alone, but there is a strong community presence.

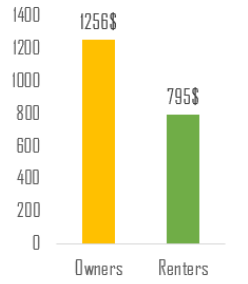
Figure 6
Sociodemographic data for the borough of Ville-Marie



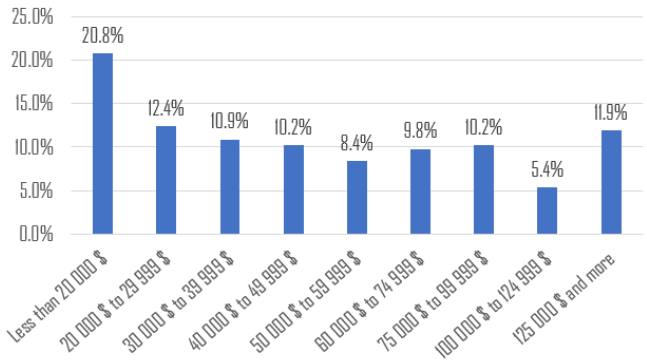
35.5% of households below the low-income threshold*

*Statistics Canada's indicator designed to distinguish families and individuals who are at a significant economic disadvantage relative to the average. This is the income below which a household is likely to spend 20% more of its income than the average household for food, clothing and housing. The low-income threshold vary according to household size and municipality or urban agglomeration

Median monthly household housing costs



Household distribution by income category



4. METHODS

4.1 Dataset

The dataset is composed of 152 questions. Most of them use dichotomous choices, frequency scale or Likert scale. Every question includes a choice to not answer the question. The results were input in SPSS and translated into numbers. In order to verify the hypothesis, a choice in the variable had to be made to create the 3 types of social capital that are analyzed.

- Bonding : The tree question measuring the number of ties each individual has with their Family, Friends, and Neighbors were used. In addition, a variable 'Net' was created to combine all the three into one unique variable. This variable is less precise as it is limited to 10. This is due to the three variables being measured on a scale from 0 to 10 with 10 being 10 or more. Using a scale bigger could lead to false analysis as the precise number is unknown. Nevertheless, it is worth noting that less than 50% of a network of at least ten persons.
- Bridging : It has been measured using the number of associations individuals were part of before COVID, as well as the number of associations they remain in contact with. It was also analyzed with a number of social actions they have been performing. In order to stay coherent in the results, only the actions that were performed by more than 50% of the sample were selected. In addition, variables counting the number of actions that were performed and the number of association respondent stay in contact with were created.
- Linking : This was measured with the trust in the government and elected, as well as health organizations. Participation to the last election was also included and only 5 to 7% of the respondents answered that they could not vote. Two variables regarding the trust in government and trust in institution were created, they were made by creating an average for each group per respondent.

The base sample was N=1665. A set of 9 questions is used to define the adherence to the directives. They are coded by Q10, and they are defined by a frequency scale: Never, Sometimes, Often and Always. It should be noted that the questions used are a combination of regulations and recommendations.

Regulations:

- Q10r1: Avoid all gathering inside a house since the start of the red zone
- Q10r2: Avoid all indoor gathering of more than 10 people during the summer
- Q10r9: Wear a mask when the two-meter distance is not possible

Recommendation:

- Q10r4: Stay two meters away from your colleagues at work
- Q10r5: Working from home
- Q10r6: Avoid crowded places
- Q10r8: Stay two meters away from people in outdoor public places
-

Combination of Regulations and recommendation:

- Q10r3: Avoid inviting people to your home for indoor (regulation) or outdoor (recommendation) activities since the start of the pandemic
- Q10r7: Avoid participating in indoor activities other than at home (Most of public building, such as gym, theater, community center were closed because of regulation)

In order to identify the respondent's adherence to the directives, new variables were defined with a dichotomous choice. If the response was Often or Always, it was assumed that the respondent adheres to the recommendation, if the response was Never or Sometimes, he does not.
Based on these new variables, the sample of people that do not follow at least one recommendation is N=433.

4.2 Analysis

Multiple statistical analyses were performed depending on the type of variables. The analysis was performed for significance level of 0.05. Likert-scale were interpretate as continuous variables. There is a debate about it, but it follows the recommendations of Harpe (Harpe, 2015)

4.2.1 Chi-Square Test of Independence

A Chi-Square analysis is performed between two categorial variables. Categorial variables are variables that cannot be quantified, such as a dichotomous variable. The requirements are two categorial variables with at least two categories for each variable. The frequency for the should be at least 5 for a majority of the cells.

4.2.2 Independent-sample T-test

The Independent-sample T-test is performed between a continuous variable and a categorial variable. It needs to be between a dependent variable which is continuous and an independent variable which is dichotomous. It needs to be independent groups.

