J Public Health (Oxf). Author manuscript; available in PMC 2016 December 19.

Published in final edited form as:

J Public Health (Oxf). 2009 March ; 31(1): 175–183. doi:10.1093/pubmed/fdn104.

Association of individual network social capital with abdominal adiposity, overweight and obesity

Spencer Moore[1,2] **[Assistant Professor]**, **Mark Daniel**[2,3,4] **[Professor of Epidemiology]**, **Catherine Paquet**[3] **[Research Fellow]**, **Laurette Dubé**[5] **[Professor]**, and **Lise Gauvin**[2,4,6] **[Professor]**

[1]School of Kinesiology and Health Studies, Queen's University, 69 Union Street, PEC 215, Kingston, Ontario, Canada

[2]Centre de recherche du Centre Hospitalier de l'Université de Montréal, Montréal, Canada

[3]School of Health Sciences, University of South Australia, Adelaide, South Australia, Australia

[4]Département de médecine sociale et preventive, Université de Montréal, Montréal, Canada

[5]Desautels Faculty of Management, McGill University, Montréal, Quebec, Canada

[6]Centre de recherche Léa-Roback sur les inégalités sociales de santé de Montréal, Universite de Montréal, Montréal, Quebec, Canada

Abstract

Background—Limited research has examined the association of individual trust, participation and social capital with obesity using objective measures of waist circumference (WC), body mass index (BMI) and network measures of social capital.

Methods—Data were obtained from a representative sample of Montreal residents. Participants completed questionnaires that included a position generator for collecting network social capital data. Measures of WC, height and weight were collected by registered nurses. To estimate associations with cardiometabolic risk, data on WC for individuals with BMI between 18.5 and 34.9 were extracted for analysis (n = 291). Using a proportional odds model with clustered robust standard errors, we evaluated the association of three different measures of individual social capital with elevated and substantially elevated WC and overweight and obesity categories of BMI. These measures were then evaluated in their associations with elevated WC and BMI, adjusting for socio-demographic and behavioral covariates.

Results—Network social capital was inversely associated with the likelihood of being in an elevated WC risk category (odds ratio (OR) = 0.81, 95% confidence intervals (CI: 0.69, 0.96) and higher BMI category (OR = 0.81, 95% CI: 0.71, 0.92).

Conclusion—Higher individual network social capital is associated with a lower likelihood of elevated WC risk and overweight and obesity.

Address correspondence to Dr Spencer Moore, mooresp@queensu.ca.

Keywords

obesity; social determinants; socioeconomics factors

Introduction

Bourdieu described social capital as one form of capital among three other forms: economic, human and cultural.[1] Unlike other forms, which are properties of individuals, social capital is relational and refers to the material, informational and affective resources to which individuals and *potentially*, groups, have access through social connections. A social capital measure should contain two key elements: (1) networks and (2) resources. Health sciences research has not generally featured measures of social capital that capture these two elements. Such research has instead relied more heavily on proxy measures of social capital that capture trust or participation. In this study, we reserve the term social capital for 'network-accessed resources.' We contrast social capital operationalized as network-accessed resources against proxy indicators of social capital in the association of these different measures with waist circumference (WC) and body mass index (BMI) as risk factors for obesity-related health outcomes.

Research on social capital and health distinguishes area-from individual-level social capital. Area-level social capital generally refers to levels of trust or participation characterizing spatially delimited areas, e.g. neighborhoods. Individual social capital refers to people and resources that individuals can access through their networks. In an ecological study of area-level social capital and obesity, Holtgrave and Crosby suggested that social capital may act as a protective factor against obesity.[2] Evidence of an association of area-level social capital with obesity has been less convincing in multilevel studies adjusting for individual factors. Kim *et al.* found a state-level association of social capital and obesity but no county-level association.[3] Research on trust, participation and obesity has shown higher individual trust to be associated with lower likelihoods of obesity.[4 – 6] In another study, participation was associated with a lower likelihood of having BMI greater than 27 kg/m^2.[6]

Little research has examined the various mechanisms by which social capital may influence obesity. The broader research on social capital and health has dealt with the potential material and psychosocial benefits that accrue to people living in socially cohesive and highly efficacious locales. Potential mechanisms include more rapid diffusion of information among residents in cohesive areas, greater access to services due to a greater number and diversity of ties, greater sense of security and belonging, and greater availability of affective support.[7] Research on social networks and obesity suggests that obesity spreads through networks, possibly by influencing the norms or behaviors that govern individual food consumption.[8]

