COMMUNITY BELONGING AND SEDENTARY BEHAVIOR AMONG FIRST NATIONS ADULTS IN CANADA: THE MODERATING ROLE OF INCOME

Scott Anderson, MSc, Cheryl L. Currie, PhD, Jennifer L. Copeland, PhD, and Gerlinde A. Metz, PhD

Abstract: This study examined how income and community belonging may interact to influence leisure sedentary behavior among Indigenous adults. Data were obtained from 1,304 First Nations adults who completed the Canadian Community Health Survey in 2012. Among average-income earners, a strong sense of belonging to local community was associated with less sedentary behavior, a finding also documented in the general population. Among low-income earners, a strong sense of belonging to local community was associated with more sedentary behavior, a finding that is novel in the literature. These associations remained significant after adjustment for sociodemographic covariates and mental and physical health, suggesting other factors are influencing this correlation.

INTRODUCTION

Sedentary behavior (i.e., prolonged sitting) is a modifiable determinant of health that has been associated with an increased incidence of cardiovascular disease, diabetes, obesity, cancer, depression, and all-cause mortality (Proper, Singh, van Mechelen, & Chinapaw, 2011; Thorp, Owen, Neuhaus, & Dunstan, 2011). Despite this evidence, current research suggests that, on average, adults spend over half their waking hours sitting (Owen, Bauman, & Brown, 2009).

While it may be difficult for some adults to choose nonsedentary activities during working hours, leisure time presents an important opportunity to choose nonsedentary pursuits. To date, we know little about the factors that underlie these choices, particularly in minority populations.

Data were collected from the three main Indigenous groups in Canada—First Nations, Métis, and Inuit. The present analysis is focused on First Nations adults in Canada, who represent more than 60% of the Indigenous population in the country (approximately 850,000 people). Pre-colonization, First Nations adults were actively engaged in hunting, gathering, fishing, and

farming pursuits (Statistics Canada, 2011). First Nations populations also traveled great distances to engage in trade and migrate with game. Colonization resulted in the forced sedentarization of First Nations peoples within small parcels of land termed reserves. The pass system instituted in some parts of Canada required government permission to leave these designated lands, which further restricted mobility, broke down traditional trade networks, and altered traditionally active lifestyles (Barron, 1988).

Currently, most First Nations peoples live outside Indigenous communities in Canada - typically in cities (Statistics Canada, 2013). In this milieu, First Nations peoples are a racial minority who experience high levels of discrimination and poverty; experiences that impact sense of belonging to local community in these urban spaces (Currie, Wild, Schopflocher, & Laing, 2015; Currie, Wild, Schopflocher, Laing, & Veugelers, 2012; Environics Institute, 2010).

Sense of belonging to local community is conceptually distinct from social support and is independently associated with self-reported health, health behavior, and health behavior change (Hystad & Carpiano, 2012; Ross, 2002). Previous research has shown that both household income and sense of belonging to local community are independently associated with sedentary behavior among adults in the general population (Anderson, Currie, & Copeland, 2016).

According to the tenets of intersectionality theory, minority populations experience intersecting social identities that interact with each other to influence health and health behavior in a nonadditive way (Bauer, 2014). Framed by intersectionality theory, this study sought to examine the ways in which income (which is a predictor of social class) and sense of belonging to local community may interact to influence sedentary behavior among First Nations adults living in cities across Canada.

Given that little has been published about the determinants of sedentary behavior among Indigenous peoples generally around the world, we also sought to examine the ways in which behavioral variables that have been associated with sedentary behavior in other studies—including physical activity, smoking, and alcohol use—may correlate with sedentary behavior among First Nations adults.

METHODS

Study Design

Data were obtained from the 2012 Canadian Community Health Survey (CCHS). The CCHS is an annual nationwide survey conducted by Statistics Canada. This cross-sectional survey collects health information from Canadians ages 12 years or older. Those living in institutions, remote locations, military bases, or Indigenous communities are excluded from the survey. These exclusions did not hamper the goals of our analysis, given that our purpose was to examine sedentary behavior among First Nations adults living outside Indigenous communities. Data were collected using computer-assisted interviewing, both in person and by phone, between January 1 and December 31, 2012. The 2012 CCHS uses a multistage stratified cluster design to ensure samples collected are generalizable to the wider Canadian population. This design has been described in detail elsewhere (Statistics Canada, 2012).