4.2.3 Pearson correlation

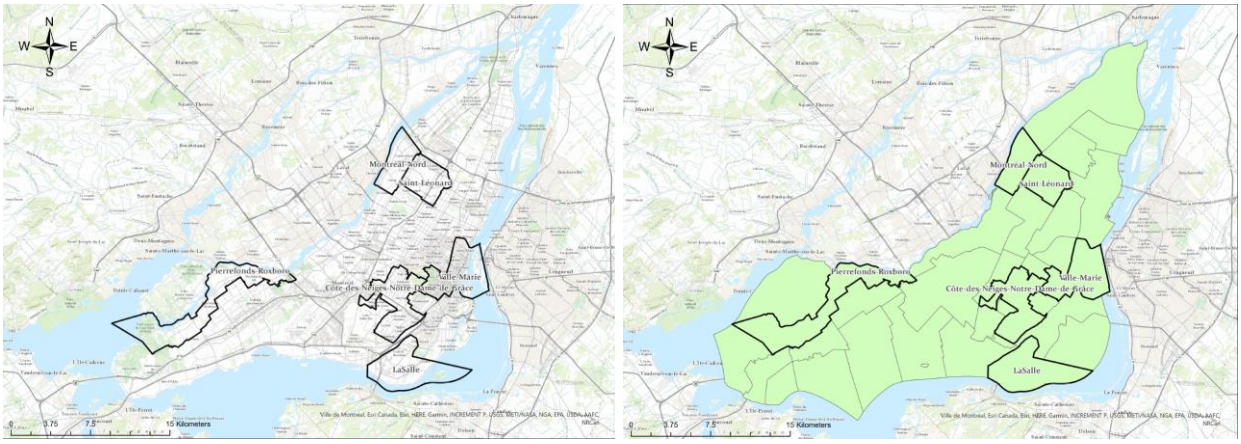
Pearson correlation is performed between two continuous variables. The variables should not have missing values and there must be a linear relationship between the variables. The variables should also be independent.

5. RESULTS

5.1 Montreal Case

A first analysis was performed in order to identify the differences in social capital between each borough. As this project is part of a larger borough study, it seems to be the first step to adopt. As mentioned earlier, the six boroughs are almost evenly spread across the island of Montreal.

Figure 7
Map showing the studied boroughs in Montreal and the complete map of Boroughs of Montreal

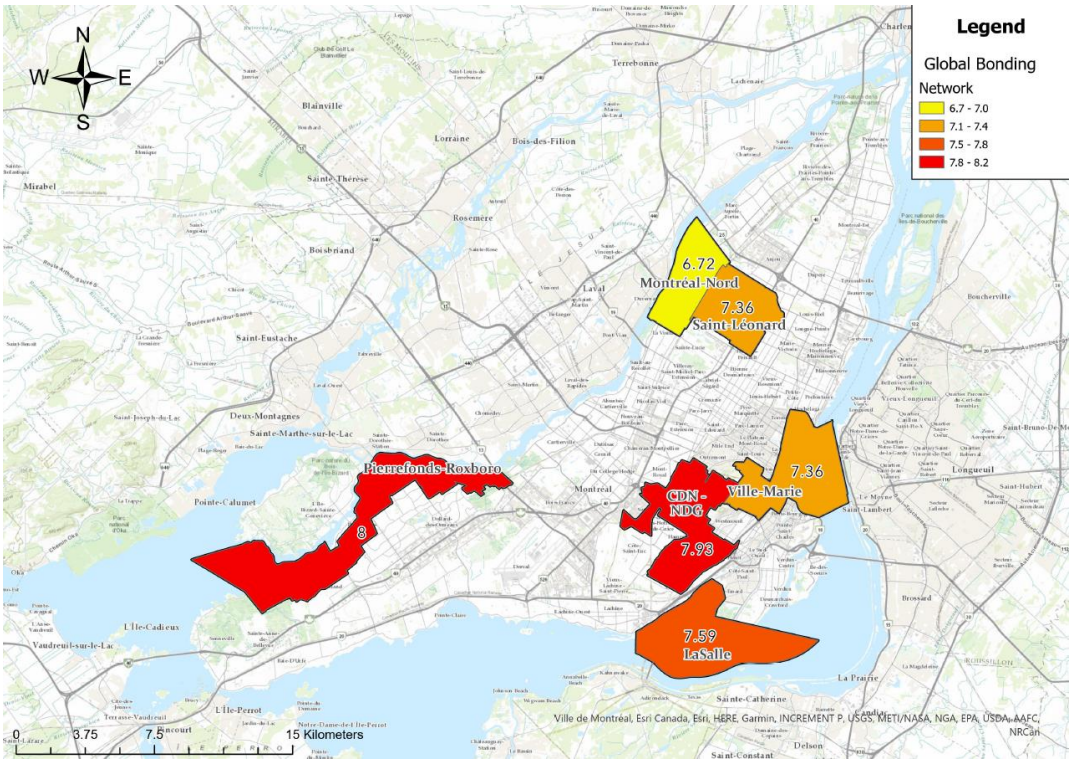


The three types of social capital were measured with the aim to give an overview of the difference in social capital between each borough.

5.1.1 Bonding ties

The bonding network was measured using the global network, friends, family, and neighbors.

