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Social correlates of leisure-time sedentary behaviours in Canadian adults

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ABSTRACT

Research on the correlates of sedentary behaviour among adults is needed to design health interventions to modify this behaviour. This study explored the associations of social correlates with leisure-time sedentary behaviour of Canadian adults, and whether these associations differ between different types of sedentary behaviour. A sample of 12,021 Canadian adults was drawn from the 2012 Canadian Community Health Survey, and analyzed using binary logistic regression to model the relationships that marital status, the presence of children in the household, and social support have with overall time spent sitting, using a computer, playing video games, watching television, and reading during leisure time. Covariates included gender, age, education, income, employment status, perceived health, physical activity level, body mass index (BMI), and province or territory of residence. Extensive computer time was primarily negatively related to being in a common law relationship, and primarily positively related to being single/never married. Being single/never married was positively associated with extensive sitting time in men only. Having children under 12 in the household was protective against extensive video game and reading times. Increasing social support was negatively associated with extensive computer time in men and women, while among men increasing social support was positively associated with extensive sitting time. Computer, video game, television, and reading time have unique correlates among Canadian adults. Marital status, the presence of children in the household, and social support should be considered in future analyses of sedentary activities in adults.

1. Introduction

As research accumulates on the deleterious health effects of prolonged sedentary behaviour, there is a growing need to understand the correlates of the behaviours typically associated with long periods of sedentary time. We define sedentary behaviour as being: "distinct from lack of physical activity; put simply it is too much sitting, as distinct from too little exercise" (Owen et al., 2011: p. 190). For many Canadians, prolonged sedentary activities make up a large proportion of their leisure time; in 2010, Canadian adults spent an average of 20–24 h of their weekly leisure time engaging in sedentary behaviour (Anderson, 2014). This is concerning from a public health standpoint, given strong evidence supporting a relationship between sedentary behaviour and cardiovascular disease incidence and mortality (De Rezende et al., 2014; Thorp et al., 2011), and its association with a greater risk of several cancers and incidence of type 2 diabetes (Biswas et al., 2015). These health outcomes were found to be independent of those attributed to insufficient physical activity (Biswas et al., 2015).

To date, research into the correlates of sedentary behaviour has focused on children and adolescents, and on measures of overall sitting time and television time (Owen et al., 2011; Rhodes et al., 2012). Existing evidence suggests a strong relationship between an increased body mass index (BMI) and prolonged sedentary activity (O'Donoghue et al., 2016). Among Canadian adults (Anderson, 2014; Shields and Tremblay, 2008) and internationally (Ishii et al., 2013; King et al., 2010; Wallmann-Sperlich et al., 2013; Depp et al., 2010), prolonged sedentary activity during leisure time has been found to be negatively related to income (Anderson, 2014; Shields and Tremblay, 2008), being employed (Anderson, 2014; Shields and Tremblay, 2008; Ishii et al., 2013), perceived physical health (Anderson, 2014; King et al., 2010), and physical activity (Anderson, 2014; King et al., 2010; Wallmann-Sperlich et al., 2013). Findings related to the relationships between prolonged sedentary activity and age (Anderson, 2014; Shields and Tremblay, 2008; Ishii et al., 2013; Wallmann-Sperlich et al., 2013; Depp et al., 2010), gender (Anderson, 2014; Shields and Tremblay, 2008), and province/territory of residence (Anderson, 2014; Shields and Tremblay, 2008) have been mixed.

Because some sedentary behaviours can be socially interactive, identifying the social factors associated with sedentary behaviours is a necessary step in planning interventions targeting these behaviours. In our study, social support is conceptualized as a combination of five different

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social functions that may be obtained from relationships with others (Cutrona and Russell, 1987). These include: guidance (advice or information), reliable alliance (assurance that others can be counted on for tangible assistance), reassurance of worth (recognition of one's competence, skills, and value by others), attachment (emotional closeness from which one derives a sense of security), and social integration (a sense of belonging to a group that shares similar interests, concerns, and recreational activities) (Cutrona and Russell, 1987). Studies examining the relationship between social support and sedentary behaviours have yielded mixed results. A European study of adults found that social support was positively related to internet use, but weakly related to television watching or reading newspapers (Wangberg et al., 2008). Playing online video games was found to be associated with increased social support in an international study (Trepte et al., 2012), and a study looking at social support and internet addiction among Taiwanese adults found online social support to be positively related to internet addiction, while offline social support was protective against it (Wang and Wang, 2013).

