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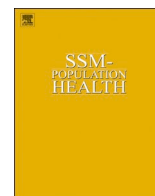
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Bonding social capital and health within four First Nations communities in Canada: A cross-sectional study

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ABSTRACT

To date, research on social capital in Indigenous contexts has been scarce. In this quantitative study, our objectives were to (1) Describe bonding social capital within four distinct First Nations communities in Canada, and (2) Explore the associations between bonding social capital and self-rated health in these communities. With community permission, cross-sectional data were drawn from the Canadian Alliance for Healthy Hearts and Minds study. Four reserve-based First Nations communities were included in the analysis, totaling 591 participants. Descriptive statistics were computed to examine levels of social capital among communities and logistic regression analyses were performed to identify social capital predictors of good self-rated health. Age, sex, education level, and community were controlled for in all models. Across the four communities in this study, areas of common social capital included frequent socialization among friends and large and interconnected family networks. Positive self-rated health was associated with civic engagement at federal or provincial levels (OR=1.65, $p<0.05$) and organizational membership (OR=1.60, $p<0.05$), but overall, sociodemographic variables were more significantly associated with self-rated health than social capital variables. Significant differences in social capital were found across the four communities and community of residence was a significant health outcomes predictor in all logistic regression models. In conclusion, this study represents one of the first efforts to quantitatively study First Nations social capital with respect to health in Canada. The results reflect significant differences in the social capital landscape across different First Nations communities and suggest the need for social capital measurement tools that may be adapted to unique Indigenous contexts. Further, the impact of social capital on health may be better explored and interpreted with more community-specific instruments and with supplementary qualitative inquiry.

1. Introduction

In recent decades, the impact of social determinants on health outcomes has become widely acknowledged and applied to health sciences research and public health practice. Within these bodies of work, the concept of *social capital* has been imported from the sociological and

politico-scientific literature (Bourdieu and Richardson, 1986; Coleman, 1990; Putnam, 2000) to explore the role that norms and networks of social cooperation play in shaping health outcomes of individuals and communities, with substantial evidence reproduced internationally to suggest that its contributions towards physical, mental, and emotional health outcomes are largely positive (Ehsan et al., 2019; Kawachi et al.,

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2014; Murayama et al., 2012). In view of this, widespread interest in social capital has developed within the realm of public health in Canada, to the extent that it has been pursued as a research and policy priority by national governmental agencies, including Health Canada and the Public Health Agency of Canada (Canada, 2006). However, despite these advances, much of the research completed to date has excluded Indigenous peoples (i.e., First Nations, Inuit, and Métis peoples), and failed to consider the unique social capital milieus of these communities within health promotion policies and programs. As Canada continues to pursue truth and reconciliation with Indigenous peoples nationwide in closing the gaps in health outcomes and supporting the development of holistic, culture and community-based health services, it is imperative that Indigenous social capital be fully acknowledged and understood as a unique concept in public health practice (Truth and Reconciliation Commission of Canada, 2015).

Foregoing specific discussion of the many conceptual debates surrounding the definitions and scope of social capital, the essence of social capital, for the purposes of health research, surrounds its identity as the “features of social organization, such as the extent of interpersonal trust between citizens, norms of reciprocity, and density of civic associations, that facilitate cooperation for mutual benefit” (Bourdieu and Richardson, 1986; Kawachi et al., 1999; Putnam, 2000). The question of what precisely should be encompassed within this definition takes on differing perspectives; in this regard, the classical works of Putnam and Coleman emphasize collective trust, reciprocity, and sanctions available to members of a group, while theorist Bourdieu, by contrast, emphasizes individual social networks and the actual or potential resources embedded within those networks (Bourdieu and Richardson, 1986; Coleman, 1988; Putnam, 2000). In efforts to bridge these distinctions and provide an all-encompassing model of social capital for health research, multiple scholars have distinguished the components of social capital into “structural” and “cognitive” categories, with structural social capital referring to “networks, relationships, and institutions that link people and groups together,” (Nyqvist et al., 2014) measured via quantification of network ties and group participation (what people do [within their social environments]), and cognitive social capital referring to “values, attitudes, trust, confidence and norms,” measured via more subjective, attitudinal measures (how people feel [about their social environments]) (Nyqvist et al., 2014). Social capital has additionally been defined according to the scale on which it manifests, frequently described as “bonding” (relations within the community), “bridging” (relations with other communities), or “linking” (relations within formal institutions). (Mignone, 2009).

To date, the only conceptual model of social capital designed specifically within Indigenous contexts in Canada has been that of scholar Javier Mignone, who developed an Indigenous social capital framework and measurement tool in partnership with three First Nations communities in Manitoba (Mignone et al., 2004, 2011). Mignone’s framework dissected social capital into three components: socially invested resources, community ethos, and social networks (Mignone et al., 2004). Each of these components were considered uniquely within the bonding, bridging, and linking social dimensions (Mignone et al., 2004). Subsequently, the authors of this research conducted a validation study for a culturally-sensitive, social capital measurement instrument based on this conceptualization of bonding social capital among 24 First Nations communities in Manitoba (Mignone et al., 2011). This measurement instrument, which contained twenty-seven Likert scale items, further broke down the components of bonding social capital into constituent qualities for measurement: “socially invested resources” was subdivided into questions aimed to determine investment in each of physical, financial, human, and natural resources, while networks were measured with respect to their inclusiveness, flexibility, and diversity. Finally, the component of “ethos”, on which this present study primarily draws, was measured according to **trust, norms of reciprocity, collective action, and participation** (Mignone et al., 2011). Beyond Mignone’s work in this realm, however, there have been very few additional efforts to

imagine or conceptualize a unique Indigenous social capital.

