



Cohort Profile

Cohort Profile: The Montreal Neighbourhood Networks and Healthy Aging (MoNNET-HA) study

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Abstract

The Montreal Neighbourhood Networks and Healthy Aging study was established: (i) to assess the added value in using formal network methods and instruments to measure social capital and its relationship to health; (ii) to determine whether older adults are more vulnerable to the effects of network and neighbourhood environments; and (iii) to examine longitudinally the relationship between social capital and health among adults in Montreal, Canada. The MoNNET-HA cohort consists of men and women aged 25 years and older, residing in the Montreal Metropolitan Area (MMA). Participants were recruited using a random stratified cluster sampling design with oversampling of adults older than 65 years. Initial MoNNET-HA study participants ($n = 2707$) were recruited for telephone interviews in the summer of 2008. Since 2008, participants were interviewed in the autumn of 2010 and the winter of 2013/2014. Data currently fall into five categories: (i) social network and social capital; (ii) psychosocial and psychological; (iii) socio-demographic and socioeconomic; (iv) health behaviours and conditions; and (v) neighbourhood environmental characteristics. Healthcare utilization data will be available for a subsample of participants. Upon funding, future work will measure anthropometric and metabolic health directly. Based on agreements with participants, external researchers should request access to data via collaborations with the study group.

Key Messages

- The MoNNET-HA study is unique in its collection of longitudinal social network and capital data on adults of various ages.
- MoNNET-HA findings provide a complex portrait of the ways in which social capital and social networks are associated with health behaviours and conditions, with effects potentially differing by age and sex.
- Initial studies highlight the added value in using social network methods and measures to examine the relationship between social capital and health.

Why was the cohort set up?

Social capital refers to the resources to which individuals or groups have access through their social networks. Most of what is known about social capital and health has come from cross-sectional studies examining the association between health and area-level proxy indicators of social capital such as trust, perceived social cohesion, and reciprocity. The Montreal Neighbourhood Networks and Healthy Aging study (MoNNET-HA) was established with three main objectives: (i) to assess the added value of using formal network measures of social capital to study the relationship between social capital and health; (ii) to examine whether older adults are more vulnerable to social network and neighbourhood environmental influences on health; and (iii) to assess the influence of social capital on health longitudinally.

First, although social capital is conceptualized as network-accessed resources, research has tended to rely on proxy measures, such as generalized trust, to examine the association between social capital and health.¹ Using proxy measures to study social capital and health has certain advantages: proxy measures are often already available through pre-existing data sets; and they often involve questions that are quickly and easily administered by questionnaire, thereby reducing the time and cost of survey administration. Nevertheless, proxy measures of social capital do not formally measure the composition or structure of a person's social networks or the resources that may be available within those networks. The dissonance between the conceptual and operational definitions of social capital in public health research may limit our understanding of the behavioural, psychological and social mechanisms linking social capital to health. The MoNNET-HA study was designed: (i) to use social network methods to collect network measures of social capital; (ii) to compare those measures with proxy ones in their relationship with a range of health and behavioural outcomes; and (iii) to evaluate the added value in using network methods and instruments to study social capital and health.

Second, recent research results suggest that network and neighbourhood environmental conditions may exert a stronger influence on the health behaviours and conditions of older adults as compared with younger people. Due to a variety of life course changes, such as retirement and widowhood, older adults can experience significant changes in the size and composition of their social networks. These changes may have implications for their health. For example, among older adults, social isolation and disengagement have been shown to be risk factors for cognitive decline.² In addition, research has shown links between neighbourhood built and social environmental

characteristics and the health and health behaviour of older adults.^{3,4} Reduced physical mobility, changes in cognitive capacity and greater functional limitations may all heighten the importance of spatially-proximate resources for personal health and well-being.^{5,6} The MoNNET-HA study was designed to examine in the Montreal context whether: (i) social capital (interpersonal and neighbourhood levels) was more strongly related to the health of older compared with younger adults; and (ii) interpersonal social capital moderated the influence of neighbourhood environmental conditions on health.