Several mechanisms have been proposed through which marital status can affect health behaviours: shifting responsibilities can influence how people spend their leisure time, romantic partners may influence each other's behaviours by encouraging healthier habits, or being released from the marriage market might make married and cohabitating adults less likely to engage in healthy behaviours related to maintaining physical attractiveness (Robert and Wood, 2007). Being married appears to have a negative effect on physical activity (Robert and Wood, 2007; Averett et al., 2008), but evidence regarding the effects of marital status on sedentary behaviour remains equivocal. Marital status was found to be unrelated to television time in studies of Canadian (Anderson, 2014) and Taiwanese adults (Ishii et al., 2013), and overall sedentary time in European men (Varo et al., 2003). Sedentary activities found to be higher among those who are single include: screen time (time spent watching or using any electronic device with a screen) among Japanese (Ishii et al., 2013) and Canadian adults (Anderson, 2014); computer time among Canadian adults (Shields and Tremblay, 2008); and television time among American women (Teychenne et al., 2012). Conversely, overall sedentary time was found to be higher among European women who were married, divorced, or widowed (Varo et al., 2003). Married adults in America (King et al., 2010) and Hong Kong (Xie et al., 2013) have been found to watch more television than those who weren't, while American adults who were divorced or separated watched more television than those who were married (Raynor et al., 2006).

Having dependent children in the household affects how adults spend their leisure time and appears to decrease moderate to vigorous physical activity while increasing light intensity activity (Rhodes et al., 2013). Common barriers to physical activity among parents of dependent children include fatigue, lack of time, and lack of childcare (Bellows-Riecken and Rhodes, 2008), while providing care appears to increase light intensity activity and decrease sedentary time, especially among women (Rhodes et al., 2013). The presence of children in the household has been found to be unrelated to sitting and television time among Canadian (Gaston et al., 2014) and Australian (Ding et al., 2012) adults respectively, but most literature suggests that the presence of children in the household may be protective against extensive sitting (Rhodes et al., 2013; Candelaria et al., 2012; Van Dyck et al., 2010; Sanchez et al., 2008) and television watching during leisure time (King et al., 2010; Teychenne et al., 2012; Saidj et al., 2015; Uijtdewilligen et al., 2014). Having children has been associated with lower television time in American (King et al., 2010), French (Saidj et al., 2015), and Dutch (Uijtdewilligen et al., 2014) adults, and American women (Teychenne et al., 2012). Regarding overall leisure sitting time, the presence of children in the household was associated with less sedentary time among American women (Sanchez et al., 2008), and Belgian adults (Van Dyck et al., 2010). American adults (Kozo et al., 2012) with children were found to spend less time using a computer than those without in one study, but the effects on computer time have not been established and no studies were found related to video game or reading time.

A 2016 systematic review highlighted a need for research on the interactions between social correlates of sedentary behaviour with individual and environmental variables (O'Donoghue et al., 2016). Furthermore, different sedentary behaviours such as watching TV and using a computer have been found to have different correlates, indicating that different types of sedentary behaviour should be measured individually (Rhodes et al., 2012). Our study examines the associations between marital status, having children in the household, and social support on four distinct leisure time sedentary behaviours among Canadian adults, and the potential moderating effects that age and gender have on these associations. We expect to see the following relationships: people with children spending less time engaging in each type of sedentary behaviour than people without; social support being negatively related to television time and positively related to computer and video game time; and people who are married or in common-law relationships engaging in more overall sedentary time than those who are single.