Lacking in most earlier operational measures of social capital in the health sciences is the hierarchical dimension, i.e., the differential access to resources. Our measure of social capital, however, uses formal network data on ties and resource accessibility. Moreover, we evaluate and contrast network social capital against trust and participation in their associations with two objective measures of overweight and obesity. First, we use WC as a

measure of abdominal adiposity to differentiate persons within BMI range of 18.5–34.9 kg/m^2. Persons with elevated WC levels are at higher risk for unfavorable cardiometabolic outcomes and excess morbidity due to abdominal adiposity.[9 – 11] Second, we classify people as overweight or obese based on BMI as calculated from measured height and weight.

The current study follows calls for greater use of network measures in health sciences research,[12,13] and evaluates whether such measures have utility in relation to objective measures of cardiometabolic risk. Supported by emerging evidence that high social capital is protective against obesity, we hypothesized that higher individual social capital would be associated with having WC and BMI below at-risk levels. We also hypothesized that a network measure would have greater content validity than proxy measures in representing social connectivity and resource access, and would be most strongly associated with overweight and obesity.

Methods

Sample and procedures

Data were drawn from the Montreal Neighborhood Survey of Lifestyle and Health (MNSLH). The MNSLH was designed to integrate individual behavioral, psychosocial, anthropometric and biochemical markers of health into a geographic information system (GIS).[14] The MNSLH used a stratified cluster sampling design with clusters consisting of Montreal island census tracts (CTs) (n = 521); these clusters were stratified into tertiles representing high, medium and low socio-economic status (SES) using 2001 Canada census data. From each SES tertile one high-proportion French-speaking CT and one high-proportion English-speaking CT were randomly selected. Predominantly French- and English-speaking CTs were matched on socio-demographic variables. Six CTs were selected from this stratified cluster design; one additional medium-SES French-speaking tract was later added to augment sample size.

The individual-level sample was restricted to persons 18 to 55 years old. To facilitate recruitment of Montreal residents within sampled CTs, the MNSLH protocol allowed participants to complete questionnaires by telephone, Internet or mail-outs, with in-home collection of anthropometric and biochemical data by registered nurses. Options for mode of completion were meant to reduce the overall respondent burden often associated with population-based surveys and in-home nurse visits. Of 374 individuals contacted for a home visit, a total of 332 (89%) participated in the social capital module with anthropometric data. The study protocol received ethics approval from the Centre de Recherche du Centre Hospitalier de l’Université de Montréal and McGill University.

Measures

Dependent variables

WC/BMI: WC, height and weight were measured by registered nurses. World Health Organization (WHO) criteria for sex-specific WC cut-offs associated with elevated and substantially elevated risk due to excess abdominal fat were used to classify respondents as being at (1) no, (2) elevated, or (3) substantially elevated levels of risk.[15] Men and women

were categorized as being at elevated risk: (WC_m: 94.0–101.9 cm; WC_f: 80.0–87.9 cm, respectively) and substantially elevated risk (WC_m: ≥102.0 cm; WC_f: ≥88.0 cm, respectively). WC cut-offs are valid for persons with BMI ranging from 18.5–34.9 kg/m^2. For BMIs ≥ 35.0 kg/m^2, WC measures do not provide additional information on cardiometabolic risk.[9] For BMI overweight and obesity cut-offs, standard guidelines for categorizing BMI were followed wherein normal is defined as 18.5–24.9 kg/m^2, overweight as 25.0–29.9 kg/m^2 and obesity as greater than 30.0 kg/m^2.[9]

Independent variables

Social capital

1. *Network social capital.* A position generator was used to measure social capital. Position generators measure an individual's social capital by assessing respondents' ties to persons in specific occupations.[16] The instrument contained a list of 16 occupations with Canada-specific prestige scores.[17] The listing included occupations of high and low prestige. Respondents indicated if they knew someone on a first name basis in each listed occupation. Prestige scores enabled calculation of the value of resources potentially accessible to each respondent. We calculated three indices of social capital: (1) upper reachability, (2) diversity and (3) range. Upper reachability represents the highest prestige occupation accessed; diversity is the number of different occupations accessed; and, range is the difference between the highest and lowest occupation accessed. The three separate indices were correlated: the highest correlation was between range and diversity ($r = 0.76$, $p < 0.001$), followed by range and upper reachability ($r = 0.75$, $p < 0.001$) and upper reachability and diversity ($r = 0.59$, $p < 0.001$). Given the objective to have a multidimensional measure of social capital and high correlation present among the indices, we created a linear component score using the optimally weighted sum of the three, with the weights derived from a principal components analysis in SAS. In that score, the range index had an optimal weight of 0.56; upper reachability and diversity each had a weight of 0.22.