Third, despite advances in our understanding of social capital and health, most research on social capital has been cross-sectional and unable to assess the causal pathways linking social capital to health. The MoNNET-HA study was extended into a cohort to provide the opportunity to assess longitudinally the relationship between social capital and health at the interpersonal and neighbourhood levels. Longitudinal results will contribute to a greater understanding of the mechanisms by which social capital influences health and strengthen the evidence base for designing social capital interventions to improve health.

Funding for the MoNNET-HA study and data collection in 2008 and 2010 was provided through a Canadian Institutes of Health Research (CIHR) standard operating grant (MOP-84584). Additional funding for the third wave of data collection in 2013 and the formal recruitment of the MoNNET-HA cohort was provided through a CIHR catalyst grant (CHL-126208).

Who is in the cohort?

The MoNNET-HA cohort consists of men and women aged 25 years and older, residing in the Montreal Metropolitan Area (MMA). The MoNNET-HA study used a two-stage stratified cluster sampling design to oversample older adults and collect data from adults living in a range of neighbourhood environments. In stage one, MMA census tracts (CT) ($n = 862$) were stratified using 2001 Canada Census data into tertiles by household income. One hundred CTs were selected from each tertile ($n_j = 300$). In stage two, potential respondents within each tract were stratified into three age groups: 25–44 years old, 45–64 and 65 or older. Three respondents were randomly selected within each age stratum and CT for a total of nine respondents per CT, except for seven tracts in which four participants were selected ($n_i = 2707$). To be selected, individuals had to meet the following criteria: (i) to be non-institutionalized, (ii) to have resided at their current address for at least 1 year; and (iii) to be able to complete the questionnaire in French or English. Random digit dialling of listed telephone numbers was used to select households and a computer-assisted

telephone interviewing system guided questionnaire administration. Figure 1 illustrates the geographical distribution of the MoNNET-HA participants along with the median household income tertile for each CT.

As detailed elsewhere,⁷ the initial MoNNET-HA study had a response rate of 38.7%. To assess the representativeness of the MoNNET-HA sample, chi-square analyses were conducted on a CT-by-CT basis to compare the observed sample counts with the expected counts based on the 2006 Canada census. Results of these analyses showed that initial MoNNET-HA participants over-represented: (i) older adults (by design); (ii) females; (iii) individuals in households with an income less than \$50,000 Canadian dollars per year; (iv) persons who had lived in their current residence for more than 5 years; and (v) those with more than a high-school degree.

How often have they been followed up?

MoNNET-HA participants were recruited for initial telephone interviews in the summer of 2008. These participants were followed up in the autumn of 2010 and the winter of

2013/14. Figure 2 illustrates the recruitment flow and overall sample sizes at each wave. During the third wave of data collection, we formalized MoNNET-HA cohort participation and asked participants if their survey information could be linked to their Regie Assurance Maladie Quebec (RAMQ) health registry data. Cohort participants have agreed to ongoing participation and contact with study personnel.

Table 1 provides basic descriptive information about the MoNNET-HA study participants for the three waves in which data have been collected. Analyses comparing the composition of the MoNNET-HA study sample in 2008, 2010 and 2013 showed a consistent response bias across waves in that recurrent participants tended to be Francophone, higher educated, between 35 and 74 years old and residing in their current location for comparatively longer. There was greater variation in the composition of the sample by income categories over the three waves.

What has been measured?

The MoNNET-HA study measures cover five main areas: (i) social networks and social capital; (ii) psychosocial