Figure 8
Heatmap of the global network per borough



According to the results, CDN-NDG appear to have the largest network. In comparison, MN, SL and VM have the weakest networks (Appendix B.3) . So, it seems that the western part of Montreal has a slightly larger network than the eastern part. When diving into the network, it can be seen that CDN-NDG has the most extensive network of friends, while MN has the least. The differences between the other boroughs are less significant (Appendix B.4). The PR family network ranks first, while VM ranks last (Appendix B.5). As far as the network of neighbors is concerned, it appears to be fairly weak, with nearly two points lower than family and friends in most boroughs. The first rank is occupied by RP and the last by VM. It may be interesting to note that the two boroughs are characterized by the opposite in terms of housing type, PR being predominantly made up of single-family homes, while VM is mainly made up of apartments block housing at least twelve households (Appendix B.6).
In addition, VM residents have closer ties with friends, while family and neighbors networks are weaker than in the other boroughs. Conversely, MN residents have closer ties with their families, while it is the borough with the lowest network of friends and a relatively low score for the network of neighbors. It is also interesting to note that SL has the score in combined network as

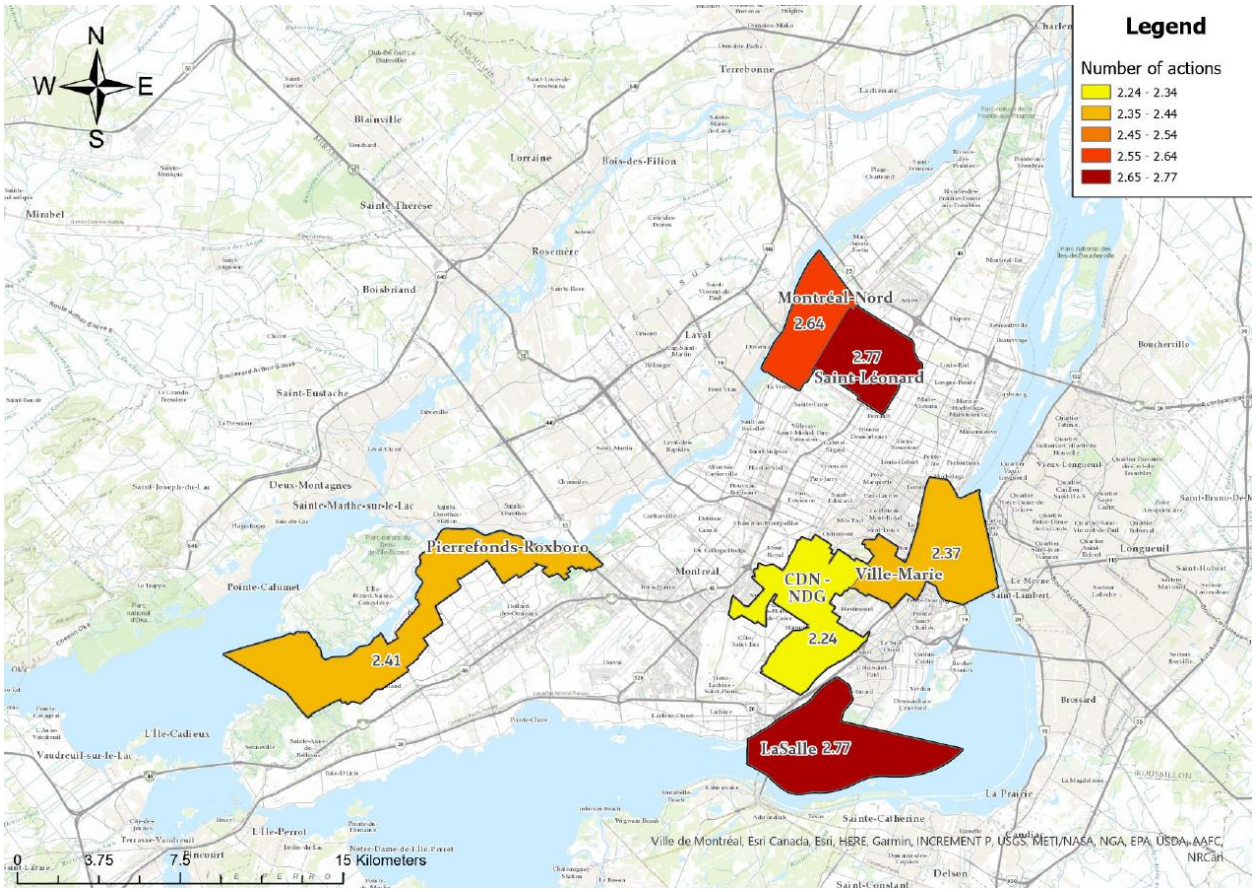
VM, while it scores average in the friends and neighbors networks and second in the family network.
It should also be noted that, as the scale is limited to 10, it may only partially reflect differences between the boroughs. Nevertheless, it gives a good overview of the situation in each type of network in relation to the others.

