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National Classification of Diet and Exercise Behaviors: How Healthy are Canadian Men?

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Abstract

Background: Unhealthy behaviours, including poor diet and lack of physical inactivity, are risk factors for premature mortality in men. Identifying disparities and inequalities regarding these habits in Canadian men may allow for targeted interventions to promote wellness. **Purpose:** Our objective was to evaluate a representative sample of the Canadian men to determine current diet and exercise health behaviours and identify predictors of unhealthy habits. **Methods:** A total of 5,362 men and women were asked to complete an online survey men's health. Using a stratification algorithm, 2000 male survey participants which represented the population distribution of Canadian provinces were included in this study. Their diet and exercise behaviours were classified based upon pre-determined thresholds. **Results:** In this national survey of Canadian men, 48.9% did not meet the recommended 150 minutes of moderate exercise per week and 61.8% were classified as having an unhealthy diet. Multivariable analysis identified age (OR 1.01, p=0.001), inability to work (OR 2.10, p=0.022), income less than \$100,000 (OR 1.42-2.20) as significant predictors of unhealthy exercise behavior. Living with parents (OR 1.58, p=0.033), living with a partner and children (OR 1.43, p=0.010), and living with relatives (OR 2.32, p=0.042) were significant predictors of unhealthy eating. **Conclusion:** This study suggests that many Canadian men do not meet minimal requirements for healthy exercise diet. Given most men are pre-contemplative and contemplative about change, interventions to improve these health behaviours should be directed at health education, awareness, and tools for change. Addressing these behaviours may prevent future morbidity and mortality. **Health & Fitness Journal of Canada 2020;13(2):16-29.**

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Keywords: Health behaviors, men's health, diet, exercise, Canada, Canadian men

Introduction

Men worldwide are dying from preventable causes at an unprecedented rate (Elterman et al. 2013; Canadian Institute for Health Information 2016). While the etiology of preventable death among men is multifactorial, unhealthy behaviours, including smoking, poor diet,

physical inactivity, and unhealthy alcohol consumption are leading risk factors for premature mortality worldwide, according to the World Health Organization (WHO, 2017a). The combination of unhealthy diet and exercise behaviours has increased in prevalence worldwide, contributing to

downstream mortality and morbidity (Nichols et al. 2011).

A paramount concern regarding unhealthy lifestyle choices is the increased risk for obesity. In Canada, one in four adults aged 18 to 79 years are obese and two out of three men are overweight as a result of diet and lifestyle-related causes (Haberman et al. 2014). Obesity in men has been associated with a multitude of healthcare issues, including an increased risk of chronic illnesses such as cardiovascular diseases (Kivimaki et al. 2017) and several forms of cancer (Gallagher and LeRoith 2015). The economic and social burden of obesity in Canada is enormous, resulting in \$7.1 billion dollars in healthcare costs (Janssen 2013). Furthermore, unhealthy behaviours have contributed to 6 years of life expectancy loss in 2010 according to the Canadian Mortality Population Risk Tool (MPoRT)(Manuel et al. 2016). In light of this, the promotion of an active lifestyle with adequate exercise and healthy diet has become a national priority. Evidence from previous studies demonstrate that lifestyle choices, specifically diet and exercise, are influenced by a range of factors, including sex, age, education, and socioeconomic status (Hiza et al. 2013; Konttinen et al. 2013). Currently, disparities and inequalities regarding Canadian men's lifestyle choices are poorly understood. In order to address this epidemic and promote wellness, demographic studies are necessary to determine at risk populations to be targeted.

In this study, we evaluated a representative sample of the Canadian male population to determine baseline diet and exercise health behaviours and predictors of unhealthy lifestyle habits for future targeted interventions.