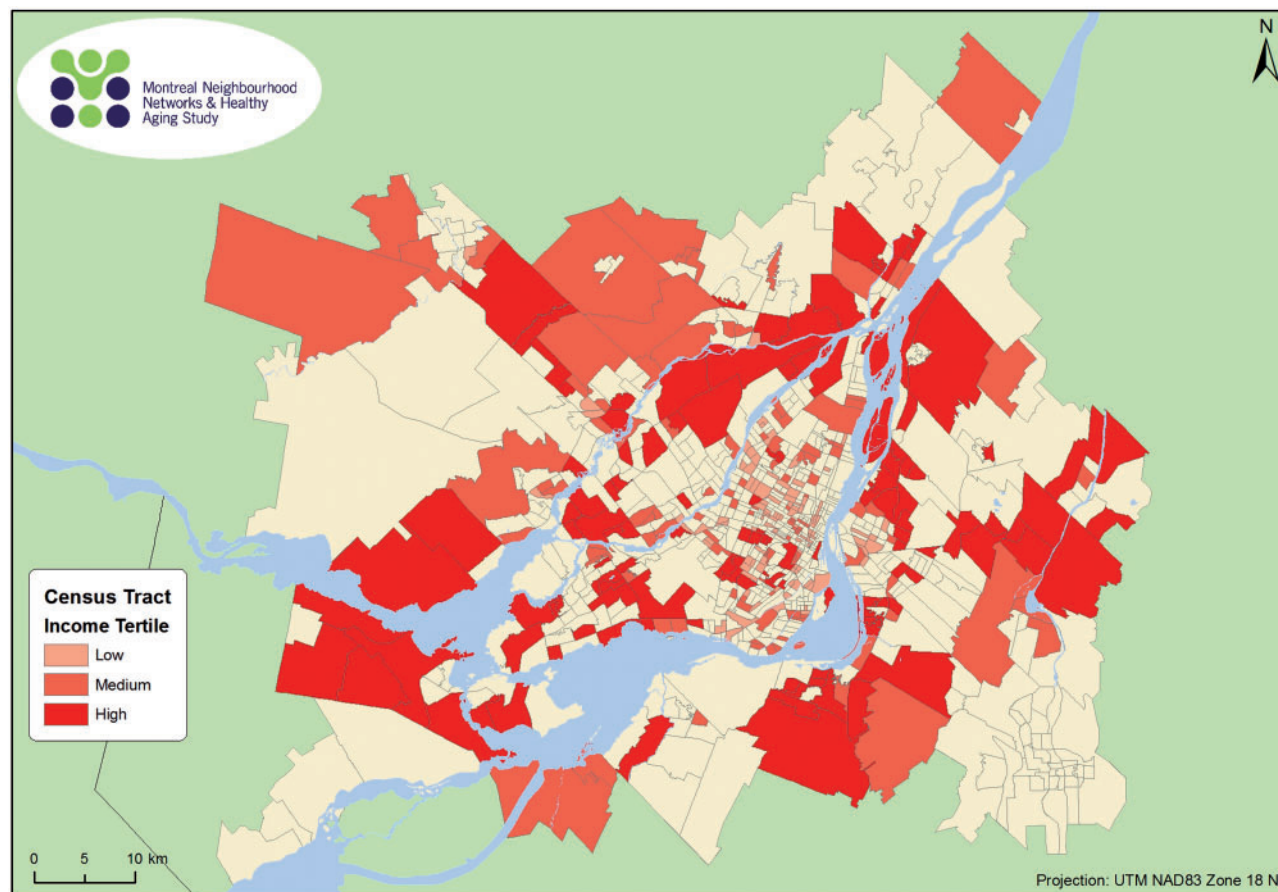


Figure 1. Montreal Metropolitan Area (MMA) with census tract neighbourhoods covered in the Montreal Neighbourhood Networks and Healthy Aging (MoNNET-HA) study by median household income tertile.

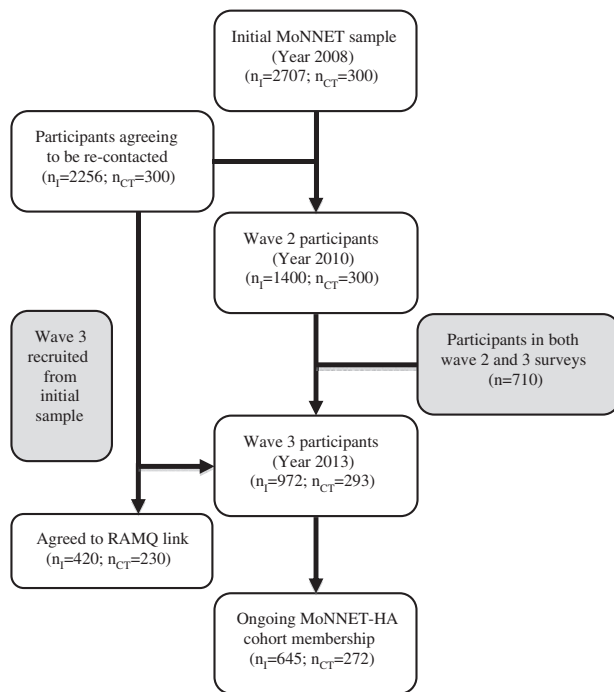


Figure 2. Montreal Neighbourhood Networks and Healthy Aging (MoNNET-HA) cohort recruitment and participation flowchart.