5.1.2. Bridging ties

Bridging ties were evaluated on the basis of the number of actions in which the respondent participated, whether he belonged to associations or groups, and whether he remained in contact with them during pandemic. Eight actions were listed on a scale offering three possibilities: Often, Sometimes, Never. These actions were:

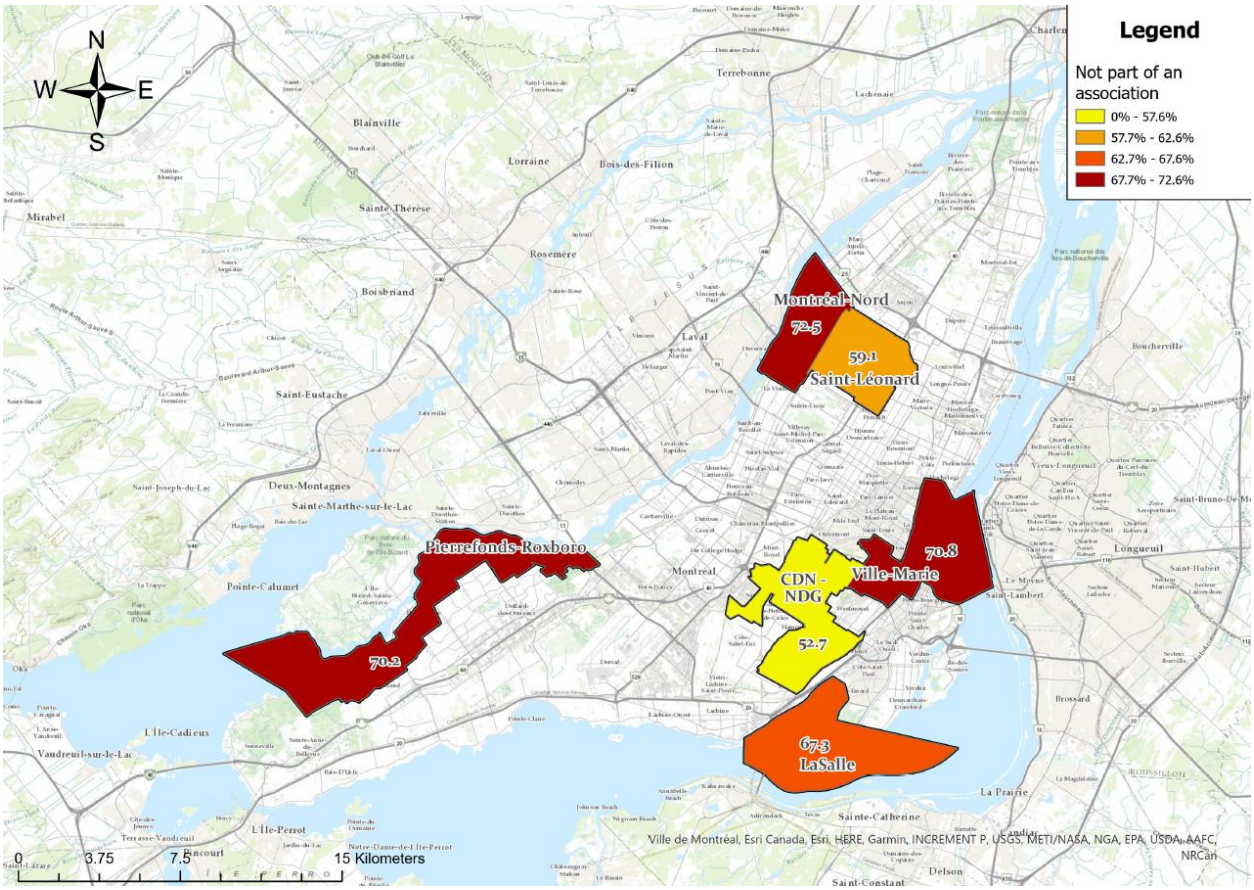
- Q12r5: Join an online community about COVID-19.
- Q12r6: Join a group calling for the end or relaxation of lockdown measures.
- Q12r7: Participate in a videoconference event.
- Q12r8: Participate in a volunteer activity related to COVID-19 (online or in person).
- Q12r10: Donate money to an organization to support the response to COVID-19.
- Q12r11: Donate blood.
- Q12r12: Give your time to help someone at risk.
- Q12r13: Buy more products from local businesses.

Figure 9
Heatmap of the number of social bridging action performed per borough



The borough with the fewest actions is CDN-NDG, and those with the most are LS and SL. It should be noted that although there are differences between boroughs, the average across all boroughs is two actions (Appendix B.7).

Figure 10
Heatmap of the percentage of respondents who were not part of an association per borough.



Concerning the number of associations, since the scale is not linear but includes multiple numbers per answer, it is difficult to know the exact number of associations to which the respondents belong, especially as naming these associations were optional. Consequently, the group that answered that it did not belong to a group was chosen for the study. It can be noted that this is also the majority group in each borough. CND-NDG has the most respondent active in association or group, while MN has the highest percentage of respondents not belonging to an association at 72.5%. Interestingly, the percentage in PR and VM are also over 70% (Appendix B.8).