2. *Trust.* To measure trust we asked: 'Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?' Following previous research, respondents were classified as having high trust if they answered 'most people can be trusted' and low trust if they responded otherwise.[5,18]

3. *Participation.* The MNSLH asked respondents to identify if they were active in nine types of voluntary or community service groups. Respondents also had the option of identifying another type of association that might have not been on the list. For each respondent, we summed the number of associations in which they were active. Respondents were then grouped into those who reported: (1) no association involvement (low participation), (2) being active in one (medium participation) and (3) being active in more than one (high participation).

Covariates

Socio-demographic: Socio-demographic covariates included educational attainment, income level, age, gender, primary household language, marital or common-law relationship status and foreign-born status. Educational attainment was classified into three levels: (1) less than high school, (2) high school or equivalent and (3) more than high school, which included earning a trade certificate on to a doctorate (upper education referent). Income was also classified into three levels: (1) less than $35 000 per year, (2) $35 000–$149 999 per year and (3) more than $150 000 per year. In cases where respondents did not provide income information ($n = 24$), we imputed using a GIS[14], the respondent's income from census data on the average income of households within a 250-meter radius around their residence. Of those observations with imputed income data, 75% fell into the medium income level and the remaining 25% fell into the highest level. Age was treated as a continuous variable. Primary household language was classified into French, English or other. Respondents indicated if they were in a marital or common-law relationship, or not. Foreign-born status was based on whether respondents reported being born inside or outside of Canada.

Behavioral: Behavioral covariates included physical activity, fruit and vegetable consumption, heavy alcohol consumption and smoking status. Physical activity was measured using an adapted version of the International Physical Activity Questionnaire (IPAQ). Respondents provided information on the number of days per week that they: (1) walked at least 10 minutes at a time and (2) performed at least one vigorous activity for at least 10 minutes during leisure time. We calculated a metabolic equivalent (MET) level in walking and vigorous activities for each respondent and used the values to assign a score of low, moderate or high physical activity to each respondent based on the IPAQ cut-off values. Fruit and vegetable consumption was assessed using a modified version of the US Behavioral Risk Factor Surveillance System (BRFSS) questionnaire. Respondents were provided response options of: (1) none, (2) 1 day, (3) 2–3 days, (4) most days and (5) every day, and asked to choose which best represented their consumption of eight different sets of fruits and vegetables over the past seven days. In addition to the six BRFSS questions, the MNLSH included questions about frozen fruit and vegetable consumption. A total fruit and vegetable consumption score was from the sum of responses to the eight questions. The fruit and vegetable consumption score was split into tertiles with each individual assigned to a low, medium or high level of fruit and vegetable consumption. Heavy alcohol consumption was coded as drinking an average of three or more drinks per day or not. This value conforms to Canadian guidelines recommending no more than two drinks per day for men and women.[19] Smoking status was dichotomous and coded according to self-reported current smoking.

Statistical analyses: For the 332 participants providing social capital and biological data, some observations were dropped due to missing data on study covariates ($n = 17$). To examine elevated risk associated with WC levels, observations were excluded on the basis of BMI < 18.5 kg/m^2 ($n = 12$) and ≥34.9 kg/m^2 ($n = 12$).[9] To maintain the same sample for WC and BMI analyses, the BMI analysis was also restricted to persons below 35.0 BMI. (In ancillary analyses, we tested if the inclusion of the 12 observations above 35.0 BMI altered

the significance of our findings on the BMI-social capital association; they did not.) Hence complete data for 291 respondents were analyzed.

The proportional odds, or ordinal logistic, model was used to assess associations between social capital and elevated WC and BMI. The proportional odds model can be interpreted in terms of odds ratios (ORs) for cumulative probabilities. The proportional odds assumption states that the OR is the same for both levels of elevated risk.[20] An approximate likelihood-ratio test of proportionality of odds across response categories indicated non-violation of this assumption for the levels of WC and BMI. The odds of moving from low risk to the higher risk categories of elevated and substantially elevated risk are no different from moving from low and elevated risk categories to substantially elevated risk. The social capital measure was standardized. CTs were specified as fixed effects.[21] We report ORs and 95% confidence intervals (CIs) calculated using clustered robust standard errors (CRSEs) to account for inter-correlations among individuals within the same CTs.