At a national level, the overall response rate was 68.4% (N = 61,707) among participants ages 12 years and older (Statistics Canada, 2012). This study included only those participants who were ages 18 years and older and self-identified as First Nations. There were 1,304 individuals who met these criteria and provided valid responses related to the outcome of interest. This study was exempt from Institutional Review Board review, as data were obtained in deidentified form.

Outcome Variable

As part of the CCHS, respondents were asked to report average weekly leisure time (outside of school or work) spent in the following sedentary activities: (1) on a computer, including playing computer games and using the Internet; (2) playing video games such as Xbox, Nintendo, and PlayStation; (3) watching television or videos; and (4) reading.

Statistics Canada calculated total leisure sedentary behavior time and provided the data in 10 categories beginning at $<$ *5 hours per week*, and increasing by increments of 5 hours to a maximum of $\geq$ *45 hours per week*. This variable was used in the present analysis, with a focus on better understanding the determinants of low sedentary time in this sample.

Sociodemographic Variables

Sociodemographic characteristics were examined, including gender, age, education (i.e., less than secondary school graduate, secondary school graduate, and postsecondary graduate), household income as a proxy for social class (15 categories in total, ranging from $0 to ≥ $150,000), marital status (i.e., married/common-law, widowed/divorced/separated, or single/never married), and employment status (currently employed: yes or no).

Behavioral Variables

Data were collected on physical activity, and a derived variable of energy expenditure values of kcal/kg/day was created by Statistics Canada. Individuals were categorized into three groups: 1 = active (> 3 kcal/kg/day), 2 = moderately active (1.5-3 kcal/kg/day), or 3 = inactive (< 1.5 kcal/kg/day). Smoking behavior was examined by asking respondents if they smoked cigarettes: 1 = not at all, 2 = occasionally, or 3 = daily. Alcohol use was derived by calculating number of drinks reported per month, with participants stratified into three groups: 1 = regular drinkers (at least once per month), 2 = occasional drinkers (less than once per month), and 3 = did not drink in the last 12 months.

Sense of Community Belonging

Participants' sense of belonging to local community was examined by asking "how would you describe your sense of belonging to your local community?" on a scale of 1 to 4 (1 = *very strong*, 2 = *somewhat strong*, 3 = *somewhat weak*, and 4 = *very weak*). This single item is frequently used to measure this construct (Carpiano & Hystad, 2011; Shields, 2008). A longer survey instrument is also available for this variable (Hagerty & Patusky, 1995; Ma, 2003).

Statistical Analysis

The prevalence of sedentary behavior for each of television viewing, computer use, video game use, and reading were calculated and an overall prevalence estimate was calculated. Data for all analyses were weighted to represent the general household population of First Nations adults living outside of Indigenous communities in Canada; the creation of this weighting variable is described in detail elsewhere (Statistics Canada, 2012).

Four sets of linear regression models were used to examine associations between key exposure variables—namely, community belonging, smoking, alcohol consumption, and physical activity—and sedentary behavior with 95% confidence intervals. Associations between each exposure variable and sedentary behavior were first examined adjusting for age, followed by other sociodemographic confounders selected a priori based on existing literature (i.e., gender, marital status, income, education, and employment; Anderson et al., 2016; Clark et al., 2010; Shields & Tremblay, 2008). A third model included additional control for overall self-perceived health and mental health, as health can confound associations between the exposure variables we examined and sedentary behavior.

To examine the ways in which income and sense of belonging may interact to influence sedentary behavior, we stratified the sample into three household income groups: very low income for a household in Canada (< $20,000), low income for a household in Canada ($20,000-$80,000), and average income for a household in Canada (≥ $80,000). We then examined associations between community belonging and sedentary behavior for each income group.