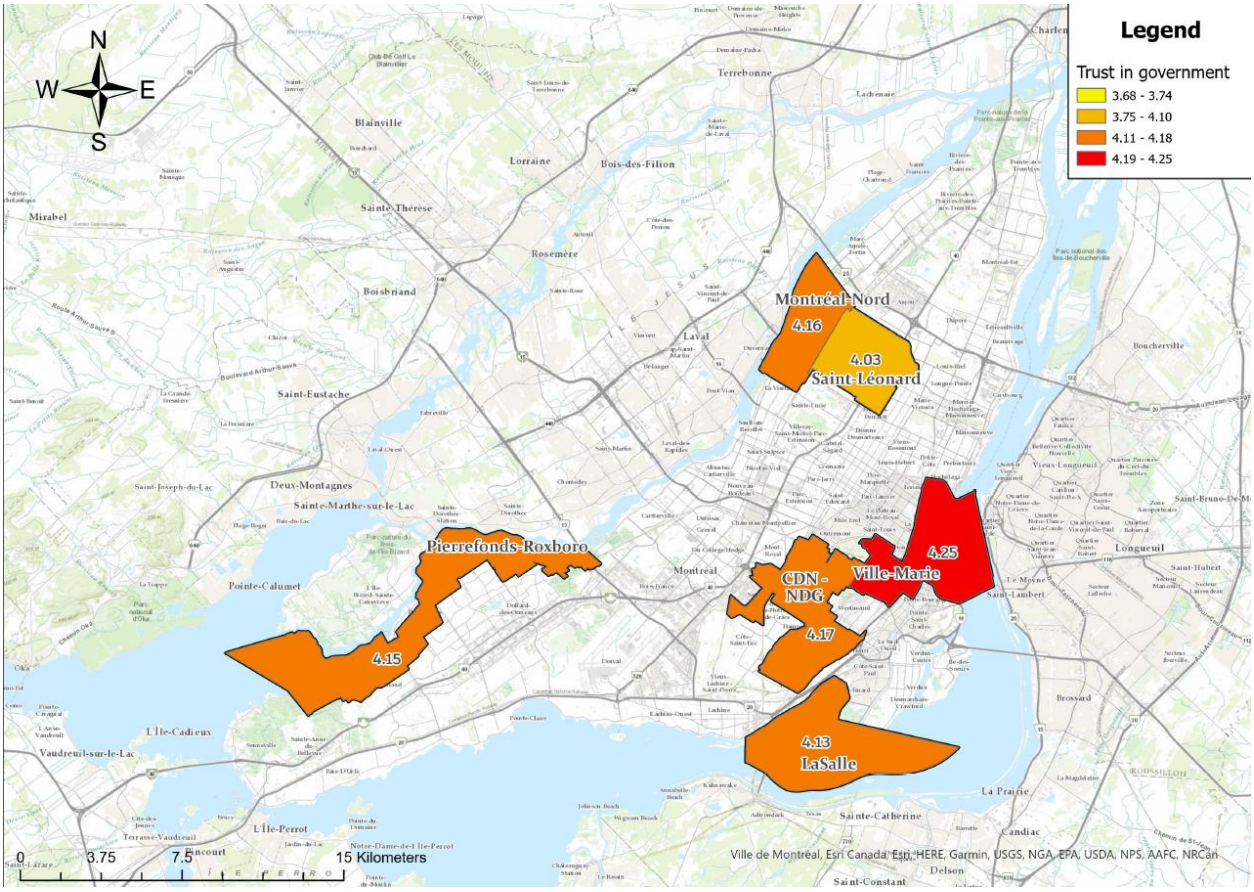
If the percentage of people who have not kept in touch with other association members is considered, CND-NDG ranks highest while MN has the lowest percentage, as might be expected, but there are two other interesting results: as might be expected, but there are two other interesting results: PR ranks first and SL ranked second to last in terms of the number of respondents involved in associations (Appendix B.9).
It can thus be seen that bridging ties are lacking in PR, whereas they are important in SL.

5.1.3. Linking ties

Linking ties were measured using two parameters: trust and voter turnout. Voter turnout was used in the last two elections on two different scales, one at a city level and the other at province level. It should be noted that turnout was measured for all respondents, including those who answered that they were unable to vote. Trust was measured for government institutions and representatives, and for healthcare institutions.

It can be noted that the turnout for local elections (Appendix B.10) was lower than for provincial elections (Appendix B.11). PR and LS have a high percentage of participation compared to with the other boroughs. MN seems to be more involved in local elections than in provincial ones.

Figure 11
Heatmap of the trust in government on a scale from 1 to 5 per borough



Trust was measured on a scale from 1 (No trust) to 5 (high trust). Trust in government was measured with Q9r1, Q9r3, Q9r4, Q9r5, Q9r6 while the trust in institutions was measured with Q9r2 and Q9r7. Trust in government (Appendix B.12) is higher than trust in healthcare institutions (Appendix B.13). In general, there is no particular trust in institutions and respondents are neutral, but they trust governmental institutions and representatives. It can be

noted that VM has the lowest trust in institutions but the highest in government, while SL has the lowest trust score and particularly in government.

5.2 Adherence to regulations and recommendations

After the overall overview of the boroughs, the overall sample's adherence to regulations and recommendations was studied. To do this, questions Q10r1 to Q10r9 were used, which are the following:

How often have you adopted the following behaviors because of the pandemic?