While Indigenous social capital is a relatively new concept to western academe, its underlying principles have, in contrast, been embedded and valued within traditional Indigenous worldviews and knowledge systems for many centuries, though they are not strictly compartmentalized or labelled with the same terms that western science espouses. As there are many Indigenous peoples, many unique Indigenous worldviews exist; however, they share in common a relational quality that is historically rooted in what McKenzie and Morrisette (2003) describe as a “symbiotic relationship to the earth and a belief in the delicate balance among all living things.” (14 p.93) (Graham, 2002) Within this philosophy is the metaphysical belief that “all things are an extension of the grand design, and as such, contain the same essence as the source from which it flows (*Gitchi-Munitow*); and this essence is understood as “spirit,” which links all things to each other and to Creation.” (14 p.259) (HartIndigenous World, 2010) The emphasis on spirit and spirituality and its connection between all life, including people, the spiritual world, and the natural world in turn produces a sense of commitment to family (“communitism”) and to the communal good, even in the context of self-expression (“respectful individualism”) (Gross, 2003; Weaver, 2001; Weaverative American, 1997). In describing the development of an Indigenous research paradigm, Cree scholar Michael Hart summarizes the focus of Indigenous worldviews to be one of “people and entities coming together to help and support one another in their relationship.” (16 p.3) This observation is particularly poignant because it parallels the essential nature of social capital that enables it to act as a *resource* for both individual and common good as conceptualized by Western theorists discussed previously. In practice, the manifestation of this world view facilitates activities such as the sharing of resources among family networks, consensual decision making, and the provision for those who are in need, manifestations which are also congruent with Western expressions of social capital (Canada, 2015). While Indigenous relational worldviews are perhaps most overtly manifest within the early social and political clan systems that were disrupted through colonial processes and historical erosion, many Indigenous peoples today continue to resonate with and adhere to the fundamental values of this worldview, thus rendering the concept of a unique, contemporary social capital of significance to explore (HartIndigenous World, 2010; Morrisette et al., 2014).

Studies on the impacts of social capital on health have largely yielded mixed results owing to diverse methodologies that have been applied, but it is generally understood that social capital may benefit both physical and mental health outcomes, as well as endorse health-promoting behaviours (Ehsan et al., 2019; Kawachi & Berkman, 2001; Kim et al., 2008, pp. 139–190). In Indigenous contexts in Canada, the few studies that have been conducted suggest that social support is associated with self-reported thriving health (Richmond & Ross, 2007), and related concepts like cultural continuity and connectedness have benefits for suicide prevention and youth resilience (Chandler & Lalonde, 2004; Ledogar & Fleming, 2008). In Indigenous contexts outside of Canada, such as those in Australia and New Zealand, some evidence has shown a significant mental health benefit and reinforcement of cultural identity through social capital, although definitive evidence on the subject continues to be sparse (Berry, 2009).

In this study, we contribute to filling this gap in the literature by exploring the unique features of Indigenous social capital and their impact on health within a strengths-based framework. Specifically, we aim to (1) Quantitatively describe the *ethos* dimension of bonding social capital (as defined by Mignone’s framework) in four unique First Nations communities in Canada, and (2) Examine the statistical associations between the elements of bonding social capital and individual self-rated health. In comparison to other dimensions of social capital (bridging and linking), bonding social capital focuses on intra-community relations, which are known to be particularly strong among Indigenous communities. To date, neither of these research objectives have been explored in the published, peer-reviewed health

sciences literature. Throughout this work, we employ a strengths-based approach that aims to recognize the unique assets embedded within Indigenous communities that contribute to fostering thriving Indigenous health and well-being.

2. Methods

2.1. Participants and procedures

Cross-sectional data were obtained from the baseline evaluation of the *Canadian Alliance for Healthy Hearts and Minds* (CAHHM) study that took place from 2013 to 2018. The CAHHM study, described in detail elsewhere (Anand et al., 2016, 2018a), is a pan-Canadian, multi-ethnic prospective cohort study that aimed to examine patterns of socio-environmental and contextual factors and their association with cardiovascular and chronic disease risk factors and outcomes. Within the CAHHM study, a First Nations cohort, consisting of 1302 individuals from eight reserve-based First Nations communities across Canada, was assembled to specifically investigate the causes of subclinical vascular disease and clinical heart disease, stroke, dementia, and cancer among these communities (Anand et al., 2018a). For the current analysis, four communities from the CAHHM First Nations cohort volunteered to take part, totaling 591 participants. Of the communities that chose not to take part, the predominant reason was lack of resources to oversee another research study. This analysis utilized data from the EPOCH-2 Contextual Factors Questionnaire, the CPTP Core Baseline Health and Lifestyle Questionnaire, and the Health Services Research Questionnaire that were completed for the CAHHM study by these four communities (Anand et al., 2018a). Ethics approval for this analysis of CAHHM data was acquired through the Queen's University Health Sciences Research Ethics Board and with each participating First Nations community.