The data were examined for multivariate outliers before conducting the analysis; none were found. Multicollinearity between exposure and confounding variables was examined using variance inflation factors (VIFs) before main effect models were derived. All VIFs were below 5. All confounders were examined for effect modification prior to entry into main effects models using lowess curves; none were found. All analyses were completed in 2014 and run using SPSS version 22.0.

RESULTS

Sample Description

Characteristics of the sample are outlined in Table 1. The sample (N = 1,304) was 47.6% male. The mean age range was 35-44 years. Most First Nations participants were married and employed, and had completed a post-secondary degree. Approximately 70% of the sample lived in households with incomes that fell below the national average of $80,000/year.

Table 1
Characteristics of Sample [a, b]

Characteristic	*N* = 1,304
Gender	
Male	47.6%
Female	52.4%
Age	
18–24	15.8%
25–34	21.8%
35–44	22.7%
45–54	19.2%
55–64	12.2%
≥ 65	8.3%
Marital Status	
Married/Common-law	54.6%
Widowed/Divorced/Separated	13.4%
Single	32.0%
Education	
Less than high school	12.4%
High school diploma	25.7%
University or college degree	61.9%
Household Income	
$0–$19,999	17.2%
$20,000–$39,999	22.1%
$40,000–$59,999	18.6%
$60,000–$79,999	11.3%
≥ $80,000	30.8%
Employed	
Yes	58.3%
No	41.7%

[a] Percentages are based on unweighted data. [b] Weighted percentages for the sample were not calculated, given that the data were weighted to match the characteristics of the First Nations population living outside Indigenous communities in Canada in 2011, which has been widely published across various reports.

Prevalence of Sedentary Behavior

On average, First Nations adults were sedentary 25-29 hours/week during leisure (range = 0 to ≥ 45 hours/week). Watching television/videos was the most frequent sedentary behavior (11-14 hours/week), followed by using a computer (3-5 hours/week), reading (3-5 hours/week), and playing video games (< 1 hour/week). When results were stratified by household income, the

very low- (< $20,000) and low- ($20,000-$80,000) income groups reported the highest sedentary behavior at 25-29 hours/week, while First Nations adults who most closely approximated the average Canadian household income (≥ $80,000) reported 20-24 hours/week.

Correlates of Sedentary Behavior

As shown in Table 2, First Nations females who were employed and not single were the least sedentary during leisure. Being female was associated with a 0.66-point decrease (3.3 hours/week) in sedentary time. Those with higher incomes were also less sedentary. Higher physical activity and not smoking were also associated with lower sedentary behavior. After adjustment for age, being a nonsmoker was associated with a 1.6-hour/week decrease in sedentary behavior. The size of this effect became very small, although still significant, once other sociodemographic confounders were controlled. Surprisingly, increased alcohol consumption was associated with less sedentary behavior. Every 1-point increase in alcohol consumption resulted in a 0.364-point decrease (1.8 hours) in sedentary behavior during leisure.

Table 2
Correlates of Sedentary Behavior: Multiple Linear Regression Models and 95% Confidence Intervals [a]

	Adjusted Model 1 [b]			Adjusted Model 2 [c]			Adjusted Model 3 [d]		
	B (95% CI) [e]	*SE*	B [f]	B (95% CI)	*SE*	β	B (95% CI)	*SE*	β
Community belonging	0.17 [0.16, 0.18]	0.005	0.06	0.07 [0.06, 0.08]	0.005	0.02	0.02 [0.01, 0.03]	0.005	0.01
Physical activity	0.33 [0.32, 0.34]	-0.005	0.11	0.34 [0.33, 0.35]	0.005	0.11	0.28 [0.27, 0.29]	0.005	0.09
Alcohol use	0.26 [0.25, 0.27]	0.005	0.08	0.36 [0.35, 0.37]	0.005	0.11	0.35 [0.34, 0.36]	0.005	0.11
Smoking	0.16 [0.17, 0.15]	0.004	0.06	0.06 [0.07, 0.05]	0.005	0.02	0.02 [0.03, 0.02]	0.005	0.01
Gender (female)				-0.66 [-0.68, -0.64]	0.008	-0.12			
Age				-0.01 [-0.01, -0.01]	0.001	-0.02			
Income				-0.05 [-0.05, -0.05]	0.001	-0.07			