resources; (iii) socio-demographic and socioeconomic variables; (iv) health behaviours, conditions and health service use; and (v) neighbourhood environmental characteristics. Through collaboration with the Population Health Record (PopHR) project,⁸ the MoNNET-HA study is able to link participant data to a range of indicators measuring nutrition,⁹ the built environment and the health status of the MMA **Box 1** provides a listing of the instruments and measures available at the individual and neighbourhood levels from the MoNNET-HA study, as well as a selected number of indicators available through the PopHR.

Social networks and social capital

The social networks and social capital module included a position generator, name generator/interpreter instrument and items covering perceived social cohesion and neighbourhood belonging. Position generators ask respondents to indicate whether they know others holding certain occupations in society. These occupations are linked to a prestige value, thereby allowing measures of network diversity, reach and range to be calculated. The MoNNET-HA position generator included a listing of 10 occupations. The name generator asked respondents to nominate up to three people with whom they had discussed important matters in the past 6 months; the name interpreter included a series of questions asking respondents about the people they named (e.g. age, education level, health behaviours) and whether

they knew each other. Perceived social cohesion included question items about perceptions of the neighbourhood environment, trust and informal social control. Further information about the MoNNET-HA social network and capital instruments can be found elsewhere.⁷

Psychosocial and psychological resources

The MoNNET-HA questionnaire included four items from the locus of control of Mirowsky and Ross¹⁰ in the 2008 and 2010 waves but the full eight items in the 2010 wave. In 2013, the study also added the behavioural approach system (BAS) and behavioural inhibition system (BIS) scales.¹¹

Socio-demographic and socioeconomic variables

The MoNNET-HA study has collected a range of socio-demographic and socioeconomic information about participants at each wave. This information includes age, sex, educational levels, income categories, household language, foreign-born status and marital status.

Health behaviours and conditions

The MoNNET-HA study asked participants about: (i) a range of doctor-diagnosed chronic conditions, including diabetes and hypertension; (ii) their height and weight for calculation of body mass index; (iii) their health behaviours: smoking, alcohol consumption, physical activity (using the International Physical Activity Questionnaire)¹² and diet; and (iv) depressive symptoms using the shortened 10-item version of the Center for Epidemiologic Studies Depression Scale.¹³ In addition to self-reported health information, a subsample of participants has given permission to access their health registry data whereby health service use will be assessed. Future studies will involve the collection of anthropometric and objective metabolic information.

Neighbourhood health determinants and outcomes

Participants' six-digit postal codes have been collected. This information has allowed the geographical linkage of study data to other information, including the Canada Census, and the aggregation of individual-level data, particularly the social network and capital data, to higher spatial scales. Ecometric methods have been used to estimate a range of neighbourhood-level measures of the social environment, including neighbourhood social network diversity. These social environmental measures will be linked to neighbourhood-level indicators of health determinants and

Table 1. Socio-demographic and socioeconomic characteristics of Montreal Neighbourhood Networks and Healthy Aging (MoNNET-HA) study participants across three waves of data collection, 2008–13