2.2. Measurement of social capital

In the analysis, bonding social capital was conceptualized using Mignone's social capital framework in addition to classical concepts of social capital described previously. This blended approach (one which considered both Indigenous and non-Indigenous definitions of social capital) to conceptualizing social capital was utilized as the broader CAHHM study included non-Indigenous cohorts in addition to the Indigenous cohort whose data is featured in this paper. In particular, this study emphasized measurement of the *ethos* component of Mignone's framework, encompassing components of trust, norms of reciprocity, collective action, and participation, combining these indicators with network-based, structural social capital indicators. Social capital data was collected via the CAHHM Community Contextual Factors Questionnaire, which was replicated from the Environmental Profile of Community Health (EPOCH-2) instrument that has been studied and validated in five countries, including Canada (Anand et al., 2018b; Chow et al., 2010; Corsi et al., 2012). A further breakdown of the social capital measures used and the social capital construct they aim to represent is provided in Appendix 1.

Structural social capital describes the network memberships, relationships, and activities that link people and institutions together (what people *do*; *behavioural* manifestations) and was measured through the domains of **civic participation, political engagement, and social contact** (Harpham et al., 2002; Krishna & Shrader, 2000). Civic engagement was assessed by a question that asked about organizational memberships (i.e. church groups, councils, Native Women's Group, etc.). This variable was coded dichotomously (one or more memberships, compared to none). Political involvement was assessed by a dichotomous variable representing whether the participant voted in the last election, distinguishing between local (band) elections and provincial or federal elections. Social contact was measured based on frequency of contact with friends who live outside the house. Frequency of social contact via virtual and in-person means were assessed separately,

with response options being 'Never', 'Less than once per year', '1–2 times per year', 'Every few months', '1–2 times a month', '1–2 times a week', or 'Daily'. Responses were dichotomized, with the latter three options representing 'Frequent social contact', and the others 'Infrequent social contact'.

Cognitive social capital refers to the less tangible aspects of social capital that derive from mental processes (what people *feel* regarding social relations; *attitudinal* manifestations) that predispose a community to work together for a common good (Harpham et al., 2002; Krishna & Shrader, 2000). Cognitive social capital was measured in terms of **safety, trust, reciprocity, and collective action**. Each domain was assessed by individual questions that asked participants how much they agreed with certain statements about their community environment. Possible responses were 'Strongly agree', 'Agree', 'Disagree', and 'Strongly disagree'. Responses were collapsed and dichotomized into 'Agree' and 'Disagree' categories.

2.3. Measurement of health

Health was measured through self-report based on the question "How would you rate your general health?" Possible responses were 'Excellent', 'Very good', 'Good', 'Fair', and 'Poor'. Responses were dichotomized into two categories: 'Good health' (encompassing 'Excellent', 'Very good', and 'Good' responses), and 'Poor health' (encompassing 'Fair' and 'Poor' responses). This dichotomization of responses has been evaluated in previous studies and has been found to yield similar results in logistic regression compared to strategies that incorporate the multi-category, ordered nature of the variable (Jylhä, 2009; Lundberg & Manderbacka, 1996; Miilunpalo et al., 1997; Schnittker et al., 2014). Furthermore, self-reported health is a validated and popularly used proxy for measuring health and has been found to correlate closely with overall physical health measures (Miilunpalo et al., 1997; Schnittker et al., 2014).

2.4. Sociodemographic variables/covariates

Age, sex, income, education, marital status, and community of residence were tested as potential confounders. The variable 'Community of residence' denoted the community to which the participant belonged (out of the four communities included in the analysis).

2.5. Statistical analysis

Descriptive statistics were computed for all exposure and outcome variables. Bivariate associations between exposures and self-rated health were calculated in preliminary analyses and Pearson Chi-square tests were performed.

Following this, logistic regression analysis was performed for the outcome of good self-rated health. Four unique models were constructed for the outcome: first, a model containing sociodemographic variables only¹ was constructed (Model 1). Next, structural social capital variables² were added (Model 2). Cognitive social capital variables³ were added to Model 1 separately to form a new model (Model 3). Finally, structural and cognitive social capital variables were combined in a summative model, along with significant sociodemographic covariates (Models 4). Model 4 was built using backwards elimination, first including all structural and cognitive social capital variables, followed by stepwise elimination of non-significant variables. Stepwise variable elimination was performed according to the results of multiple partial F tests with an exit criterion of $p \geq 0.15$. The criterion to remain in the

¹ Age, sex, income, education, marital status, and community of residence.

² Social contact (in person), social contact (virtual), voting (local), voting (provincial/federal), organizational membership.