Three series of analyses were conducted. First, we examined the correlation among social capital, trust and participation. Second, we assessed the association of social capital, trust and participation with levels of WC and BMI separately, followed by analyses adjusting for socio-demographic and behavioral covariates. Third, in ancillary analyses, we examined the association of the three dimensions of network social capital (upper reachability, range and diversity) with WC and BMI separately. Analyses were performed with STATA, version 10.

Results

Tables 1 and 2 provide descriptive information on the study sample, covariates and the occupations listed in the position generator. The BMI cut-offs classified proportionately more men into the higher risk categories, specifically overweight, than did WC cut-offs. Correlations between network social capital and low and high participation ($r = -0.19$, $p < 0.01$; and $r = 0.16$, $p < 0.05$, respectively) and high trust ($r = 0.15$, $p < 0.05$) were statistically significant. Trust and participation were not correlated with each other.

Tables 3 and 4 provide results from analyses of the association between social capital and the higher risk levels of WC and BMI. In full models (Model 3), social capital was associated with low risk WC (OR = 0.81, 95% CI: 0.69, 0.96) and normal BMI (OR = 0.81, 95% CI: 0.71, 0.92). ORs for network social capital were similar in both analyses. Certain study covariates differed between analyses in their associations with WC and BMI.[9 – 11,22,23]

Ancillary analyses assessed the sensitivity of the three separate dimensions of network social capital. First, based on tertiles, we rescaled upper reachability and diversity into 3-level categorical variables given negative and positive skewness, respectively. Range was kept on a continuous scale. In full models, persons with the greatest level of upper reachability were less likely to have higher risk WC or BMI compared with those with the lowest reachability ($OR_{WC} = 0.36$; 95% CI: 0.14, 0.91; $OR_{BMI} = 0.39$; 95%CI: 0.16, 0.99); persons with the greatest variety of ties were less likely to have higher risk WC than those with the least variety ($OR_{WC} = 0.63$; 95%CI: 0.42, 0.93). Range was inversely associated with at-risk WC

and BMI (OR_{WC} = 0.98; 95%CI: 0.97, 0.99; OR_{BMI} = 0.98, 95%CI: 0.97, 0.98). Ancillary test results are available on request.

Discussion

Main finding of this study

Individuals with higher levels of network social capital were less likely to have elevated or substantially elevated WC and be overweight or obese than those with lower levels of social capital. Although other studies have reported that individual trust is inversely associated with obesity measured by BMI,[5] these data do not support such findings. Network social capital alone was significant in relation to lower risk associated with physical measures of WC and BMI. Regardless of the places in which individuals reside, those with more diverse ties and greater access to resources tended to have a lower risk of excess adiposity and overweight and obesity.

What is already known on this topic

To date, research on social connectivity, i.e., social networks and social capital, and obesity has fallen into two areas: (1) studies that have used formal network data to study how social network influences, e.g., peer groups, affect the spread of obesity in a network and (2) studies that have used proxy indicators of spatially circumscribed social connectivity to study the association of individual- and area-level social capital with obesity. Regarding the first area, Christakis and Fowler (2007) suggested that social network effects are more influential than geographical proximity factors in influencing the spread of obesity in a network.[8] Lacking, however, in their network study were measures of resources accessible to network members through those connections. Regarding the second area, findings suggest that proxy measures of social capital, particularly at the individual level, may be associated with BMI but it is unclear how such proxy indicators might relate to structural indicators of neighborhood social connectivity. Furthermore, little is known about how proxy indicators perform compared with structural measures when examined against physical measures of regional adiposity and BMI.