Methods

Institutional Research Board (IRB) approval was obtained from the University of British Columbia and research was conducted according to the Declaration of Helsinki. Between April 20, 2017 and April 28, 2017. Weighted randomization was used to select 5,362 individuals from a large panel of potential survey takers by an online survey provider. All potential respondents met the initial criteria: 19 years and older, had online access, able to read French or English. These participants were invited to take a 15-min online survey about their health behaviours (available by request). The survey topic was not disclosed in the initial survey invitation and only potential respondents who went to the survey introduction page were advised that men's health was the focus. Participants were incentivized to complete a survey with proprietary panel points which could later be exchanged for various rewards. This sample of 5,362 survey takers was further reduced to 2,000 males through the use of post opt-in screening and stratification quotas, the removal of respondents who chose not to complete the survey, and the removal of respondents who provided non-differential responses (straight-lining) or completed the survey significantly faster than average (speeding). Stratification of men was done to ensure that the sample's composition reflected the relative distribution of the Canadian population by age and geography as determined by the 2016 Canadian Census data (Statistics Canada, 2016).

Health Behaviours

The survey included established key health behaviours known to impact morbidity and mortality including: smoking, alcohol use, sleep, depression and exercise and diet. For this study, we

analyzed the dietary and exercise behaviours of the men surveyed. Diet and exercise behaviour were assessed as either 'healthy' versus 'unhealthy' based upon the published literature.

Exercise: Men achieving 150 minutes or greater of moderate to strenuous exercise per week were classified as 'healthy', as recommended by the Public Health Agency of Canada and Health Canada. Exercise was assessed using the Godin Shephard Leisure-time Exercise Questionnaire, a 4-item scale that assesses episodes, intensity, and duration of physical activity during a typical 7-day period (Godin and Shephard 1985).

Diet: Healthy diet guidelines were derived from the World Health Organization (Organization 2018) and the Canada Food Guides (Government of Canada, 2018). Participants were asked about their weekly frequency of consuming unhealthy foods, including those that were high in salt, high in saturated fats, high in refined sugar; as well as healthy foods, including those that were high in OMEGA-3 healthy fats, and 5 or more servings of fruits and/or vegetables per day. Scores were given based on the frequency of eating certain groups of food. Table 1 shows the grading rubric for eating habits. Lower frequencies of unhealthy food choices and higher frequencies of healthy food choices resulted in greater scores. Men with a composite score greater than 11 out of maximum score of 15 were classified as 'healthy'.

Stages of Change

Selection of an unhealthy behaviour prompted the survey taker to describe his stage transtheoretical model stages of change (SOC) which has extensively been used in classifying stages of adopting

healthier physical activity and dietary habits (Mastellos et al. 2014).

Statistical Analyses

Descriptive analyses were initially performed to identify the number of men with healthy and unhealthy classification of behaviours. Chi-squared analysis was utilized to evaluate associations between demographic factors and behaviour classification. Multivariate logistic regression was conducted to analyze predictive factors for our dichotomized categories of healthy or unhealthy behaviours and to identify behavioural factors predictive of various medical comorbidities. The referent predictor variables were assigned to the most populous variable within each variable section. A two-sided p-value of <0.05 was considered significant. Statistical analyses were performed using Stata 14.1.

Results

Current Diet and Exercise Behaviours:

The demographic information of 2000 male survey takers in this analysis is shown in Table 1. As previously described, men who fit the geographic stratification by province were included in this study. Table 2 describes the distribution of exercise and diet behavior by age, household income, child status, and Province. Men engaging in 150 minutes or greater of moderate to strenuous exercise per week were classified as healthy. Using this definition, 977 men (48.9%) did not meet this threshold and were classified as unhealthy. Most concerning, 20% of men reported not participating in any exercise. The highest proportion of unhealthy men were in the 55+ age range (55.9%), had less than or equal to \$80,000 yearly income (50.9%),

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Table 1: Scoring rubric for eating behaviors based from WHO and the Government of Canada guidelines. A total combined score of 11 out of 15 considered healthy.