- Q10r1 : Avoid all gatherings inside a house since the start of the red zone on September 28, 2020, with the exception of members of your family bubble.
- Q10r2 : Avoid all indoor gatherings of more than 10 people during the summer.
- Q10r3 : Avoid inviting people to your home for indoor or outdoor activities since the start of the pandemic.
- Q10r4 : Stay two meters away from your colleagues at work.
- Q10r5 : Working from home.
- Q10r6 : Avoid crowded places.
- Q10r7 : Avoid participating in indoor activities other than at home (e.g., community center, show, gym.
- Q10r8 : Stay two meters away from people in outdoor public places (e.g., park)
- Q10r9 : Wear a mask when the two-meter distance is not possible.

The results, in percentage are shown below (Appendix C.1):

Table 2

Result in percentage of the behaviors adopted because of pandemic.

	Q10r1	Q10r2	Q10r3	Q10r4	Q10r5	Q10r6	Q10r7	Q10r8	Q10r9
Never	**2.2**	**2.6**	**3**	**1.6**	**8.7**	**2**	**3.6**	**0.8**	**0.8**
Sometimes	**5.6**	**4.1**	**8.1**	**7.2**	**8**	**5.9**	**5.6**	**7**	**3.2**
Often	**15.6**	**9.6**	**20.7**	**19**	**10.8**	**26.9**	**10.2**	**27.7**	**9.4**
Always	**75**	**82**	**66.5**	**36.3**	**29.4**	**63.7**	**76.8**	**62.2**	**85.4**
N/Q	**1.6**	**1.7**	**1.7**	**35.9**	**43.3**	**1..5**	**3.9**	**2.3**	**1.2**

As the number of people who do not follow the recommendations is very small, it has been decided to form two groups : Those who follow recommendations and those who do not. The question Q10 were then recompute, and a new variable was created, as followed :

- Always or Often = Follow the recommendations
- Sometimes or Never = Do not follow the recommendations

This allowed us to determine whether a respondent was following the recommendations or not.

Table 3

Result in percentage of the behaviors adopted because of pandemic in two categories, Do not respect and respect.

	Q10r1	Q10r2	Q10r3	Q10r4	Q10r5	Q10r6	Q10r7	Q10r8	Q10r9
Do Not Respect	**7.8**	**6.7**	**11.1**	**8.8**	**16.7**	**7.9**	**9.2**	**7.8**	**4**
Respect	**90.6**	**91.6**	**87.2**	**55.3**	**40.2**	**90.6**	**87**	**89.9**	**94.8**
N/A	**1.6**	**1.7**	**1.7**	**35.9**	**43.3**	**1.5**	**3.9**	**2.3**	**1.2**

As can be seen, at least 85% of the sample complies with the various recommendations. There are two exceptions : Q10r4 and Q10r5. As Q10r5 may not depend on the respondent's will, it was chosen to exclude it for further investigation. Q10r4 was retained despite the high percentage of N/A, as it relates to social distancing and therefore depends on the individual for compliance.

Because people who do not follow the regulations and recommendations (NFR) are surveyed, the sample is therefore reduced from N=1665 to N=433. This number includes every respondent who answered the questions Sometimes or Never at least once.

The interdependency between borough and NFR was analyzed by performing a Chi-Square Analysis (Appendix C1). The p-value (p=0.774) is greater than the typical significance level (a=0.05), therefore no statistical differences were found (Table 4).

Table 4

Chi-Square analysis between the borough and NFR

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.502[a]	5	.776
Likelihood Ratio	2.524	5	.773
N of Valid Cases	1666		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 51.20.

It was then decided that further investigation will be undertaken at Montreal level rather than at borough level to keep a sample size significant.

5.3 Bonding ties

It has been decided to redefine a support network of 4 or less members on whom who can count on as "moderate", based on the definition previously done by CITE-ID. Chi-Square analyses were performed between a moderate support network and NFR (Appendix C.2). No significant statistical differences ($p<0.05$) were found for the aggregate network, friends network and family network contrary to the neighbors network (Table 5).

Table 5

Chi-Square between the Neighbors network and NFR

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.432[a]	1	.011		
Likelihood Ratio	6.120	1	.013		
N of Valid Cases	1611				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 46.04.

Another analysis has been conducted using independent-sample T-test on the network. This test shows a statistically significant difference for the friends network (Table 6).

Table 6

Independent-sample T-test analysis between support network and NFR

Independent Samples Test

		Levene's Test for Equality of Variances					
				Significance			
		F	Sig.	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference
Network	Equal variances not assumed	3.333	0.068	0.116	0.232	-0.18121	0.15143
Friends	Equal variances not assumed	3.005	0.083	0.008	0.015	-0.40157	0.16527
Family	Equal variances not assumed	1.059	0.304	0.184	0.368	0.14064	0.15625
Neighbors	Equal variances not assumed	1.121	0.290	0.133	0.265	-0.14134	0.12670

5.4 Bridging ties

The number of actions performed by the respondents (Actions), their belongings to an association or a group (NoGroup), and if they stayed in contact with them (ContactAssos) were looked at.