What this study adds

As far as we are aware, this is the first study to report an association between three different measures of individual social capital, including a formal network measure and anthropometric measures of WC and BMI. There is considerable debate about how best to measure social capital.[24] Measures of trust and participation may potentially capture important dimensions of social integration. Yet, this study showed that network measures of social capital, which capture networks and resources, have strong and consistent associations with obesity. Although more studies need to be conducted across a variety of settings, populations and outcomes, we suggest that it is the hierarchical, resource accessibility dimension of the network social capital measure that contributes to its strength. Measures of participation provide information on the extent of an individual's civic and political involvement but not the value of resources accessible through that involvement; measures of generalized trust may indicate a person's psychosocial integration in society but again do not

assess formally a person's degree of connectivity or resource accessibility. A second novel aspect of the study is the use of objective, instead of self-reported, assessments of weight and height by which BMI was calculated. Reporting biases and the equivocal validity of many self-report measures of height and weight suggest that associations between self-reports of height and weight and social ties may be more prone to bias, particularly a type of same-source bias, than our results using objective measures of social connections and weight, height and circumference. Last, we suggest that the current study adds greater theoretical specificity in the use of terms such as social capital and social cohesion and applies measures that are congruent with those theoretical specifications.

Limitations of the study

These results should be considered in light of several limitations. First, the study is cross-sectional. We emphasize the upstream role of social capital but it is also conceivable to think that a person's adiposity and weight may influence their social connections. We thus highlight the *associational* character of this relationship and refrain from drawing *causal* inferences. Second, current research on linking, bridging and bonding social capital and health highlights the importance of more valid and reliable measures. Although such measures are not often based on formal network data, they may perform better than trust or participation when compared with network social capital. Unfortunately, the data do not allow for a test of this possibility. In addition, given the limited sample size, there may have been insufficient statistical power to detect associations between trust, participation and WC/BMI, and we would caution against any final conclusions to be drawn on the importance of social trust and participation for understanding overweight and obesity. Finally, although we accounted for the clustering of observations, the limited number of CTs included in the MNSLH prohibited use of multilevel methods to examine associations between area-level social capital and WC or BMI.

Acknowledgments

At the time of this research, S.M. held postdoctoral fellowships from the *Fonds de la Recherche en Santé du Québec* (FRSQ) and the Strategic Training Program in Public and Population Health research of Québec, a partnership of the Institute of Population and Public Health and the Institute of Health Services and Policy Research of the Canadian Institutes of Health Research (CIHR) and the Québec Population Health Research Network. M.D. was supported through a Canada Research Chair (Population Health) awarded by the Canadian Institutes of Health Research. C.P. held a FRSQ postdoctoral fellowship. L.D. holds a James McGill Chair in Consumer and Lifestyle Psychology and Marketing. L.G. holds a CIHR Centre de Recherche en Prevention de l'Obésité Applied Public Health Chair in Neighborhoods, Lifestyle, and Healthy Body Weight.

Funding

Data collection was supported by a team grant from the FRSQ (grant # 8394, L.D.), the Canada Research Chairs program (M.D.), Canada Foundation for Innovation (grant #201252, M.D.), and CIHR (grant # 200203 MOP 57805, L.G.).

References

1. Bourdieu, P. The forms of capital. In: Richardson, J., editor. Handbook for the Theory and Research for the Sociology of Education. New York: Greenwood Press; 1986. p. 241-58.
2. Holtgrave DR, Crosby R. Is social capital a protective factor against obesity and diabetes? Findings from an exploratory study. Ann Epidemiol. 2006; 16:406–408. [PubMed: 16246583]