Eating Behavior	Frequency (score)		
	Once a week	1-2 times a week	3+ times a week
Eat foods that are high in salt (e.g processed foods, fast foods, salty snacks, canned soups)	3	2	1
Eat foods that are high in saturated fats (e.g red meats, butter, deep-fried foods, donuts)	3	2	1
Eat foods that are high in refined sugar (e.g red meats, butter, deep-fried foods, donuts)	3	2	1
Eat foods that are high in omega-3 healthy fats (e.g fish, avocado, olive oil, omega-3 eggs, flaxseeds, nuts)	1	2	3
Eat 5 or more servings of fruits and/or vegetables a day	1	2	3

and came from central Canada (Saskatchewan/Manitoba) (55.0%).

With regards to diet, 1235 (61.8%) were classified as unhealthy. Men who were younger (19-29 age group) were the unhealthiest eating group (69.1% unhealthy). Other demographic categories with unhealthy diets included men who had income less than 80,000 (65.3% unhealthy), men with children (66.2% unhealthy), and those from Saskatchewan/Manitoba (68.7% unhealthy), all of which were unhealthier than their counterparts.

Predictors of Unhealthy Health Behaviours

Table 4 shows the predictors associated with unhealthy exercise behaviour. Increasing age was significantly associated with unhealthy behaviour (odds ratio (OR) 1.01, 95% confidence interval (CI): 1.00-1.02, $p=0.001$). Employment status affected exercise behaviour as well. Men unable to work were more than two times more likely to practice unhealthy exercise behaviour (OR 2.10, 95% CI: 1.11-3.67, $p=0.022$). Additional predictors of unhealthy exercise behaviours were men who were homosexual (OR 1.38, 95% CI: 1.00-1.92, $p=0.049$), living with a partner

and children (OR 1.39, 95% CI: 1.06-1.82, $p=0.017$), and men with lower incomes as compared to those making \$60,000-79,999 including \$19,000 or less (OR 2.20, 95% CI: 1.36-3.56, $p=0.001$), \$20,000-39,999 (OR 1.59, 95% CI: 1.13-2.23, $p=0.001$), and \$40,000-59,999 (OR 1.70, 95% CI: 1.23-2.34, $p=0.001$). Geographically, men from Alberta were less likely to have unhealthy exercise behaviour compared to Ontario (OR 0.66, 95% CI: 0.48-0.91, $p=0.011$).

Predictors of healthier exercise behaviours included men who were in the healthcare field (OR 0.45, 95% CI: 0.27-0.77, $p=0.003$) and part-time students (OR 0.32, 95% CI: 0.16-0.69, $p=0.003$).

Table 5 demonstrates the factors associated with unhealthy eating behaviours. Significant predictors of unhealthy eating behaviours were those that lived with their parents (OR 1.58, 95% CI: 1.03-2.43, $p=0.033$), living with partner and children (OR 1.43, 95% CI: 1.08-1.88, $p=0.010$) and living with relatives (OR: 2.32, 95% CI 1.03-5.25, $p=0.042$). Significant predictors of healthy eating behaviours were men who were minorities (OR 0.72, 95% CI: 0.53-0.98, $p=0.042$) and age (OR 0.98, 95% CI: 0.98-0.99, $p=0.047$).

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Table 2: Demographics of Canadian men who took a national survey of health behaviours.