For the number of actions, an independent-sample T-test was performed, and no significant statistical difference ($p<0.05$) was found. No significant statistical difference was found either in A Chi-square analysis performed on a variable concerning respondents who do not belong to an association (NoGroup). The Independent-sample T-test was performed between the number of associations the respondents keep contact with (ContactAssos) and NFR and a Chi-Square analysis between the respondents who keep contact with associations and NFR, and both have no significant statistical difference (Appendix C.3).

5.5 Linking Ties

For Linking social capital, vote participation was analyzed with a Chi-Square Analysis (Appendix C.4). Both Provincial and Municipal vote participation have a significant statistical difference. The stronger significant difference is between Municipal election and NFR (Table 7).

Table 7
Chi-Square analysis between Municipal election vote participation and NFR
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.267[a]	3	.004
Likelihood Ratio	12.886	3	.005
N of Valid Cases	1665		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.78.

But in the context of the study the provincial vote participation holds more interest because the regulations were decided on a provincial level. Therefore, a statistically significant relation between the linking social capital pre-pandemic and NFR, and particularly at the regulation-making level, provides useful information. The results are shown in Table 8.

Table 8
Chi-Square analysis between Provincial election vote participation and NFR
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.577a	3	.035
Likelihood Ratio	8.152	3	.043
N of Valid Cases	1665		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.22.

The trust analyses were performed with an independent-sample T-test. Trust in government and health institutions was tested with the same variables as previously. Four out of five tests have returned statistically significant differences. The only exception is trust in elected federal officials. Table 9 summarizes the findings.

Table 9

Independent-sample T-test analyses between trust in government elected and institution and NFR

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
				Significance			
		F	Sig.	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference
MunicipalElected	Equal variances assumed	5.960	.015	.003	.006	0.17433	0.06377
ProvincialElected	Equal variances assumed	14.473	<.001	<.001	<.001	0.21123	0.06091
GovernmentQuebec	Equal variances assumed	48.352	<.001	<.001	<.001	0.32145	0.05850
FederalElected	Equal variances assumed	10.516	.001	.056	.112	0.10043	0.06309
GovernmentCanada	Equal variances assumed	26.495	<.001	<.001	<.001	0.20804	0.05699

Trust in health institutions has a statistically significant difference with NFR. Results are summarized in Table 10.

Table 10

Independent-sample T-test analyses between trust in public health institution and NFR

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
				Significance			
		F	Sig.	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference
MTLRegionalPubHealth	Equal variances assumed	25.607	<.001	<.001	<.001	0.28599	0.05700
WHO	Equal variances assumed	14.304	<.001	<.001	<.001	0.21631	0.06089

5.6 Further investigations

Additional analyses were performed to gain more insights (Appendix C.5). They mainly are related to bonding ties. As such it was investigated if the actions related to bonding have a significant difference. For this a variable combining helping a neighbor (Q12r2), communicate with a relative (Q12r3,Q12r4) and creating masks for relatives (Q12r9) was made. No significant statistical difference was found. Household composition on the other hand were found related to NFR. The number of persons living in the home, the number of generation and if someone living in the home is at risk of experiencing complications after catching COVID-19 (including but not limited to people aged 70 or over, people with weakened immune system or people with chronic illnesses) were all statistically significant. Table 11 and 12 summarized the findings.

Table 11

Chi-Square analysis between Household and NFR

Chi-Square Tests

		Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Number of Generation	Pearson Chi-Square	24.172[a]	1	<.001		
	Likelihood Ratio	23.441	1	<.001		
	N of Valid Cases	1508				
Person at risk living in the home	Pearson Chi-Square	3.892[a]	1	.049		
	Likelihood Ratio	3.916	1	.048		
	N of Valid Cases	1629				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 120.35.

Table 12

Independent-sample T-test analyses between Household and NFR

Independent Samples Test

		Levene's Test for Equality of Variances					
				Significance			
		F	Sig.	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference
Number of People living at home	Equal variances assumed	26.742	<.001	<.001	<.001	-0.426	0.083

The relation with the bonding network and frequency of meetings were found to be significant with an independent-sample T-test analysis for the relation with neighbors and meeting but the relationship with family and friends were not significant. Results are shown in table 13.

Table 13

Independent-sample T-test analyses between trust in relation with bonding network and NFR

Independent Samples Test

		Levene's Test for Equality of Variances					
				Significance			
		F	Sig.	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference
RelationNeigh	Equal variances assumed	10.464	0.001	0.008	0.017	0.11418	0.04758
RelationSN	Equal variances assumed	5.398	0.020	0.059	0.118	0.08604	0.05500
Meeting	Equal variances assumed	5.150	0.023	0.000	0.000	-0.46512	0.05301

Significant relations were also found with the agreement that the duty to protect the population and limit the consequences of pandemic. Results are shown in Table 14.