3. Kim D, Subramanian SV, Gortmaker SL, et al. US state- and county-level social capital in relation to obesity and physical inactivity: a multilevel, multivariable analysis. Soc Sci Med. 2006; 63(4): 1045–59. [PubMed: 16644081]
4. Engstrom K, Mattsson F, Jaerleborg A, et al. Contextual social capital as a risk factor for poor self-rated health: a multilevel analysis. Soc Sci Med. 2008; 66:2268–80. [PubMed: 18314238]
5. Poortinga W. Perceptions of the environment, physical activity, and obesity. Soc Sci Med. 2006; 63:2835–46. [PubMed: 16952415]
6. Veenstra G, Luginaah I, Wakefield S, et al. Who you know, where you live: social capital, neighbourhood and health. Soc Sci Med. 2005; 60:2799–2818. [PubMed: 15820588]
7. Kawachi, I., Berkman, LF. Social cohesion, social capital, and health. In: Berkman, LF., Kawachi, I., editors. Social Epidemiology. Oxford, New York: Oxford University Press; 2000. p. 174-90.
8. Christakis N, Fowler J. The spread of obesity in a large social network over 32 years. N Eng J Med. 2007; 357:370–79.
9. Health Canada. Canadian Guidelines for Body Weight Classification in Adults. Ottawa: Health Canada; 2003.
10. Janssen I, Katzmarzyk PT, Ross R. Waist circumference and not body mass index explains obesity-related health risk. Am J Clin Nutr. 2004; 79:379–84. [PubMed: 14985210]
11. Lee CMY, Huxley R, Wildman R, et al. Indices of abdominal obesity are better discriminators of cardiovascular risk factors than BMI: a meta-analysis. J Clin Epidemiol. 2008; 61:646–53. [PubMed: 18359190]
12. Moore S, Shiell A, Hawe P, et al. The privileging of communitarian ideas: citation practices and the translation of social capital into public health research. Am J Public Health. 2005; 95:1330–37. [PubMed: 16006421]
13. Kawachi I. Commentary: social capital and health: making the connections one step at a time. Int J Epidemiol. 2006; 35:989–93. [PubMed: 16870679]
14. Daniel, M., Kestens, Y. MEGAPHONE (®1046898): Montreal Epidemiological and Geographic Analysis of Population Health Outcomes and Neighbourhood Effects. Montréal: Centre de recherche du Centre hospitalier de l'Université de Montréal; 2007.
15. World Health Organization. Obesity: Preventing and Managing the Global Epidemic. Vol. 11. Geneva: World Health Organization; 2000.
16. Lin, N. Social capital: A Theory of Social Structure and Action. Cambridge: Cambridge University Press; 2001.
17. Goyder J, Guppy N, Thompson M. The allocation of male and female occupational prestige in an Ontario urban area: a quarter-century replication. Can Rev Sociol Anthropol. 2003; 40:417–40.
18. Poortinga W. Social relations or social capital? individual and community health effects of bonding social capital. Soc Sci Med. 2006; 63:255–70. [PubMed: 16427171]
19. Ashley MJ, Ferrence R, Room R, et al. Moderate drinking and health: implications of recent evidence. Can Fam Physician. 1997; 43:687–94. [PubMed: 9111985]
20. Long, JS. Regression Models for Categorical and Limited Dependent Variables. Thousand Oaks: Sage Publications; 1997. p. 138-45.
21. Allison, P. Fixed Effects Regression Methods for Longitudinal Data. Cary, NC: SAS; 2005. p. 1-7.
22. Freiberg MS, Cabral HJ, Heeren TC, et al. Third national health and nutrition examination survey. Alcohol consumption and the prevalence of the metabolic syndrome in the U.S. : a cross-sectional analysis of data from the third national health and nutrition examination survey. Diabetes Care. 2004; 27:2954–59. [PubMed: 15562213]
23. Duncan BB, Chambless LE, Schmidt MI, et al. Association of the waist-to-hip ratio is different with wine than with beer or hard liquor consumption. Atherosclerosis risk in communities study investigators. Am J Epidemiol. 1995; 142:1034–8. [PubMed: 7485048]
24. Kawachi, I., Subramanian, SV., Kim, D. Social capital and health. In: Kawachi, I.Subramanian, SV., Kim, D., editors. Social Capital and Health. Boston: Springer; 2008. p. 1-26.

Table 1

Characteristics of 291 participants of the Montreal neighborhood survey of lifestyle and health providing social capital data and having a BMI between 18.5–34.9 kg/m^2

Variables	n = 291	Mean (Standard deviation)%
Social capital		
Network social capital (factor score)	291	0.01 (0.93)
Social trust *(n = 291)*		
Low social trust	222	76.3
High social trust	69	23.7
Participation		
Low participation	183	62.9
Medium participation	68	23.4
High participation	40	13.8
Education		
Lower educated (less than high school)	19	6.5
Middle educated (high school or equivalent)	49	16.8
Upper educated (more than high school)	223	76.6
Income		
Low income (<$35 000/year)	142	48.8
Middle income ($35 000–$149 999/year)	127	43.6
Upper income (>$150 000/year)	22	7.6
Primary household language		
French	211	72.5
English	37	12.7
Other	43	14.8
Age	291	36.1 (8.9)
Married	139	47.8
Male	148	51.0
Canadian born	190	65.3
Physical activity		
Low	112	38.5
Medium	97	33.3
High	82	28.2
Fruit and vegetable consumption		
Low	85	29.2
Medium	103	35.4
High	103	35.4
Smoker	108	37.1
Heavy alcohol consumption	15	5.2
Waist circumference risk levels		
Female		
Low risk (<94 cm)	97	67.8