Demographics		Number of Participants (%)
Sex		
	Male	2000 (100)
Age		
	19-29	379 (19.0)
	30-54	934 (46.7)
	55+	687 (34.4)
Province		
	British Columbia (BC)	265 (13.3)
	Alberta (AB)	217 (10.9)
	Saskatchewan & Manitoba (SK-MB)	131 (6.6)
	Ontario (ON)	768 (38.4)
	Quebec (QC)	476 (23.8)
	Maritime Provinces (MP)	142 (7.1)
	Territories (T)	1 (0.1)
Household Income		
	<\$80,000	1098 (54.9)
	≥\$80,000	902 (45.1)
Highest level of education		
	Primary School or less	6 (0.3)
	Some high school	48 (2.4)
	High school graduate	301 (15.1)
	Some college/trade school	225 (11.3)
	Graduated college/trade school	422 (21.1)
	Some university	175 (8.8)
	University undergraduate degree	495 (24.8)
	University graduate degree	328 (16.4)
Number of children age <19 living with participant		
	None	1623 (81.2)
	One	177 (8.9)
	Two	140 (7.0)
	Three	42 (2.1)
	Four +	18 (0.9)
Living Arrangement		
	Partner	818 (40.9)
	Alone	449 (22.5)
	Partner & children	392 (19.6)
	Parent	178 (8.9)
	Non-relatives	54 (2.7)
	Children	49 (2.5)
	Relatives	41 (2.1)
	University or College Campus	14 (0.7)
	Other	5 (0.3)
Employment		
	Employed full-time	1003 (50.2)
	Employed part-time	155 (7.8)
	Self-employed	170 (8.5)
	Looking for employment	93 (4.7)
	Unable to work	63 (3.2)
	Retired	453 (22.7)
	Student full-time	108 (5.4)
	Student part-time	47 (2.4)
	Home caregiver	14 (0.7)
Total number of participants		2,000 (100)

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Table 3: Demographic variation in prevalence (%) of healthy and unhealthy behaviours by age, household income, child status, and province.

Exercise	All men	Age (yr)			Household Income		Children		Province					
		19-29	30-54	55+	<\$80,000	≥\$80,000	No	Yes	BC	AB	SK-MB	ON	QC	MP, T
0 min	20.0	10.6	18.2	27.7	23.3	15.9	20.4	18.6	20.0	18.4	27.5	19.4	20.2	18.2
1-59 min	8.8	7.1	8.8	9.6	9.3	8.1	8.1	10.9	5.3	5.1	6.1	10.7	9.0	11.9
60-149 min	20.1	17.9	22.1	18.6	18.3	22.3	19.3	22.9	20.8	16.1	21.4	20.6	20.0	21.7
150-239 min	17.2	20.1	18.6	13.7	17.1	17.4	17.2	17.2	18.5	21.2	18.3	15.8	16.0	19.6
240+ min	34.0	44.3	32.3	30.4	32.0	36.3	35.0	30.4	35.5	39.2	26.7	33.6	34.9	28.7
Diet	All men (%)	19-29	30-54	55+	<\$80,000	≥\$80,000	No	Yes	BC	AB	SK-MB	ON	QC	MP, T
Unhealthy diet	61.8	69.1	64.9	53.4	65.3	57.3	60.5	66.2	58.9	62.7	68.7	62.9	59.9	59.4
Healthy diet	38.3	30.9	35.1	46.6	34.7	42.7	39.5	33.8	41.1	37.3	31.3	37.1	40.1	40.6

Healthy behaviours are highlighted; Province: British Columbia (BC), Alberta (AB), Saskatchewan & Manitoba (SK-MB), Ontario (ON), Quebec (OC), Maritime Provinces (MP), Territories (T).

Stages of Change

The stages of change in men with unhealthy diet and exercise habits were captured through the survey as well (Figure 1). Of those men with unhealthy exercise behaviors, 17.6% were in the pre-contemplation phase and reported “never thinking about exercise” habits. The largest group of men (54.9%) were in the contemplation SOC and “sometimes” thought about getting more exercise. Following this, 22.6% of men were in the preparation phase, and had “decided” to get more exercise. The lowest percentage of men were in the action and maintenance phase of stages of change in exercise and eating, 2.8% and 2.1%, respectively.

The stages of change in men who had unhealthy eating habits paralleled those with poor exercise habits. Of these men 16% were in the pre-contemplation stage, 50.4% were in the contemplation stage, and 23.6% were in the preparation phase. A minority of men were in the action and maintenance phase, 6.2% and 3.9% respectively.

Discussion

Lifestyle factors such as diet and exercise are easily modifiable and significantly contribute to morbidity and mortality in men. In our representative sample of Canadian men, half (48.9%) of men exhibited unhealthy exercise behaviours while nearly two-thirds (61.8%) of men had unhealthy eating behaviours. Identifying the prevalence and demographics of unhealthy behaviours will allow for and encourage targeting of public health initiatives.