Table 14

Independent-sample T-test analyses between Government duty and NFR

Independent Samples Test

		Levene's Test for Equality of Variances					
				Significance			
		F	Sig.	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference
DutyRuleProtection	Equal variances assumed	8.609	0.003	0.000	0.000	0.42437	0.05676
DutyRuleLimitation	Equal variances assumed	6.509	0.011	0.000	0.000	0.23843	0.05180

Lastly, a Pearson correlation was performed between the regulations and recommendations and the perception of the pandemic (Appendix C.5). Strong correlations have been found between each variable with the exception of six cases. Medium correlations were found between being afraid of being punish if the respondent does not comply with the authorities' instructions and avoiding inviting people at home for indoor or outdoor activities and with avoiding crowded places, and between the adherence to the guidelines by the closer relatives and avoiding crowded places and avoiding participating in indoor activities other than at home. No correlations were found between avoiding participating in indoor activities other than at home and being afraid to be punish if the respondent does not comply with the authorities' instructions as well as considering the authorities' guidelines to be clear.

6 ANALYSIS

This section aims to analyze the findings of the study regarding social capital and adherence to regulations and recommendations. Social capital has been defined following the Bonding, Bridging, Linking social capital.

6.1 Bonding

The results regarding Bonding social capital have shown two network variables have an impact the adherence. A significant difference for independent-sample T-test analysis has been found between the number of friends and the adherence. The network of friends has a greater influence on adherence than family and neighbors. An association between adherence and a moderate network of neighbors has been found, this result does not corroborate the hypothesis that greater social capital will increase the adherence. However, the difference between regulations and recommendations and outdoor activities can possibly explain this result. Neighbors are also geographically close, and some regulations were ambiguous such as ‘Avoid inviting people to your home for indoor or outdoor activities’ because outdoor activities with social distancing could have been acceptable. No significant results were found for the family network, but further indication as pointed toward the influence of household in the adherence. While no parameters were able to distinguish between family and other cohabitation, it can be suggested that families sharing the same home would have a higher adherence.

6.2 Bridging

No significant difference was found for the variables tested for bridging. It should be noted that the bridging variables were importantly related to association and group, but a majority of the respondents stated that they did not belong to an association or group.

6.3 Linking

Contrary to Bridging social capital result, Linking had significant results for all the tests. The elected federal officials were the only group to not hold significant result, but it should be mentioned that during COVID-19, the recommendations were provided by provincial elected who got a significant result. The dependency between Linking social capital and adherence to regulation and recommendation was expected, as trust in government increase the voluntary compliance. During a pandemic, governmental trust is required as citizens and government have to work together to limit the impact on the population (Dann, 2022).

7 DISCUSSION

7.1 Hypotheses

Through this study, it was attempted to estimate the impact of social capital to the adherence to the regulations and recommendations in times of crisis. For these two hypotheses were used based on literature :

- HYP 1 : As social capital increases, people are more likely to agree on the necessity of following the government directive. This hypothesis is based on Barrios et al. (2021)
- HYP 2 : While bonding social capital has greater impact on reducing the spread of the COVID-19, a lack of one form of social capital results in a reduction of adherence to NPI. This hypothesis is based on Pitas & Ehmer (2020) and Alfano (2022)

Through this study, it has been found that multiple variables belonging to either Bonding or Linking social capital influence the adherence to the directives. As such, a person who is part of a unigenerational with small numbers of persons, who trust the government and have an extended network of friends is more likely to follow the directives. In addition, the positive correlation between the perception of the pandemic and the adherence to the directives have shown that citizens not only fear catching COVID-19 but also the consequence of the spread, such as transmitting COVID to someone or overburdening the healthcare systems. It has also been studied that following rules is behavior and as such depends on social context. (Dunham et al., 2020). As a result, social pressure may also play a role in adherence, which is corroborated by the correlation with the question regarding the respect of guidelines by the close network. So, the more social capital a person has, the more people he will be exposed to, and the more likely he will voluntarily follow the directives. As such, the HYP 1 is verified.

According to the results, HYP 2 was not validated as no link between Bridging social capital and adherence to directives was found. It should be noted nevertheless that the questionnaire used had an important focus on associations and groups but 62.2% of the respondents answered that they were not part of either a group or association. In addition, most of the actions used to measure Bridging social capital were mostly not performed. Consequently, it can be determined that either the sample has a low Bridging social capital, or the questionnaire did not encompass Bridging social capital efficiently.

7.2 Limitations and further studies

There are multiple limitations that can contrast the result obtained. Firstly, the questionnaire was not built with the aim of assessing the adherence to directives but was built for data collection. It served as a basis for further studies about social capital in Montreal. As such, the questionnaire has its limitations. If it were to be recreated, it would seem interesting to have a wider focus for bridging social capital, in order to confirm its lack or otherwise. It should also be noted that adherence to the directive correlates with factors independent to social capital such as the age, the highest diploma or income (Arnaud et al., 2021).

The geographical information obtained through the first questionnaire was limited and the number of respondents and their location did not allow us to go any further than borough level, which has its own limitations. Montreal's boroughs are often mixed and identifying more precisely where there is a lack of social capital would help in the development of the city but also the borough. As a result, the next step will implement geolocation in its questionnaire.

This thesis underlines the lack of bridging social capital. As it is part of the first phase of the project, it provides a useful information for the next steps, especially as the collaboration with the boroughs will be increased. It would be interesting to see the engagement with activities proposed by the borough around bridging social capital and find solutions to boost it.

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