2. Methods

2.1. Sample

A sample of 13,529 Canadian adults was drawn from the annual component of the 2012 Canadian Community Health Survey Questionnaire, a cross-sectional survey of persons 12 and over living in private dwellings in all Canadian provinces and territories, excluding residents of Aboriginal reserves, Crown lands and certain remote regions, institutional residents, and full-time members of the Canadian forces (Statistics Canada, 2013a). Because this study focused on working-aged adults' leisure time sedentary behaviour, only participants aged 18 through 64 were included. All respondents in the sample lived in British Columbia, Québec, or Yukon/Nunavut/Northwest Territories, because these were the areas that participated in the social support component of the 2012 CCHS (Statistics Canada, 2013a). Note that analysis of these data and the opinions expressed in this text are not those of Statistics Canada.

2.2. Variables

The dependent variables consisted of the five sedentary time measures in the CCHS. Participants estimated the number of hours outside of work or school in the past three months spent: using a computer (including computer games, homework, and internet use), playing video games on a game console or hand-held electronic device, watching television or videos, and reading in a typical week (Statistics Canada, 2013a). The measure of overall sitting time was derived from the sum of participants' estimates in the four previously mentioned activities (Statistics Canada, 2013a).

Each dependent variable was re-categorized from an ordinal variable into a binary variable using cutoffs informed by large-scale studies that have demonstrated health risks in adult populations related to leisure sitting time (Patel et al., 2010), and television time (Katzmarzyk and Lee, 2012). Overall sitting time was categorized as low risk (<19 h/week), and high risk (≥20 h/week) based on research demonstrating an increased relative risk of cardiovascular disease mortality among adults who spent 3–5 h/day and ≥6 h/day sitting during leisure time (Patel et al., 2010). Television time was categorized as low risk (<14 h/week), and high risk (≥15 h/week) based on research indicating a 1.38 year increase in population life expectancy if television time were reduced to <2 h/day (Katzmarzyk and Lee, 2012). Comparable studies were not found for computer, video game, or reading time. Computer and reading time were categorized into low and high risk using similar cutoffs to overall sedentary time: ≤20 h/week as low risk, and

Table 1
Characteristics of the sample.

Variable	Original sample[a] N (%)	CMDD sample[b] N (%)
Sitting time		
Low (≤19 h)	5622 (41.6)	5083 (42.3)
High (≥20 h)	7623 (56.3)	6938 (57.7)
Missing	284 (2.1)	–
Time on computer		
Low (<20h)	11,893 (87.9)	10,700 (89.0)
High (≥20 h)	1446 (10.7)	1321 (11.0)
Missing	190 (1.4)	–
Time playing video games		
Low (≤14 h)	12,970 (95.9)	11,792 (98.1)
High (≥15 h)	358 (2.6)	229 (1.9)
Missing	201 (1.5)	–
Time watching television		
Low (≤14 h)	9871 (73.0)	8937 (74.3)
High (≥15 h)	3426 (25.3)	3084 (25.7)
Missing	232 (1.7)	–
Time reading		
Low (<20 h)	12,938 (95.6)	11,702 (97.3)
High (≥20 h)	347 (2.6)	319 (2.7)
Missing	244 (1.8)	–
Marital status		
Married	5630 (41.6)	4999 (41.6)
Common-law	2692 (19.9)	2405 (20.0)
Widowed/separated/divorced	1252 (9.3)	1109 (9.2)
Single/never married	3900 (28.8)	3508 (29.2)
Missing	55 (0.4)	–
Child status (<12 years)		
1 or more	3518 (26.0)	3085 (25.7)
None	10,011 (74.0)	8936 (74.3)
Social support (score range:10–40)		
N	12,711 (94.0)	12,021 (100)
Missing	818 (6.0)	–
M ± SD	35.89 ± 4.31	35.88 ± 4.30
Gender		
Female	6756 (49.9)	5901 (49.1)
Male	6773 (50.1)	6120 (50.9)
Age		
18–24	1914 (14.1)	1761 (14.7)
25–34	2800 (20.7)	2488 (20.7)
35–44	2731 (20.2)	2417 (20.1)
45–54	3210 (23.7)	2831 (23.5)
55–64	2873 (21.2)	2523 (21.0)
Household education		
Post-secondary graduate	8491 (62.8)	7857 (65.4)
Some post-secondary	1097 (8.1)	1025 (8.5)
Secondary graduate	2086 (15.4)	1930 (16.1)
Less than secondary	1368 (10.1)	1209 (10.1)
Missing	487 (3.6)	–
Household income (CAD)		
≥80,000	5346 (39.5)	4888 (40.7)
60,000–79,999	2237 (16.5)	2070 (17.2)
40,000–59,999	2386 (17.6)	2162 (18.0)
20,000–39,999	2302 (17.0)	1878 (15.6)
<20,000	1255 (9.3)	1022 (8.5)
Missing	4 (<0.1)	–
Employment		
Yes	11,250 (83.2)	10,149 (84.4)
No	2154 (15.9)	1872 (15.6)
Missing	125 (0.9)	–
Perceived health		
Excellent/very good	8374 (61.9)	7536 (28.8)
Good	3955 (29.2)	3468 (62.7)
Fair/poor	1195 (8.8)	1017 (8.5)
Missing	5 (<0.1)	–
Physical activity		
Active	6325 (46.8)	5606 (46.6)
Moderate Active	3470 (25.7)	3129 (26.0)
Inactive	3601 (26.6)	3286 (27.3)
Missing	133 (1.0)	–
BMI		
Underweight	390 (2.9)	357 (3.0)
Normal weight	6385 (47.2)	5954 (49.5)
Overweight	4138 (30.6)	3790 (31.5)
Obese	2109 (15.6)	1920 (16.0)
Missing	508 (3.8)	–
Area of residence		
Québec	8513 (62.9)	7550 (62.8)
British Columbia	4905 (36.3)	4373 (36.4)
Yukon/Northwest Territories/Nunavut	111 (0.8)	97 (0.8)