Exercise: Exercise has significant health benefits and has been shown to reduce the risk of multiple chronic and preventable health conditions (Warburton, Nicol, and Bredin 2006; Warburton and Bredin, 2018). In light of this, the Public Health Agency of Canada and Health Canada recommends that adults participate in more than 150 minutes of moderate to vigorous physical activity per week. In the present study population, only 51% of men met 150 minutes of weekly exercise. This rate is far lower than the WHO estimates of worldwide physical activity, which found

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Table 4: Predictors of unhealthy exercise behaviours in a representative sample of Canadian men.

Predictors of unhealthy exercise behavior	Odds Ratio (95% CI)	p-Value
Demographics		
Minority	1.14 (0.84-1.56)	0.379
Age	1.01 (1.00-1.02)	0.001*
Employment Status (employed full-time ref)		
Employed part-time	0.78 (0.51-1.19)	0.256
Looking for employment	0.65 (0.40-1.06)	0.091
Unable to work	2.10 (1.11-3.97)	0.022*
Retired	0.81 (0.58-1.13)	0.219
Student full-time	0.72 (0.44-1.17)	0.188
Student part-time	0.32 (0.16-0.69)	0.003*
Not reported	1.00 (0.69-1.46)	0.996
Home caregiver	1.56 (0.37-6.60)	0.548
Healthcare worker	0.45 (0.27-0.77)	0.003*
Orientation (heterosexual ref)		
Gay or Lesbian	1.38 (1.00-1.91)	0.049*
Orientation (Ontario ref)		
British Columbia	0.81 (0.60-1.09)	0.180
Alberta	0.66 (0.48-0.91)	0.011
Saskatchewan & Manitoba	1.19 (0.80-1.78)	0.366
Quebec	0.87 (0.68-1.12)	0.295
Atlantic Provinces + Territories	0.96 (0.65-1.39)	0.835
Living Arrangement (living with partner ref)		
Parents	0.90 (0.60-1.36)	0.646
Alone	0.82 (0.62-1.07)	0.153
Partner & children	1.39 (1.06-1.82)	0.017*
Non-relatives	1.16 (0.63-2.15)	0.616
Children	1.24 (0.67-2.30)	0.482
Relatives	0.56 (0.27-1.16)	0.123
University or College Campus	2.40 (0.74-7.74)	0.153
Other	1.30 (0.19-8.66)	0.782
Highest level of education (undergraduate degree ref)		
Primary school	0.97 (0.17-5.47)	0.976
Some high school	1.01 (0.52-1.94)	0.987
High school graduate	1.17 (0.85-1.61)	0.322
Some college/trade school	0.71 (0.51-1.01)	0.057
Graduated college/trade school	1.05 (0.79-1.38)	0.721
Some university	0.89 (0.61-1.30)	0.563
University graduate degree	0.88 (0.66-1.19)	0.424
Household Income (60,000-79,999 ref)		
19,000 or less	2.20 (1.36-3.56)	0.001*
20,000-39,999	1.59 (1.13-2.23)	0.007*
40,000-59,999	1.70 (1.23-2.34)	0.001*
80,000-99,999	1.42 (1.02-1.97)	0.037*
100,000-119,99	0.91 (0.63-1.30)	0.608
120,000-139,999	1.16 (0.76-1.78)	0.178
140,000 or more	0.79 (0.55-1.12)	0.189

that 77% of adults were sufficiently physically active (WHO, 2017b).