³ Collective action, reciprocity, safety, trust.

model was $p < 0.20$. All sociodemographic confounders and effect modifiers were assessed using a change-in-estimate approach. Interaction effects of age, sex, and educational level were tested for their effect on the association between health outcomes and social capital variables for (Eriksson, 2010; Forsman et al., 2012). No significant interaction effects were found.

Goodness of fit was assessed with the Hosmer-Lemeshow test and the odds ratio (OR) for good self-rated health with 95% confidence intervals are reported (Tables 4 and 5). For the Community variable, the community with the smallest sample size was selected as the reference category ("Community A") and odds ratios for this variable were computed with respect to the results of this reference community. All statistical models were constructed using SAS software 9.4 (Cary, NC: SAS Institute Inc.)

3. Results

3.1. Socio-demographics

Of the 591 First Nations adults who participated in this study, 387 identified as female (65.59%), and the rest identified as male (203, 34.41%). The average age of participants was 43.48 years ($SD=12.88$) and was similar between males ($\mu=42.8$ years, $SD=13.09$) and females ($\mu=43.84$ years, $SD=12.76$). Over one-third of participants (209, 35.73%) had completed education above secondary school (i.e. trade school, community college, university certificate, Bachelor's degree, or Graduate degree), with a greater proportion of females (159, 41.41%) having completed higher education than males (50, 24.88%). Approximately one-third of participants lived in Community B (190, 32.20%), another third lived in Community C (199, 33.73%), and the final third were split between Community D (107, 18.14%), and the reference community, Community A (94, 15.93%). The four communities represented in this sample hail from three different provinces and three unique linguistic-cultural groups, or Nations. Approximately half of participants were single (306, 52.49%) and the remainder were married or living with a partner. Most participants made an annual income of \$50,000 or below (300, 70.75%). Sample demographics are summarized in Table 1.

These sociodemographic variables were examined in relation to good self-rated health in the baseline logistic regression model (Model 1) described in Table 2. From this model, it was identified that higher education, male sex, and younger age are significantly associated with good self-rated health ($B > 0$). These variables, in addition to community of origin, were used as co-variates in the subsequent models that examined the association of social capital and self-rated health (Models 2 to 4, Tables 4 and 5).

3.2. Distribution of social capital

Overall, high levels of structural social capital were reported among participants across all four communities. Participants reported high levels of social contact, both in person and virtually. The majority of participants (464, 80.28%) reported meeting up with friends at least 1–2 times per month, with 353 (61.07%) meeting up with friends at least 1–2 times per week. Similarly, the majority of participants (503, 85.25%) reported speaking on the phone, writing, emailing, or texting their friends at least 1–2 times per month, and 78.51% (464) participants reported doing so at least 1–2 times per week. Participants also reported that they had a close relationship with an average of 13.96 family members ($SD=14.33$) and 6.67 friends ($SD=9.46$). The majority of participants reported active civic engagement: over half voted in the most recent local band election (347, 60.35%) and the majority voted in the most recent provincial or federal election (321, 54.41%). However, most participants did not report belonging to any community associations or groups (406, 69.40%). The most popular community associations included church groups (56, 9.56%), sports clubs (44, 7.50%), and

Table 1

Distribution (%) of sociodemographic variables (age, highest education, marital status, community, income) by sex among study participants.

	Male (%)	Female (%)	Total (%)
Age	42.80, $SD=13.09$ N=203	43.84, $SD=12.76$ N=387	
Education			
Elementary school or less	50 (24.88)	74 (19.27)	124 (21.20)
High school	101 (50.25)	151 (39.32)	252 (43.08)
Higher education	50 (24.88)	159 (41.41)	209 (35.73)
Community			
A (Ref.)	32 (15.76)	62 (16.02)	94 (15.93)
B	62 (30.54)	128 (33.07)	190 (32.20)
C	78 (38.42)	121 (31.27)	199 (33.73)
D	31 (15.27)	76 (19.64)	107 (18.14)
Marital status			
Single	107 (53.77)	199 (51.82)	306 (52.49)
Living with partner	92 (46.23)	185 (48.18)	277 (47.51)
Income			
Less than \$10,000	51 (36.43)	59 (20.77)	110 (25.94)
\$10,000 to \$49,999	55 (39.29)	135 (47.54)	190 (44.81)
\$50,000 to \$99,999	15 (10.71)	57 (20.07)	72 (16.98)
\$100,000+	19 (13.57)	33 (11.62)	52 (12.26)

Table 2

Probability of good health based on sociodemographic variables (Model 1).