Data from the 2012 Canadian Community Health Survey (CCHS).
[a] The raw data retrieved the 2012 CCHS.
[b] The data retrieved from the 2012 CCHS after cases with missing data were deleted.

>20 h/week as high risk. These cutoffs differ slightly from overall sitting time because of the way the variables are grouped in the public CCHS data. Video game time was categorized the same way as television time because few participants reporting playing video games for 20-plus hours per week.

The predictor variables considered were marital status, children present in the household, and social support. Based on past studies of adult sedentary behaviour, the covariates included in the models were gender, age, education, income, employment status, perceived health, physical activity level, body mass index (BMI), and province/territory of residence (Anderson, 2014; Ishii et al., 2013; King et al., 2010; Wallmann-Sperlich et al., 2013; Depp et al., 2010). Refer to Table 1 for the categorizations and the distributions associated for all variables included in the study.

Social support was measured using the overall social provisions measure from the Social Provisions Scale, which is derived from subscales assessing six provisions of social relationships: guidance, reliable alliance, reassurance of worth, attachment, social integration, and opportunity for nurturance (Cutrona and Russell, 1987). This scale was adapted for the CCHS into a shorter version which does not retain the items related to opportunity for nurturance (Statistics Canada, 2013b). Higher scores represent more social support. Social support was included as a distinct variable from marital and child status because while romantic and parental relationships are strongly related to certain provisions of social support, other provisions such as reassurance of worth and reliable alliance, and guidance can be provided by other relationships with friends, co-workers, and extended family (Cutrona and Russell, 1987). BMI was calculated as weight (kg) per height (m^2) from self-reported heights and weights, and classified according to the Canadian Guidelines for Body Weight Classification in Adults (Health Canada [Internet], 2015). Physical activity levels were categorized using an individual's total daily expenditure values (Herman et al., 2015).

2.3. Statistical analyses

All analyses were conducted using normalized weights (Statistics Canada: Publications [Internet], 2016) with the SAS™ system version 9.3 for Windows (SAS Institute, Cary NC). A binary logistic regression model was constructed for each of the five dependent variables to determine their relationship with marital status, children in the household, and social support, while controlling for gender, age, education, income, employment status, perceived health, physical activity level, BMI and province or territory of residence. Little's Test for Missing Completing at Random (MCAR) indicated the data were not MCAR ($p < 0.001$). To determine any bias introduced by ignoring the cases with missing data, the missing data were generated using Expectation-Maximization Imputation. The results from the analyses of the imputed data were statistically no different from the analysis of the cases-with-missing-data-deleted (cmdd) subset. Hence all results presented are based on the cmdd subset. All variables had variance inflation factors lower than 2.5, indicating multicollinearity minimally impacted, if at all, model fits (Midi et al., 2010). The absence of quasi-complete separation was also confirmed prior to analysis.