Variables	Wave 1 (2008) n = 2707	Wave 2 (2010) n = 1400	Wave 3 (2013) n = 972
Sex			
Female	64.6%	63.7%	63.9%
Male			
Age group			
25 to 34 years old	14.6%	13.1%	10.9%
35 to 44 years old	17.6%	18.5%	16.9%
45 to 54 years old	20.1%	22.7%	24.4%
55 to 64 years old	16.3%	18.3%	18.7%
65 to 74 years	20.9%	19.4%	22.7%
75 years and more	10.5%	8.0%	6.4%
Income			
Less than \$28,000	20.9%	8.8%	17.3%
\$28,000-\$49,000	28.2%	29.0%	23.5%
\$50,000-\$74,000	26.9%	40.5%	21.1%
\$75,000-\$100,000	12.7%	13.5%	17.6%
More than \$100,000	11.3%	8.2%	20.4%
Education			
Less than a high school degree	11.9%	7.5%	8.0%
High school degree or trade certificate	29.2%	27.6%	28.1%
College certificate	20.7%	22.3%	19.5%
Bachelors degree and higher	38.2%	42.6%	44.4%
Marital status			
Married/common-law relationship	54.2%	57.1%	57.9%
Single	20.5%	18.6%	16.9%
Divorced/separated	14.9%	15.0%	15.8%
Widowed	10.4%	9.3%	9.4%
Household language			
French (bilingual)	78.0%	82.9%	84.4%
English	13.6%	11.1%	11.5%
Other	8.4%	6.0%	4.1%
Foreign-born Status			
Residential duration (avg. yrs)	14.1	14.1	18.4
(> 5 years)	68.0%	70.1%	85.1%

outcomes available through the PopHR, and used in other studies to assess the influence of the social environment on the health of Montreal residents in the context of a range of influences, such as nutrition and the built environment.

What has it found?

To date, research has relied on the initial MoNNET-HA baseline data to examine the association between social capital and a range of health behaviours and conditions, including physical inactivity,^{14–16} self-reported health,^{7,16} depressive symptoms,^{17,18} restless sleep,¹⁹ obesity,¹⁵ and hypertension.¹⁶ These cross-sectional studies suggest the following insights into the relationship between social capital and health, and have allowed us to address our original aims in the following manner.

First, with regard to the study's initial aim, our research has shown network measures of social capital to have independent and different associations with health behaviours and conditions compared with those using proxy measures. For example, in a study of physical inactivity, our research showed that adults with higher network diversity and social participation were less likely to be physically inactive, whereas generalized trust, a common proxy for social capital, was not associated with physical inactivity.¹⁴ In another study, adults with high generalized trust and perceived social cohesion were less likely to report depressive symptoms, whereas network capital was not associated with depressive symptoms.¹⁷ These findings along with others suggest that network measures of social capital compared with proxy ones may be capturing different aspects of a person's social connectivity and environment,

Box 1. Listing of individual- and neighbourhood-level measures available for the MoNNET-HA cohort

Social networks and social capital

Network capital (Position generator)

Network diversity
 Network range
 Network reach
 Overall network capital
 Neighbourhood network diversity
 Neighbourhood network range
 Neighbourhood network reach
 Overall neighbourhood network capital
 Type of network access (kin, friend acquaintance)

Core network information 'Discussant network'

(Name generator)

Core network size (0-3)
 Social isolation

Core network composition (Name interpreter)

Sex
 Type of relationship (kin, friend acquaintance)
 Relationship heterogeneity
 Age
 Educational level
 Area of residence (household, neighbourhood,
 Montreal district, outside Montreal)
 Exercise behaviour
 Smoking behaviour
 Occupation
 Core network density
 Neighbourhood network density

Social participation

Neighbourhood social participation
 General social participation

Perceived social cohesion

Perceived neighbourhood reciprocity
 Perceived neighbourhood instrumental support
 Perceived neighbourhood expressive support
 Perceived informal social control
 Generalized trust
 Neighbourhood trust

Psychosocial and psychological resources

Sense of control (Mirowsky and Ross, 4-item locus
 of control scale; 8-item available in 2013)
 Behavioural activation system
 Perceived sociability

Socio-demographic and socioeconomic characteristics

Age
 Sex
 Educational level
 Income category
 Employment status
 Occupation
 Country of birth
 Household language
 Marital status
 Number of children

Health behaviours and conditions

Chronic conditions (diabetes, hypertension, arthritis,
 cardiac problems, osteoporosis, high cholesterol)
 Functional limitations
 Self-reported height and weight
 Smoking status
 Alcohol consumption
 Binge drinking
 Heavy drinker status
 Physical activity (International Physical Activity
 Questionnaire-IPAQ)
 Walking behaviour
 Physical inactivity
 Diet (Food Frequency Questionnaire available in
 2013)
 Depressive symptoms (Center for Epidemiological
 Studies – 10 item scale)
 Restless sleep (CESD item)