Sociodemographic variables	Model 1		
	B	p	OR (95% CI)
Age	-0.023	0.015*	0.978 (0.960, 0.996)
Sex			
Male			1.0
Female	-0.741	0.003**	0.477 (0.291, 0.781)
Education			
Less than secondary school			1.0
Secondary school	0.949	0.002**	2.58 (1.41, 4.74)
More than secondary	1.368	<0.0001****	3.93 (2.04, 7.57)
Community			
A (Ref.)			1.0
B	-1.01	0.009**	0.364 (0.171, 0.778)
C	-0.651	0.076	0.521 (0.254, 1.07)
D	-0.388	0.386	0.678 (0.282, 1.63)
Marital status			
Single			1.0
Married and/or living with partner	0.084	0.701	1.09 (0.700, 1.69)
Income per year			
\$10,000			1.0
\$10,000 - \$49,999	-0.287	0.311	0.751 (0.431, 1.31)
\$50,000 - \$99,999	0.247	0.525	1.28 (0.598, 2.74)
\$100,000+	0.010	0.982	1.01 (0.424, 2.41)

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$, **** $p \leq 0.0001$.

education, music, or arts groups (43, 7.33%). Of note, the examples of community groups provided in the survey instrument under this question did not include community or culturally specific organizations, such as drum circles, dance, or beading groups, which likely skewed participant responses to this item.

In terms of cognitive social capital, participants reported high levels of reciprocity within their communities: the majority (362, 62.52%) agreed that people are willing to help their neighbours and that people do favours for each other (379, 65.68%). In terms of collective action, approximately half (252, 43.52%) of participants agree that neighbours work together to keep their community clean and safe. Over one-third of participants indicated that people could be trusted (217, 37.67%), and similar numbers agreed that they felt safe going for walks during both day and night (216, 37.44%).

There was significant variation in levels of social capital across the four communities (Table 3). Communities differed at a statistically significant level ($p < 0.05$) on all cognitive social capital measures and on three of the five structural social capital measures (local and provincial/federal voting and organizational membership).

4. Distribution of health outcomes

When asked to rate their own health, the majority of participants indicated that their health was good, very good, or excellent (371, 63.75%), with a greater proportion of males (141, 70.85%) indicating so than females (230, 60.05%). Of particular note is that self-rated health differed significantly between communities (Chi-sq = 13.77, $df = 3$, $p = 0.0032$).

4.1. Association between social capital and health

With respect to structural social capital, bivariate analyses revealed that civic participation at the federal or provincial level is associated with higher self-rated health (Chi-sq = 10.44, $df = 1$, $p = 0.0012$), as is organizational participation (Chi-sq = 4.85, $df = 1$, $p = 0.028$). In the regression analysis (Table 4, Model 2), which controlled for education, sex, community of origin, age, and other structural social capital variables (i.e. social contact and local voting), both factors continued to be significantly associated with self-rated health. Provincial or federal civic participation was associated with higher self-rated health (OR = 1.64,

95%CI = 1.08, 2.51, $p = 0.021$), similar to organizational membership (OR = 1.65, 95%CI = 1.08, 2.52, $p = 0.021$).

Bivariate analyses conducted for cognitive social capital identified the feeling of safety (Chi-sq = 4.08, $df = 1$, $p = 0.04$) and trust (Chi-sq = 6.03, $df = 1$, $p = 0.014$) as factors associated with higher self-rated health. However, in the subsequent logistic regression analysis (Table 4, Model 3), in which all sociodemographic variables and other cognitive social capital variables (i.e. collective action and reciprocity) were controlled for, neither factor was statistically significant. Feelings of trust appeared to approach a significant positive association with self-rated health (OR = 1.43, 95%CI = 0.913, 2.18, $p = 0.098$).

In the combined structural and cognitive social capital model (Table 5, Model 4), federal or provincial voting and organizational participation were found to be statistically significant (Chi-sq = 5.34, $p = 0.021$ and Chi-sq = 4.74, $p = 0.029$, respectively) when controlling for all other variables. Additionally, municipal voting and trust were significant enough for inclusion in the model in the variable selection process (Chi-sq = 5.34, $p = 0.151$; Chi-sq = 3.52, $p = 0.061$, respectively). All sociodemographic variables were significantly associated with good health in the final model.

5. Discussion

The main goals of this study were to explore the cultural dimension of bonding social capital across four First Nations communities and characterize its impact on health. In our pursuit of these objectives, we most strikingly observed that a coherent and consistent narrative of social capital, as we have conceptualized it based on previous studies, did not exist uniformly across all communities in our study. In fact, inter-community differences were found in our results to be statistically significant ($p < 0.0001$) for every metric of cognitive social capital, and three of the five measures of structural social capital (local voting, provincial/federal voting, and organizational membership) (Table 3). This finding questions the existence of a pan-Indigenous social capital and suggests instead that the resources drawn upon in the social environment differ from Nation to Nation, which further supports Indigenous peoples' resistance to being grouped within a singular cultural domain (Czyzewski, 2011; Smith, 1999). While the unique historical, social, political, and cultural landscapes have been considered in cross-cultural and cross-national studies on social capital, our findings

Table 3
Distribution of exposure and outcome variables by community among study participant.