Chi-squared tests of association were used to test for associations between marital and child status and the dependent variables, and Spearman's rank correlations were used to determine relationships between social support and the dependent variables. $p < 0.25$ indicated variables should be included in the initial unadjusted model. Using a 20% change in parameter estimate, non-significant variables were tested for moderating effects before removal from their respective models.

On each of the initial unadjusted models, a logistic regression analysis was performed. In these analyses, if $p < 0.25$ in the Type 3 Analysis of Effects for a predictor variable, it was included in the main effect model for that dependent variable. Then the covariates were also added to each main effects model. Interactions were tested among our study variables (marital status, children in the household, and social support) and for marital status with age and gender, children in household with age and gender, and social support with age and gender based on Owen et al.'s socio-ecological framework (Owen et al., 2014). Interactions were not tested for the models predicting video game or reading time because the analysis would have insufficient power if the interactions were included- too few subjects reported risky amounts of video game or reading time. Likelihood ratio tests with $p < 0.05$ were used to compare models. The fits for the final models were assessed using receiver operating characteristic (ROC) curves. Outliers were identified as observations with Pearson standardized residuals less than −3 or >3.

3. Results

Descriptive statistics are presented in Table 1. Of the 12,021 participants with complete data, 57.7% reported spending 20-plus hours per week engaging in some sedentary activity (overall sitting time). Per week, 25.7% and 11.0% respectively reported spending 15-plus hours watching television and 20-plus hours using a computer. Only 2.7% read for 20-plus hours per week, and 1.9% spent 15-plus hours playing video games.

In our univariate analyses, only reading time was independent of the predictor social support ($p = 0.86$). Social support was included in the final reading model because it modified the effects of physical activity and education. Marital status was unrelated to reading time in the unadjusted model ($p = 0.85$) but was included in the final model because it modified the effects of physical activity and age. While social support was unrelated to video game time in the unadjusted model ($p = 0.59$),

Table 2
Fully adjusted models: main effects.[a]