The impact of exercise on health has long been established. A 1995 study of 17,321 Harvard Alumni followed for more than 20 years found an inverse relationship between total physical activity and mortality. In that analysis, vigorous exercise was associated with decreased all-

cause mortality compared to non-vigorous exercise (Lee, Hsieh, and Paffenbarger 1995). Further links have noted associations of exercise with improvements in stress, cognitive function and a multitude of chronic disease including cardiovascular disease (Pedersen and Saltin 2015). It is worth noting that there is likely a dose-dependent

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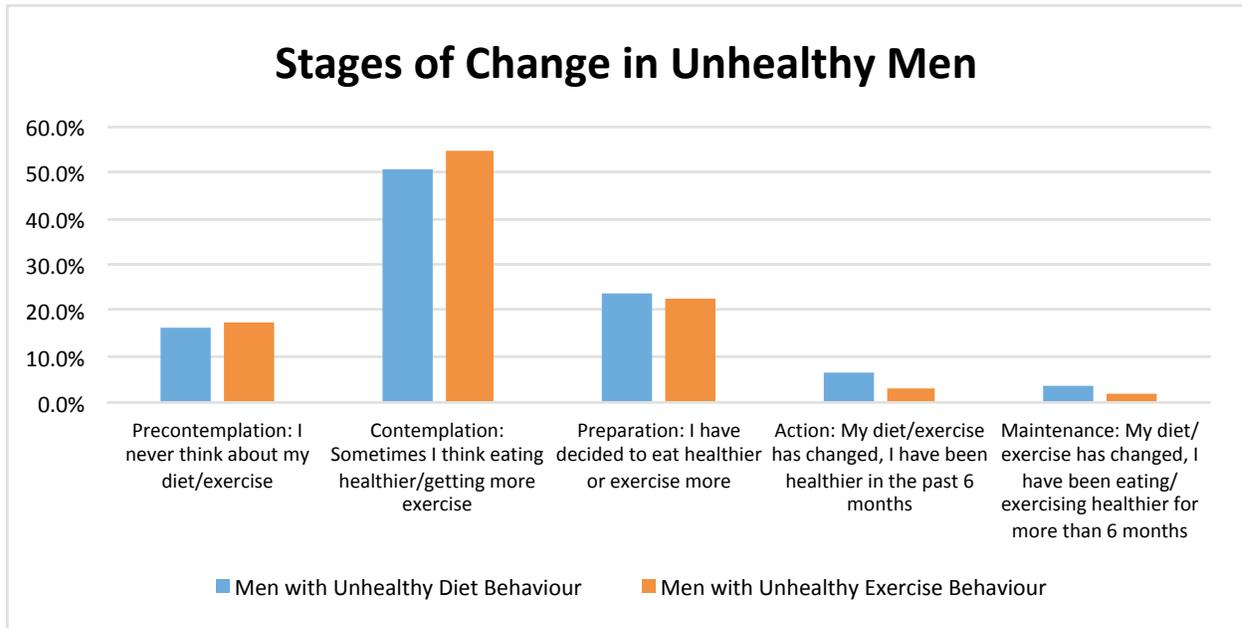
Table 5: Predictors of unhealthy of eating habits in a representative sample of Canadian men.