Exposure variable	Community	A (Ref.)	B	C	D	Total	Chi-sq	P value
Structural social capital								
Social contact (in person)	Frequent	83 (88.30)	142 (78.02)	152 (77.16)	87 (82.86)	464 (80.28)	6.056	0.109
	Infrequent	11 (11.70)	40 (21.98)	45 (22.84)	18 (17.14)	114 (19.72)	Df=3	
Social contact (virtual)	Frequent	84 (89.36)	160 (84.21)	163 (81.91)	96 (89.72)	503 (85.25)	4.894	0.180
	Infrequent	10 (10.64)	30 (15.79)	36 (18.09)	11 (10.72)	87 (14.75)	Df=3	
Voting (local)	Yes	40 (43.48)	64 (35.16)	166 (84.26)	77 (74.04)	347 (60.35)	114.4	<0.0001****
	No	52 (56.52)	118 (64.84)	31 (15.74)	27 (25.96)	228 (39.65)	Df=3	
Voting (provincial/federal)	Yes	55 (58.51)	85 (44.74)	116 (58.29)	65 (60.75)	321 (54.41)	10.75	0.013*
	No	39 (41.49)	105 (55.26)	83 (41.71)	42 (39.25)	269 (45.59)	Df=3	
Organizational membership	Yes	30 (31.91)	83 (44.39)	45 (22.73)	21 (19.81)	179 (30.60)	28.40	<0.0001****
	No	64 (68.09)	104 (55.61)	153 (77.27)	85 (80.19)	406 (69.40)	Df=3	
Cognitive social capital								
Collective action	High	56 (60.87)	60 (32.26)	88 (44.90)	48 (45.71)	252 (43.52)	21.22	<0.0001****
	Low	36 (39.13)	126 (67.74)	108 (55.10)	57 (54.29)	327 (56.48)	Df=3	
Reciprocity	High	71 (76.34)	90 (48.39)	126 (64.62)	75 (71.43)	362 (62.52)	27.36	<0.0001****
	Low	22 (23.66)	96 (51.61)	69 (35.38)	30 (28.57)	217 (37.67)	Df=3	
Trust	High	47 (51.09)	46 (24.86)	88 (45.36)	36 (34.29)	217 (37.67)	25.37	<0.0001****
	Low	45 (48.91)	139 (75.14)	106 (54.64)	69 (65.71)	359 (62.33)	Df=3	
Safety	High	71 (76.34)	34 (18.68)	64 (32.49)	47 (44.76)	216 (37.44)	91.91	<0.0001****
	Low	22 (23.66)	148 (81.32)	133 (67.51)	58 (55.24)	361 (62.56)	Df=3	
Health outcomes								
Self-rated health	Poor or fair	23 (24.47)	84 (45.65)	71 (35.68)	33 (31.43)	211 (36.25)	13.77	0.0032**
	Good, very good, or excellent	71 (75.53)	100 (54.35)	128 (64.32)	72 (68.57)	371 (63.75)	Df=3	

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$, **** $p \leq 0.0001$.

Table 4
Probability of good health based on structural social capital variables alone (Model 2) or cognitive social capital variables alone (Model 3).

	Model 2			Model 3		
	B	p	OR (95%CI)	B	p	OR (95%CI)
Sociodemographic variables						
Education						
Less than secondary school			1.0			1.0
Secondary school	0.525	0.032*	1.69 (1.05, 2.73)	0.565	0.019*	1.76 (1.096, 2.83)
More than secondary	0.903	0.0006***	2.47 (1.47, 4.14)	1.098	<0.0001****	3.00 (1.80, 5.00)
Sex						
Male			1.0			1.0
Female	-0.664	0.0013**	0.515 (0.34, 0.77)	-0.643	0.002**	0.526 (0.353, 0.782)
Community						
A (Ref.)			1.0			1.0
B	-0.848	0.006**	0.428 (0.23, 0.78)	-0.738	0.024*	0.478 (0.251, 0.908)
C	-0.302	0.330	0.739 (0.40, 1.36)	-0.482	0.122	0.618 (0.335, 1.14)
D	0.002	0.995	1.00 (0.51, 1.98)	-0.116	0.736	0.891 (0.454, 1.75)
Age	-0.0210	0.0072**	0.98 (0.96, 0.99)	-0.0194	0.0114*	0.981 (0.966, 0.996)
Structural social capital (Reference categories are "Infrequent" or "No")						
Social contact (in person)						
Frequent	0.1481	0.576	1.16 (0.69, 1.949)			
Social contact (virtual)						
Frequent	0.1938	0.532	1.21 (0.66, 2.23)			
Voting (local)						
Yes	-0.3054	0.199	0.74 (0.46, 1.17)			
Voting (provincial/federal)						
Yes	0.4974	0.021*	1.64 (1.08, 2.51)			
Organizational membership						
Yes	0.4998	0.021*	1.65 (1.08, 2.52)			
Cognitive social capital (Reference category is "Low" for all variables)						
Collective action (work together)						
High				-0.057	0.792	0.95 (0.62, 1.44)
Reciprocity (help)						
High				0.017	0.939	1.02 (0.668, 1.55)
Trust						
High				0.356	0.098	1.43 (0.937, 2.18)
Safety						
High				0.082	0.695	1.09 (0.720, 1.64)

*p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001, ****p ≤ 0.0001.

suggest that similar consideration needs to be made for the *intra-cultural* nuances of social capital in Indigenous contexts, in which Nation (and community) histories and cultures can significantly differ from one community to another (Ledogar & Fleming, 2008; Mignone et al., 2004; van Kemenade, 2003).