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Table 2, Continued
Correlates of Sedentary Behavior: Multiple Linear Regression Models and 95% Confidence Intervals [a]

	Adjusted Model 1 [b]			Adjusted Model 2 [c]			Adjusted Model 3 [d]		
	B (95% CI) [e]	*SE*	B [f]	B (95% CI)	*SE*	β	B (95% CI)	*SE*	β
Education				0.06 [0.05, 0.08]	0.007	0.02			
Employed				-0.67 [-0.69, -0.66]	0.010	-0.13			
Currently unmarried				-0.06 [-0.09, -0.03]	0.013	-0.01			
Never married				0.90 [0.88, 0.92]	0.011	0.16			

[a] Higher beta values in this table correspond to lower sedentary time. [b] Model adjusted for age. [c] Model adjusted for age, gender, income, education, employment, marital status. [d] Model adjusted for all variables in Model 2, and overall physical and mental health. [e] Unstandardized beta coefficient. [f] Standardized beta coefficient.

Community Belonging, Income, and Sedentary Behavior

Before stratification by income, there was a weak association between sense of community belonging and sedentary behavior that became nonsignificant after adjustment for confounders. After stratifying the sample into three income groups we found that, among First Nations adults in average-income households, a strong sense of community belonging was associated with *less* sedentary behavior. In a fully adjusted model, the unstandardized beta coefficient indicates that every 1-point increase in community belonging resulted in a 0.47-point (2.3 hours/week) decrease in sedentary behavior (Table 3).

Table 3
Correlates of Sedentary Behavior: Multiple Linear Regression Models and 95% Confidence Intervals[d]

	Adjusted Model 1 [a]			Adjusted Model 2 [b]			Adjusted Model 3 [c]		
Income	B (95% CI) [e]	*SE*	B [f]	B (95% CI)	*SE*	β	B (95% CI)	*SE*	β
Average	0.63 [0.62, 0.65]	0.007	0.23	0.44 [0.43, 0.46]	0.007	0.17	0.47 [0.45, 0.48]	0.007	0.18
Low	-0.24 [-0.25, -0.22]	0.007	-0.07	-0.20 [-0.22, -0.19]	0.008	-0.06	-0.30 [-0.32, 0.029]	0.008	-0.09
Very low	0.21 [0.19, 0.22]	0.010	0.08	-0.06 [-0.08, -0.04]	0.011	-0.02	-0.17 [-0.20, -0.15]	0.011	-0.06

[a] Model is adjusted for age. [b] Model is adjusted for age, gender, marital status, education, household income, and employment status. [c] Model is adjusted for age, gender, marital status, education, household income, employment status, and overall mental and physical health. [d] Higher beta values in this table correspond to lower sedentary time. [e] Unstandardized beta coefficient. [f] Standardized beta coefficient.

In contrast, among First Nations adults living in low- and very low-income households, stronger sense of community belonging was associated with *more* sedentary behavior. In a fully adjusted model, every 1-point increase in community belonging was associated with a 0.30-point (1.5 hours/week) increase in sedentary behavior in the low-income group, and a 0.17-point (50 minutes/week) increase in sedentary behavior in the very low-income group.

DISCUSSION

Overall, First Nations adults reported mean levels of sedentary behavior during leisure that slightly exceeded the national average in Canada. High sedentary behavior during leisure is associated with lower household incomes in wealthy countries (Anderson et al., 2016; Clark et al., 2010; Shields & Tremblay, 2008), and this finding was repeated in this study. First Nations adults who reported household incomes that met or exceeded the national average engaged in the same amount of sedentary behavior as other Canadians (20-24 hours/week), suggesting that, if the majority of First Nations adults lived in average- rather than low-income households, we may not see elevated leisure sedentary behavior in this population. The findings from this study build on others to highlight the ways in which social inequities shape sedentary behavior among adults.