Variables	n = 291	Mean (Standard deviation)%
Medium risk (94–102 cm)	27	18.9
High risk (>102 cm)	19	13.3
Male		
Low risk (<94 cm)	116	78.4
Medium risk (94–102 cm)	19	12.8
High risk (>102 cm)	13	8.8
Body mass index levels		
Normal weight (18.5–24.9 kg/m^2)	97	67.8
Overweight (24.9–29.9 kg/m^2)	30	21.0
Obese (30.0–34.9 kg/m^2)	16	11.2
Male		
Normal weight (18.5–24.9 kg/m^2)	84	56.8
Overweight (24.9–29.9 kg/m^2)	54	36.5
Obese (30.0–34.9 kg/m^2)	10	6.8

Table 2

Distribution of responses to the position generator instrument measuring individual social capital ($n = 291$)

Occupation	Occupational Prestige Score (Goyder et al., 2003)	Total (standard deviation) (%)
High school teacher	68.4	49.5 (0.50)
Carpenter	52.4	25.1 (0.43)
Owner of retail store	60.8	30.6 (0.46)
Taxi driver	34.6	10.0 (0.30)
Physician	92.7	45.4 (0.50)
Janitor	33.6	20.6 (0.41)
Funeral director	58.8	5.5 (0.23)
Registered nurse	77.0	52.9 (0.50)
Sewing machine operator	35.9	14.4 (0.35)
Retail sales associate	39.1	19.9 (0.40)
Insurance agent	48.8	29.6 (0.46)
Welder	55.2	14.1 (0.35)
Lawyer	74.4	40.2 (0.49)
Accountant	66.6	48.5 (0.50)
Trailer truck driver	42.0	15.8 (0.37)
Receptionist	40.4	32.3 (0.47)

Table 3

Results from ordinal logistic regression of WC risk level on individual social capital, socio-demographic and behavioral covariates among 291 participants of the MNSLH survey[†]

	Model 1 (n = 291) OR (95% CI)	Model 2 (n = 291) OR (95% CI)	Model 3 (n = 291) OR (95% CI)
Individual social capital	0.76 ** (0.61–0.94)	0.79 ** (0.65–0.96)	0.81 ** (0.69–0.96)
High social trust (low referent)	1.13 (0.87–1.47)	1.32 (0.90–1.92)	1.24 (0.84–1.84)
Social participation		–	–
Low social participation	1.06 (0.29–3.85)	1.15 (0.28–4.79)	1.11 (0.33–3.77)
Medium social participation	0.73 (0.25–2.14)	0.81 (0.26–2.58)	0.78 (0.25–2.42)
High social participation (referent)	1.00	1.00	1.00
Educational attainment			
Less than high school	–	1.24 (0.67–2.31)	1.51 (0.64–3.58)
High school or equivalent	–	1.00 (0.48–2.08)	1.05 (0.59–1.85)
More than high school (referent)	–	1.00	1.00
Income category			
Less than $20 000/year	–	1.17 (0.26–5.30)	1.05 (0.32–3.42)
Between $20 000 – $50 000/year	–	0.92 (0.30–2.85)	0.84 (0.37–1.88)
More than $50 000/year (referent)	–	1.00	1.00
Primary household language			
English	–	1.02 (0.45–2.33)	0.76 (0.39–1.48)
Other	–	0.97 (0.51–1.83)	0.94 (0.40–2.20)
French (referent)	–	1.00	1.00
Marital status			
Married	–	1.05 (0.69–1.83)	1.18 (0.76–1.81)
Non-married (referent)		1.00	1.00
Gender			
Male	–	0.48 **** (0.33–0.71)	0.55 ** (0.34–0.88)
Female (referent)		1.00	1.00
Age	–	1.04 **** (1.02–1.07)	1.04 *** (1.01–1.07)
Foreign born status			
Canadian born	–	0.99 (0.54–1.81)	1.22 (0.58–2.56)
Non-Canadian born (referent)		1.00	1.00
Physical activity level			
Low physical activity	–	–	2.52 *** (1.31–4.86)
Medium physical activity	–	–	1.15 (0.74–1.80)
High physical activity (referent)	–	–	1.00
Fruit and vegetable consumption	–	–	
Low fruit and vegetable consumption	–	–	0.90 (0.47–1.73)
Medium fruit and vegetable consumption	–	–	0.41 ** (0.19–0.90)
High fruit and vegetable consumption (referent)	–	–	1.00