The nature of these differences poses the question of how quantitative methodologies can adapt to account for community variation: in studies on cross-cultural social capital, it has been proposed that variation between cultures does not necessarily mean that distinct measurement tools must be created in every locale, as this would curtail the benefit that quantitative methodology possesses in capturing a large and diverse set of data within its sample (Krishna and Shrader, 1999, 2000). Rather, the focus should be on developing broad categories that are generalized enough to capture the similar or recurrent elements of social capital, yet flexible enough to be customized and altered to identify more context-specific characteristics that support social capital in any one community (Krishna and Shrader, 1999, 2000). To this end, our study results also identified several elements of social capital that were particularly resonant across all communities that may inform a common social capital framework. These qualities were: the frequent socialization among community members, both in-person and online, and the existence of dense and connected family networks. These categories, having some similarity across communities, may serve as a basis for adaptation to capture the more nuanced elements of Indigenous social capital that may be different across communities, such as types of networks present, the resources that those networks provide, and the quality and nature of interpersonal interactions.

Finally, with respect to the health impact of social capital, the most

consistent findings in our results were the well-known associations between health and sociodemographic factors of age, sex, and education, elements, which were intended as control variables in the analysis. The results of this analysis reaffirm the prevailing importance of these characteristics as predictors of good health in population-based studies and are consistent with the findings of the broader CAHMM study (Anand et al., 2019). With respect to social capital, two domains of structural social capital were found to have significant positive associations with self-rated health: civic engagement (voting) at provincial or federal levels, and organizational membership. These associations were present in both bivariate and logistic regression analyses. While there are no studies with Indigenous peoples that have previously demonstrated these associations, these findings corroborate larger epidemiological studies of the general population that have identified positive health benefits relating to organizational memberships, such as longer life expectancy (Hyyppä & Mäki, 2003), increased participation in leisure-time physical activity (Lindstrom et al., 2003), and successful ageing (Veenstra, 2000). Similarly, previous research has demonstrated a relationship between civic participation and higher self-rated health, owing to mediating factors such as social connectedness, which may affect both voting and health outcomes simultaneously (Denny & Doyle, 2007; Mattila et al., 2013).

Of the cognitive social capital variables, trust appeared to trend towards a significant positive association with good self-rated health in bivariate analyses but was ultimately not found to be statistically significant in logistic regression models. However, findings from the broader CAHMM First Nations cohort, which included all eight communities, identified that higher levels of trust are significantly

Table 5

Probability of good health based on structural social capital and cognitive social capital variables combined (Model 4).

	Model 4		
	B	p	OR (95%CI)
Sociodemographic variables			
Education			
Less than secondary school			1.0
Secondary school	0.017	0.897	1.63 (1.00, 2.64)
More than secondary	0.453	0.002**	2.52 (1.49, 4.27)
Sex			
Male			1.0
Female	-0.336	0.001***	0.510 (0.341, 0.765)
Community			
A (Ref.)			1.0
B	-0.483	0.006**	0.484 (0.260, 0.899)
C	-0.077	0.639	0.726 (0.392, 1.35)
D	0.317	0.104	1.08 (0.541, 2.14)
Age			
	-0.022	0.007**	0.979 (0.964, 0.994)
Structural social capital			
Social contact (in person)			
Frequent			
Social contact (virtual)			
Frequent			
Voting (local)			
Yes	-0.345	0.151	0.708 (0.443, 1.13)
Voting (provincial/federal)			
Yes	0.500	0.021*	1.65 (1.08, 2.52)
Organizational membership			
Yes	0.473	0.029*	1.61 (1.05, 2.46)
Cognitive social capital			
Collective action (work together)			
High			
Reciprocity (help)			
High			
Trust			
High	0.374	0.061	1.45 (0.984, 2.15)
Safety			
High			

*p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001, ****p ≤ 0.0001.

associated with lower cardiovascular risk scores (Anand et al., 2019). This suggests that while trust was not statistically significant in our regression models, it is plausible that our study sample may simply have been underpowered to detect this association, as it has been reproduced in various different studies (Kawachi et al., 1999; Subramanian & Kim, 2002).

Besides the two elements of structural social capital that showed definitive association with self-rated health, our study results predominantly reflected a lack of statistically significant associations between self-rated health and qualities of structural and cognitive social capital. This fact further supports our previous observation that generic social capital scales, such as the ones used in this study, may not comprehensively capture the true essence of social capital – the essence by which it is able to act as the “glue that holds a community together”, and by extension, to support health (Freuchte, 2011). Adopting the strengths-based perspective that all communities possess particular assets that enables the functioning of that community’s social environment, this finding again supports the need for adaptations to be made to social capital scales in order to account for each community’s unique social context and properly capture the aspects of the social environment that are truly important for community health and well-being. To this end, we suggest greater supplementation of existing quantitative studies with qualitative or mixed-methods inquiry, as it has been made evident through this quantitative work that capturing the texture and quality of social capital through numerical scales is challenging to do comprehensively, both with respect to data collection and data interpretation. The ability to draw from concurrent qualitative data would largely improve the ability to understand and appreciate the unique scope of Indigenous social capital, and further, to recognize community-driven ways of applying these observations to public health efforts that

ultimately support thriving communities.