Environmental and geospatial information

Postal code address (6-digit census tract and 3-digit
 forward sortation area)
 Neighbourhood social capital (Ecometric
 estimations)
 Neighbourhood network capital
 Neighbourhood network diversity
 Intra-neighbourhood network density
 Extra-neighbourhood ties
 Neighbourhood social cohesion
 Neighbourhood informal social control
 Neighbourhood trust
 Neighbourhood participation

Neighbourhood socio-demographic and economic characteristics

Selected built environment measures (PopHR)
 Access to food stores
 Local food purchasing by category
 Neighbourhood walkability index
 Access to parks and green space

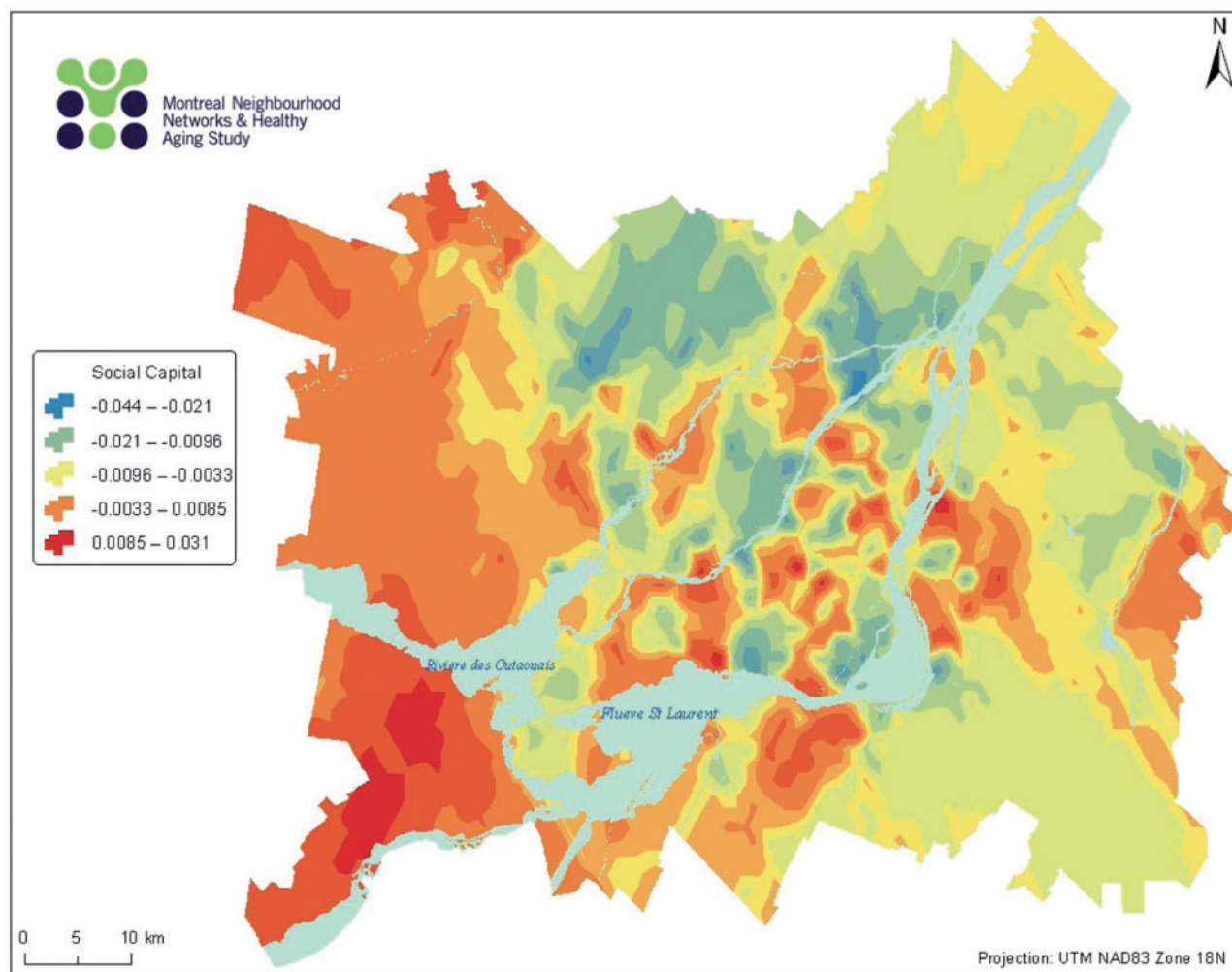


Figure 3. Spatial distribution of neighbourhood-level social capital by quintile across the MMA.