	Model 1 (n = 291) OR (95% CI)	**Model 2 (n = 291) OR (95% CI)**	**Model 3 (n = 291) OR (95% CI)**
Current smoking status			
Current smoker	–	–	0.75 (0.46–1.23)
Current non-smoker			1.00
Heavy Alcohol consumption			
Heavy alcohol consumer (average > 3drinks per day)			0.24*** (0.09–0.64)
Non-heavy alcohol consumer			1.00
/Threshold 1	1.41 (0.50–2.31)	2.90 (1.35–4.45)	2.90 (1.78–4.02)
/Threshold 2	2.54 (1.35–3.72)	4.08 (2.25–5.91)	4.14 (2.77–5.51)

† Adjusted but unreported census-tract fixed effects

* p < 0.10,

** p < 0.05,

*** p < 0.01,

**** p < 0.001

Table 4

Results from ordinal logistic regression of BMI weight categories on individual social capital, socio-demographic and behavioral covariates among 291 participants of the MNSLH survey[†]

	Model 1 (n = 291) OR (95% CI)	Model 2 (n = 291) OR (95% CI)	Model 3 (n = 291) OR (95% CI)
Individual social capital	0.82 * (0.67–1.00)	0.79 *** (0.69–0.90)	0.81 *** (0.71–0.92)
High social trust (low referent)	1.28 (0.71–2.32)	1.13 (0.71–1.81)	1.05 (0.62–1.77)
Social Participation			
Low social participation	0.96 (0.42–2.21)	1.06 (0.42–2.63)	1.00 (0.44–2.27)
Medium social participation	1.15 (0.43–3.13)	1.24 (0.43–3.57)	1.14 (0.35–3.71)
High social participation (referent)	1.00	1.00	1.00
Educational Attainment			
Less than high school	–	0.73 **** (0.61–0.89)	0.79 (0.62–1.00)
High school or equivalent	–	0.89 (0.52–1.52)	0.82 (0.42–1.61)
More than high school (referent)	–	1.00	1.00
Income Category			
Less than $20 000/year	–	1.08 (0.21–5.62)	0.93 (0.21–4.17)
Between $20 000–$50 000/year	–	0.76 (0.19–3.03)	0.70 (0.22–2.26)
More than $50 000/year (referent)	–	1.00	1.00
Primary household language			
English	–	1.18 (0.69–2.00)	0.99 (053–1.87)
Other	–	1.21 (0.62–2.38)	1.15 (0.66–1.99)
French (referent)	–	1.00	1.00
Marital status			
Married	–	1.14 (0.84–1.54)	1.24 (0.91–1.71)
Non-married (referent)		1.00	1.00
Gender			
Male	–	1.21 (0.61–2.38)	1.39 (0.74–2.60)
Female (referent)		1.00	1.00
Age	–	1.05 **** (1.02–1.08)	1.05 **** (1.02–1.09)
Foreign born status			
Canadian born	–	1.38 (0.66–2.84)	1.52 (0.75–3.10)
Non-Canadian born (referent)		1.00	1.00
Physical activity level			
Low physical activity	–	–	1.53 (0.98–2.41)
Medium physical activity	–	–	1.20 (0.82–1.74)
High physical activity (referent)	–	–	1.00
Fruit and vegetable consumption	–	–	
Low fruit and vegetable consumption	–	–	0.90 (054–1.49))
Medium fruit and vegetable consumption	–	–	0.52 (0.25–1.10)
High fruit and vegetable consumption (referent)	–	–	1.00

	Model 1 (n = 291) OR (95% CI)	**Model 2 (n = 291) OR (95% CI)**	**Model 3 (n = 291) OR (95% CI)**
Current smoking status			
Current smoker	–	–	1.15 (0.81–1.64)
Current non-smoker			1.00
Heavy alcohol consumption			
Heavy alcohol consumer (average > 3drinks per day)		–	0.18 *** (0.05–0.57)
Non-heavy alcohol consumer			1.00
/Threshold 1	0.69 (0.14–1.24)	3.03 (1.31–4.74)	2.98 (1.38–4.57)
/Threshold 2	2.56 (1.78–3.34)	4.96 (2.86–7.07)	4.97 (3.08–6.86)

† Adjusted but unreported census-tract fixed effects

* p<0.10,

** p<0.05,

*** p<0.01,

**** p<0.001