5.1. Limitations

Our study was limited by its size; while the inclusion of four different First Nations communities created a sizeable and diverse sample, the significant variation on indices of social capital from one community to another brought to attention the need for a much larger sample size if more generalizable observations on social capital are to be made about First Nations, let alone Indigenous communities more broadly. This variation also emphasizes the importance of engaging with communities individually and exploring the uniqueness of local context in order to generate meaningful research (Canadian Institutes of Health Research, 2010). Furthermore, the study instrument used was not specifically designed to measure social capital, nor was it specific to Indigenous social capital, as it instrument was intended to be used across all non-Indigenous cohorts of the CAHHM study as well. This prevented in-depth exploration of the specific intricacies of Indigenous social capital and greater contribution towards the conceptual development of social capital within the data available.

6. Conclusion

To date, quantitative studies of social capital in Canada have largely excluded Indigenous (i.e., First Nations, Inuit, and Métis) communities and ignored their unique social, historic, and cultural constructions. In order to address this gap, we utilized data from the Canadian Alliance for Healthy Hearts and Minds study to describe the social capital of four First Nations communities across Canada and to explore the association between social capital and self-rated health. Overall, the findings of our study highlighted the manifestation of social capital in environments of frequent socialization and strong networks of interconnected family and friends, which are elements that should be prioritized further in conceptualizations of Indigenous social capital. This study also identified the limitations of traditional definitions of social capital in capturing the full depth and range of social capital among Indigenous communities, particularly as these communities differ significantly from one another in their social landscapes. Given this, we suggest that measurement tools for Indigenous social capital be created in a dynamic way, such that metrics used are able to be adapted and modified to individual community definitions and conceptualizations of social capital. Further, we support the grounding of social capital research in additional qualitative inquiry that can enable individual communities to derive these tools for themselves. In this way, the study of social capital may be used as a vehicle to focus upon Indigenous strength and resilience in health research and policy, ultimately supporting Indigenous environments of thriving health and well-being.

Author statement

Sharon Yeung: Conceptualization, methodology, formal analysis, writing and editing. Mark Rosenberg: Conceptualization, methodology, formal analysis, writing, supervision. Donna Banach: Investigation, resources. Lisa Mayotte: Investigation, resources. Sonia Anand: Conceptualization, methodology, data curation, resources. Heather Castleden: Conceptualization, methodology, formal analysis, writing, supervision.

Ethical statement

The authors verify that this study is original and has not been submitted for review to other journals. Ethics approval for the conduct of the analysis reported in this study was granted by the Queen’s University Health Sciences Research Ethics Board (#6021696) and by the CAHHM study team of each participating First Nations community. The broader CAHHM study obtained ethics approval from the Hamilton Integrated Research Ethics Board and from each participating First Nations

community or regional research ethics board.

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Declaration of competing interest

The authors have no interests to declare.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2021.100962>.

Appendix 1

Table: Survey questions listed according to corresponding social capital construct

Social capital construct	Survey question
Cognitive social capital (Collective action)	If there is a problem in the community, neighbours work together to deal with it. (strongly agree/agree/disagree/strongly disagree)
Cognitive social capital (Trust)	People in this community can be trusted. (strongly agree/agree/disagree/strongly disagree)
Cognitive social capital (Reciprocity)	People around here are willing to help their neighbours. (strongly agree/agree/disagree/strongly disagree)
Cognitive social capital (Safety)	The crime rates in my community makes it unsafe to go on walks during the day.(strongly agree/agree/disagree/strongly disagree)
	The crime rates in my community makes it unsafe to go on walks at night. (strongly agree/agree/disagree/strongly disagree)
Structural social capital (Social networks)	On average, how often do you do each of the following with any of these friends, not including those who live with you? (never/less than once per year/1–2 times per year/every few months/1–2 times per month/1–2 times per week/daily)
	a) Meet up
Structural social capital (Social networks)	On average, how often do you do each of the following with any of these friends, not including those who live with you? (never/less than once per year/1–2 times per year/every few months/1–2 times per month/1–2 times per week, or daily)
	a) Speak on the phone
	b) Write, email, or text
Structural social capital (Political engagement/participation)	Did you vote in the following election?
	The last band election (no/yes)
Structural social capital (Political engagement/participation)	Did you vote in the following election?
	The last provincial election (no/yes)
	Did you vote in the following election?
	The last federal election (no/yes)
Structural social capital (Associational membership/civic engagement)	Are you a member of any of these organizations, clubs, or societies? (no/yes)
	Farmers association/environmental groups/political parties
	Tenant groups, community watch
	Community organization
	Self-help group
	Education, arts, or music groups, evening classes
	Social club
	Sports club, exercise classes
	Church, temple, mosque
	Any other organizations or societies
	No, I am not a member of any organizations, clubs, or societies

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