thereby leading to different associations with health behaviours and outcomes. This suggests the added value in using formal methods of assessing social networks and measuring social capital, particularly in relation to the study of specific types of health outcomes.

Second, in terms of whether there may be differential relationships between social capital and health by age, our initial research has suggested that the answer to this question may depend on the outcome being studied. For example, in a study on social capital inequalities in health, our research showed that age was a more important determinant in explaining inequalities in hypertension than other outcomes. In another study of obesity among older adults, our research suggested a complex interplay between the exercise habits of a person's social network members and the places where they live.¹⁵ However, in addition to potential differences by age, our research has also suggested that the patterns by which social capital is associated with health may also differ by sex.¹⁸ For example, in a study examining social capital and restless sleep, our research has suggested that network

capital may be more influential on men's sleep whereas trust may be more important for women.¹⁹

Finally, with regard to assessing longitudinal relationships between social capital and health, the three waves of cohort data will allow us to assess changes in social capital and health over a 5-year period. Although we anticipate relative stability in the size and composition of adult social networks over a 5-year period, certain groups (e.g. older adults) may experience greater change in their networks within the period, with health implications. Further research will allow us to assess these questions, and address the third aim of the MoNNET-HA study.

What are the main strengths and weaknesses?

There are several strengths to the MoNNET-HA study. First, the study has rich data available on the social networks and social capital of Montreal adults. These data provide insights into the composition and structure of adult

social networks both inside and outside neighbourhood settings. Moreover, these data are available over three time points, making it a unique and rich resource for examining the influence of social networks on health. Second, the initial sample was drawn using probability sampling, providing a representative profile of the social connections of Montreal residents. Furthermore, whereas the composition has changed over the different waves, the initial oversampling of older adults has allowed the cohort to retain a sufficient number of older adults to contrast findings by age group. Third, the cohort covers the entire MMA, with different types of neighbourhood environments and urban forms represented in the study. Using econometric methods,²⁰ this has allowed the estimation of neighbourhood-level measures of the social environment. For example, Figure 3 illustrates the spatial distribution of neighbourhood-level social capital scores by quintile (with highest quintile in red) across the MMA. Such estimates can be overlaid onto other studies, using geographic information systems (GIS) to assess the relative importance of social compared with built or nutritional environments, for health.

There are several weaknesses about the MoNNET-HA cohort worth noting. First, the MoNNET-HA had an initial response rate of 38.7%. The initial response rate of 38.7% may be considered low, although direct comparability between survey response rates is difficult given differences in the way in which researchers may define eligibility.²¹ Second, MoNNET-HA was not originally designed as a continuing cohort. As such, operating funds were not available to recruit participants on a long-term basis. This may have resulted in greater levels of attrition than those found in other cohort studies, particularly those planned as cohorts at the time of initial recruitment. Nevertheless, the MoNNET-HA study has been able to retain a core group of participants as represented through the collection of a third data wave and the recruitment of 645 MoNNET-HA study members into a continuing cohort. To address differential response and attrition rates, statistical analyses adjust for those socio-demographic characteristics that may be over- or under-represented in the sample when compared with MMA census data. Finally, to date, most of the data are self-reported. This weakness will be addressed through the linkage of the MoNNET-HA study information to RAMQ health registry data for a subsample of participants and seeking additional funding to measure directly the anthropometric profile and metabolic health of MoNNET-HA cohort participants.

Can I get hold of the data?

Based on the geospatial nature of the data and agreements with study participants, external researchers should

request access to data via collaborations with the study group. Enquiries by interested parties are welcome and will be reviewed with interest. Please direct initial enquiries to the corresponding author.

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