In keeping with the tenets of intersectionality theory, we found social class and sense of community belonging were social identities that interacted to influence sedentary behavior in a nonadditive way among First Nations adults. For average-income earners, a strong sense of belonging to local community was associated with *less* sedentary behavior during leisure, repeating findings in the general population (Anderson et al., 2016). Among low-income earners, a strong sense of belonging to local community was associated with *more* sedentary behavior during leisure, a finding that is novel in the literature. This association remained significant after adjustment for health, suggesting unique pathways beyond health may be influencing this correlation.

These findings, in both low- and average-income groups, may speak to the concept of *habitus*. Bourdieu (1990) coined this term to refer to the acquisition and clustering of habits among those occupying a similar social space in society. Applying the concept to this study, it may be that those who feel a stronger sense of belonging in their local community are more likely to engage in habits common within its social space. This would mean less sedentary

behavior among those who feel a strong sense of belonging within the average-income social space, and more sedentary behavior among those who feel a strong sense of belonging within the low-income social space. It would be interesting to test this hypothesis in a general population sample to determine whether these findings are replicated.

Behavioral Variables

Similar to studies within general populations, we found higher physical activity was associated with lower leisure sedentary behavior among First Nations adults (Hu et al., 2001; Jakes et al., 2003). Interestingly, we observed higher alcohol consumption was associated with less sedentary time in a model adjusted for sociodemographics and general health. Research has identified a similar association between alcohol consumption and TV viewing for women in the general population; however, studies on sitting behavior more generally have reported no association with alcohol (Rhodes, Mark, & Temmel, 2012). It may be that alcohol consumption among First Nations adults is associated with nonsedentary social activities, although this supposition would not extend to First Nations traditional cultural activities given that alcohol was not consumed by First Nations peoples pre-colonization and is banned at such events and ceremonies. Further research is needed to determine whether this association would be repeated in other studies.

Strengths and Limitations

This study was limited by the use of a cross-sectional design, which prevents inferences of causation and temporal sequence. Recall bias may have been introduced given that self-report measures were used. The sedentary behaviors examined were not exhaustive, neglecting transport and occupational sedentary behavior. Reporting of community belonging was obtained using one question; longer instruments are available to examine this construct. Residual confounding may be a concern, as factors not measured in this study may have influenced the results. The strengths of this study include a better understanding of sedentary behavior within an Indigenous population which has not yet been well described in the literature, the use of a large representative sample of First Nations adults living outside Indigenous communities in Canada,

consideration of the ways in which household income and sense of belonging may interact to influence health behavior, and control for the effects of important confounders on these associations.

CONCLUSION

Similar to general population studies, findings highlight household income as a key determinant of leisure sedentary behavior among First Nations adults. Unlike general population studies, 7 in 10 First Nations adults in this national study lived in low- and very low-income households, thus highlighting poverty as a particularly important determinant of sedentary behavior within this population, and the need for policies and programs that promote income equity. Once an average household income has been achieved, First Nations adults report the same level of leisure sedentary behavior as other Canadians. Findings highlight the importance of considering contextual factors like poverty when developing population health prevention strategies to reduce sedentary behavior among First Nations adults, particularly strategies that involve increasing community belonging.

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AUTHOR INFORMATION

Scott Anderson is a MD Candidate at the University of Alberta. He is the corresponding author and can be reached at Faculty of Medicine & Dentistry, 1-002 Katz Group Centre for Pharmacy and Health Research, Edmonton, AB T6G 2E1, Canada, or shanders@ualberta.ca.

Dr. Currie is an Associate Professor of Public Health in the Faculty of Health Sciences at the University of Lethbridge, in Lethbridge, Alberta, Canada.

Dr. Copeland is an Associate Professor in the Department. of Kinesiology & Physical Education at the University of Lethbridge, in Lethbridge, Alberta, Canada.

Dr. Metz is an associate professor in the Dept. of Neuroscience at the University of Lethbridge, in Lethbridge, Alberta, Canada.