Variables	Sitting time		Computer time		Video game time		Television time		Reading time	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Marital status (ref = married)										
Common law	0.96	0.73, 1.26	0.08	0.02, 0.39	1.75	0.77, 3.95	0.86	0.15, 5.09	1.85	0.97, 3.54
Widowed/separated/divorced	0.77	0.54, 1.09	0.19	0.01, 3.03	0.86	0.28, 2.62	0.12	0.01, 1.93	1.07	0.62, 1.86
Single/never married	0.99	0.76, 1.30	0.14	0.03, 0.63	1.64	0.78, 3.46	0.62	0.11, 3.42	1.66	0.96, 2.89
Children (ref = have children < 12)										
No children <12	1.72	0.94, 3.15	1.67	0.85, 3.25	2.41	1.21, 4.80	1.31	0.66, 2.61	1.93	1.10, 3.39
Social support	0.96	0.94, 0.99	0.97	0.94, 1.00	1.02	0.97, 1.08	0.99	0.97, 1.01	1.02	0.98, 1.07
Age (ref = 18–24)										
25–34	0.53	0.29, 0.95	0.05	0.01, 0.20	0.73	0.38, 1.37	0.75	0.12, 4.70	0.69	0.33, 1.42
35–44	0.55	0.31, 0.98	0.03	0.01, 0.14	0.28	0.13, 0.61	0.76	0.12, 4.64	1.03	0.52, 2.00
45–54	0.37	0.18, 0.76	0.04	0.01, 0.21	0.07	0.02, 0.21	0.52	0.08, 3.41	2.20	1.10, 4.41
55–64	0.42	0.13, 1.36	0.01	0.002, 0.08	0.08	0.04, 0.19	0.97	0.11, 8.45	0.69	0.33, 1.42
Gender (ref = female)										
Male	0.31	0.09, 1.11	1.39	1.09, 1.79	4.72	2.72, 8.20	0.98	0.75, 1.27	0.65	0.40, 1.06
Perceived health (ref = good health)										
Excellent/very good	0.95	0.81, 1.12	0.94	0.72, 1.23	0.70	0.43, 1.14	0.92	0.77, 1.09	0.74	0.43, 1.25
Fair/poor	1.00	0.73, 1.38	0.92	0.58, 1.47	2.14	1.10, 4.18	1.17	0.87, 1.56	1.11	0.63, 1.96
Physical activity (ref = active)										
Moderately active	1.28	1.06, 1.55	1.97	1.39, 2.81	0.87	0.49, 1.56	1.16	0.93, 1.43	1.05	0.60, 1.83
Inactive	1.54	1.29, 1.84	2.07	1.55, 2.77	0.83	0.49, 1.41	1.58	1.31, 1.91	0.90	0.60, 1.35
Area of residence (ref = Québec)										
British Columbia	1.59	1.28, 1.97	1.70	1.23, 2.35	2.86	1.62, 5.06	1.24	1.00, 1.54	2.16	1.31, 3.58
Yukon/Northwest Territories/Nunavut	1.59	1.36, 1.87	1.87	1.44, 2.42	1.73	1.04, 2.87	0.98	0.83, 1.17	1.96	1.36, 2.82
BMI (ref = normal)										
Underweight	1.03	0.69, 1.53	1.11	0.59, 2.09	1.63	0.65, 4.08	1.00	0.61, 1.62	1.48	0.63, 3.47
Overweight	0.96	0.81, 1.13	0.92	0.68, 1.26	0.58	0.34, 1.00	1.25	1.05, 1.50	0.80	0.46, 1.39
Obese	1.58	1.28, 1.95	1.20	0.85, 1.68	1.61	0.86, 3.04	1.56	1.25, 1.95	0.70	0.39, 1.26
Household income (ref = ≥80,000)										
60,000–79,999	1.26	0.85, 1.26	1.03	0.69, 1.55	0.50	0.24, 1.02	1.16	0.92, 1.47	1.82	0.96, 3.44
40,000–59,999	1.35	0.90, 1.35	1.78	1.25, 2.55	0.73	0.39, 1.37	1.07	0.87, 1.32	0.82	0.49, 1.39
20,000–39,999	1.51	0.93, 1.51	1.72	1.23, 2.41	0.86	0.43, 1.75	1.30	1.02, 1.67	1.18	0.70, 2.00
<20,000	1.77	0.91, 1.77	2.51	1.55, 4.07	1.83	0.93, 3.59	1.22	0.85, 1.74	1.39	0.77, 2.54
Household education (ref = post-secondary graduate)										
Some post-secondary	1.03	0.79, 1.35	1.14	0.73, 1.76	1.15	0.55, 2.42	1.26	0.94, 1.69	0.66	0.31, 1.40
Secondary graduate	0.90	0.73, 1.12	0.63	0.44, 0.92	2.03	1.04, 3.94	1.53	1.23, 1.90	1.16	0.69, 1.95
Less than secondary	0.86	0.66, 1.11	0.52	0.33, 0.80	2.31	1.31, 4.06	1.79	1.40, 2.30	0.90	0.45, 1.81
Employment status (ref = employed)										
Unemployed	2.30	1.87, 2.82	2.26	1.56, 3.28	0.98	0.58, 1.67	1.87	1.50, 2.33	1.30	0.82, 2.08

Data from the 2012 Canadian Community Health Survey.
[a] Outcome modeled is high-risk sedentary time.

Table 3
Fully adjusted models[a]: moderating effects of age: odds ratios.

		Computer time					Television time					Sitting time				
Variables	Age	18–24	25–34	35–44	45–54	55–64	18–24	25–34	35–44	45–54	55–64	18–24	25–34	35–44	45–54	55–64
Child status																
No children <12		1.67	2.51	1.71	1.27	3.58	1.31	1.15	2.62	1.89	2.48	1.72	2.45	2.20	2.42	3.86
Marital status																
Common law		0.08*	0.53*	1.09*	0.88*	0.76*	0.86	1.34	0.81	1.23	1.11					
Widowed/separated/divorced		0.19	0.21	0.30	0.28	0.25	0.12	0.32	0.64	1.15	1.09					
Single/never married		0.14*	1.20*	1.26*	1.23*	0.55	0.62	1.09	1.07	2.35	1.23					

Data from the 2012 Canadian Community Health Survey.
[a] Outcome modeled is high-risk sedentary time.
* $p < 0.05$.

it was included in the final model because it modified the effects of employment status. The models resulting from the methodology outlined above are presented in Tables 2, 3, and 4. Table 2 presents the factors in which only the main effect was significant and Tables 3 and 4 present the results corresponding to the significant interaction terms in the different models.

Percentages of concordant pairs ranged from 65.4% for reading time to 83.6% for video game time. These model fit statistics were deemed adequate for descriptive modeling purposes. Outliers were not removed from the models, because models with outliers removed were found to have lower percentages of concordant pairs.

3.1. Sitting time

More single/never married men were expected to spend extensive amounts of their leisure time sitting than married men ($p = 0.02$). More men who had no dependent children in their households were expected to spend extensive amounts of their leisure time sitting than men who did ($p = 0.006$). The amount of extensive sitting time among men increased as social support increased ($p = 0.02$).

3.2. Computer time

Being in a common-law relationship was protective against extensive computer time among those aged 18–24, 25–34, 45–45, and 55–64 when compared to married people in the same age groups ($p = 0.001$, 0.04, 0.02, and 0.01 respectively). Conversely, more 35–44 year olds in common-law relationships were expected to spend extensive amounts of their leisure time using a computer than 35–44 year olds who were married ($p = 0.005$). Fewer single or never married people aged 18–24 were expected to engage in extensive computer use than their married counterparts ($p = 0.01$), while more single or never married people aged 25–34, 35–44, and 45–54 were expected to do so than their married counterparts ($p = 0.01$, 0.01, and 0.01 respectively). The amount of extensive computer time increased as social support decreased ($p = 0.046$).

Table 4
Fully adjusted models[a]: moderating effects of gender: odds ratios.

		Television time		Sitting time	
Variables	Gender	Female	Male	Female	Male
Child status					
No children <12				1.72	1.06*
Marital status					
Common law		0.86	1.29	0.96	1.32
Widowed/separated/divorced		0.12	0.15	0.77	1.02
Single/never married		0.62	0.56	0.99	1.52*
Social support				0.96	1.004*

Data from the 2012 Canadian Community Health Survey.
[a] Outcome modeled is high-risk sedentary time.
* $p < 0.05$.

3.3. Television time

While the interaction between marital status and age was significantly related to television time in the Type 3 Analysis of Effects ($p = 0.03$), no significant differences were observed among the age and marital status categories.

3.4. Video game time

Lower video game times were associated with having children in the household ($p = 0.01$).

3.5. Reading time

Lower reading times were associated with having children in the household ($p = 0.02$).

4. Discussion

4.1. Marital status

Our findings that single adults in most age groups had higher odds of extensive computer use, and that single men had higher odds than married men for extensive sitting time are consistent with existing hypotheses that marriage can act as a protective factor against unhealthy behaviours (Robert and Wood, 2007). However, our finding that adults in most age groups who were in a common-law relationship had lower odds for engaging in extensive computer time than their married counterparts is not consistent with these protection hypotheses. These hypotheses are also unable to explain the reversal in computer time trends for certain age groups, or the lack of association between extensive sitting time and marital status for single women. Further research is required to determine how the effects of marital status on computer time might be related to other factors over time.

4.2. Children in the household

We found the absence of dependent children in the household to be positively associated with high video game and reading times. This is consistent with previous literature which has found having children in the household to be protective against extensive sedentary time (Rhodes et al., 2012; O'Donoghue et al., 2016). The associations we observed may be related to the constraints that having children imposes on recreational time use.

Light physical activities such as household chores have been hypothesized to replace sitting time among parents with dependent children (Rhodes et al., 2013). In our study we observed only a very slight protective effect against extensive sitting time among men with dependent

children in their households, and no significant association among women. This may be because Canadian parents appear to replace sleep, rather than sedentary time with light-intensity activities related to additional caregiving (Gaston et al., 2014).

4.3. Social support

We found television time to be unrelated to social support. Past studies have also found television time to be only weakly associated with social support, and unrelated to socializing behaviour (Wangberg et al., 2008; Hooghe and Oser, 2015). One hypothesis is that time spent watching television may take time away from time spent on social interactions and activities that build social capital (Hooghe and Oser, 2015; Robinson et al., 2000). Our lack of association between social support and reading could be attributed to similar reasons, as neither is typically interactive.

We found a positive association between social support and extensive sitting time among men, but not women. Similarly, a recent study of Canadian adults found that gaining social support over a 2-year period was associated with a decrease in leisure time physical activity among men only (Dai et al., 2014). Social support has been found to indirectly affect physical activity through other social cognitive constructs (Ayotte et al., 2010). More research is needed to explore how individual and social-environmental factors such as self-efficacy and social norms may interact with gender to predict sedentary behaviour.

The negative association we observed between social support and computer time is inconsistent with recent evidence that internet use is associated with increased social support and prosocial behaviour (Wangberg et al., 2008; Hooghe and Oser, 2015). While browsing the internet may be the dominant use of computers, it is important to note that our study measured general computer use, including homework and computer games, rather than internet use. This distinction may explain the negative association we observed.

Playing online video games was previously found to be related to social support when accounting for familiarity, physical and social proximity, and online social capital (Trepte et al., 2012). The lack of association we observed between extensive video game time and social support is surprising because the social aspect of gaming appears to be a strong motivator to play (Trepte et al., 2012; Jansz and Martens, 2005). This lack of significance may be due to the way playing video games was classified in the CCHS; playing video games online or with friends is grouped with playing video games offline or alone.

4.4. Strengths and limitations

Sedentary behaviour is of particular concern to Canadians because the country's inclement weather has been found to promote home-based leisure activities in Canadian adults (Spinney and Millward, 2010), and Canada's inclement weather patterns differ from those countries in which comparable research has been conducted (United States, Australia etc.)

Of the literature reviewed, only two Canadian studies were identified that were specific to leisure time sedentary behaviour (Anderson, 2014; Shields and Tremblay, 2008), suggesting a lack of Canadian literature on the subject. To our knowledge, ours is the first study to examine multiple social correlates of leisure time sedentary activities in Canadian adults. The CCHS questionnaire does not specify that the behaviour in question was performed while sitting or lying down (Statistics Canada, 2013a). This is of particular concern for time spent playing video games, which may involve light to moderate physical activity (Fullerton et al., 2014). In our study, the small number of people spending large amounts of time playing video games necessitated a more liberal estimate of 'risky' video game time (15-plus hours per week), which may not represent a truly risky amount of sedentary time. Conversely, estimates of sitting time may have been underestimated, given that other prominent sedentary activities such as mobile phone use (Lepp et al., 2013) were not included.

The changing ways in which Canadians are engaging in sedentary activities might lead to the misclassification of some activities by the questionnaire (e.g. watching television online (Damratoski et al., 2011) the may be classified in the CCHS as computer time). Finally, there are currently no sedentary activity guidelines for adults to inform cutoffs for high and low sedentary activity. This limits comparability between the results of our study and others like it.

5. Conclusion

Sedentary activity, particularly leisure time sedentary activity is a modifiable risk factor. Based on our findings, potential at-risk groups included: single or never married men and men with higher social support for sitting time, people with low social support, married, or single/never married people in most age groups for computer time, and people with no children in their households for video game and reading time. Our results reinforce the need to analyze prominent sedentary behaviours individually rather than using aggregate measures. Our results also suggest that marital status, children in the household, and social support, and their potential interactions with demographic variables should be further examined in future analyses of adult sedentary activities. This knowledge can then be used to inform the creation of tailored interventions to reduce sedentary behaviour in the Canadian population.

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