Predictors of unhealthy diet behavior		Odds Ratio (95% CI)	p-Value
Demographics			
	Minority	0.72 (0.53-0.98)	0.042*
	Age	0.98 (0.98-0.99)	0.047*
Employment Status (employed full-time ref)			
	Employed part-time	1.28 (0.81-2.02)	0.276
	Looking for employment	0.83 (0.50-1.37)	0.477
	Unable to work	1.18 (0.63-2.23)	0.593
	Retired	0.74 (0.53-1.03)	0.080
	Student full-time	0.83 (0.51-1.36)	0.479
	Student part-time	0.97 (0.50-1.88)	0.937
	Not reported	0.93 (0.63-1.36)	0.719
	Home caregiver	1.52 (0.30-7.63)	0.606
	Healthcare worker	1.37 (0.81-2.02)	0.229
Orientation (heterosexual ref)			
	Gay or Lesbian	1.08 (0.77-1.50)	0.635
Orientation (Ontario ref)			
	British Columbia	0.85 (0.63-1.15)	0.306
	Alberta	0.99 (0.71-1.36)	0.961
	Saskatchewan & Manitoba	1.30 (0.86-1.97)	0.208
	Quebec	0.88 (0.64-1.06)	0.143
	Atlantic Provinces + Territories	0.85 (0.58-1.24)	0.430
Living Arrangement (living with partner ref)			
	Parents	1.58 (1.03-2.43)	0.033*
	Alone	1.14 (0.87-1.50)	0.316
	Partner & children	1.43 (1.08-1.88)	0.010*
	Non-relatives	1.10 (0.59-2.07)	0.750
	Children	2.26 (1.13-4.50)	0.020
	Relatives	2.32 (1.03-5.25)	0.042*
	University or College Campus	1.45 (0.42-4.98)	0.549
	Other	1.15 (0.17-7.74)	0.885
Highest level of education (undergraduate degree ref)			
	Primary school	1.36 (0.22-8.40)	0.740
	Some high school	1.34 (0.68-2.66)	0.388
	High school graduate	1.16 (0.84-1.61)	0.361
	Some college/trade school	1.21 (0.85-1.72)	0.274
	Graduated college/trade school	0.92 (0.70-1.22)	0.605
	Some university	0.94 (0.64-1.36)	0.749
	University graduate degree	0.97 (0.72-1.30)	0.859
Household Income (60,000-79,999 ref)			
	19,000 or less	1.12 (0.68-1.82)	0.644
	20,000-39,999	0.84 (0.59-1.18)	0.327
	40,000-59,999	1.20 (0.86-1.67)	0.280
	80,000-99,999	0.77 (0.55-1.08)	0.133
	100,000-119,99	0.71 (0.50-1.02)	0.072
	120,000-139,999	0.75 (0.49-1.15)	0.198
	140,000 or more	0.76 (0.53-1.08)	0.129

relationship between physical activity and health. Thus, even small increases in physical activity can have health benefits and should be encouraged (Warburton & Bredin 2018).

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Figure 1: Stages of change in men with unhealthy diet and exercise behaviours.



Stages of Change	Men with Unhealthy Diet Behaviour	Men with Unhealthy Exercise Behaviour
Precontemplation: I never think about my diet/exercise	16.0%	17.6%
Contemplation: Sometimes I think eating healthier/getting more exercise	50.4%	54.9%
Preparation: I have decided to eat healthier or exercise more	23.6%	22.6%
Action: My diet/exercise has changed, I have been healthier in the past 6 months	6.2%	2.8%
Maintenance: My diet/exercise has changed, I have been eating/exercising healthier for more than 6 months	3.9%	2.1%

We found that increasing age was associated with unhealthy exercise behaviours. Given that exercise requires functional capacity which may be reduced with aging, it is not surprising that activity decreases with age (Milanovic et al. 2013). In addition to jeopardizing their health and increasing the risk of morbidity, men may be also compromising quality of life by not engaging in adequate exercise. In one study in China, men aged 40-70 who reported higher levels of physical activity were significantly less likely to develop aging

symptoms compared with those who reported lower levels of physical activity (Wang et al. 2015). In addition, we found lower incomes were associated with higher rates of unhealthy exercise behaviours. The lowest income class that we analyzed, those making \$19,000 or less, had more than a 2-fold increase in unhealthy exercise behaviours. These numbers are consistent with other national studies, including one from Australia, which found that individuals making higher incomes exercise more often and with higher

intensity than those with lower incomes (Maruyama and Yin 2012). Several explanations including lack of income to afford conventional methods of exercise such as gym memberships may explain this relation. The poor rates of adherence to healthy exercise principles may be rectified by exercise promotion efforts (Bottorff et al. 2015). Evidence from our study found that a majority of men (72.5% total) are in the pre-contemplation or contemplation stage of change with regards to exercise. This suggests a strong climate for disseminating health education which may lead men to shift rightward toward preparation and later stage of change.

Research has examined the effectiveness of various physical activity interventions; however, few studies have focused on program effects by sex or considered the influence of gender-related factors. One recent review by George *et al.* examined the effectiveness of physical activity programs in adult males found that only a limited number of physical activity interventions targeted men specifically (George et al. 2012). Men-specific health interventions improved male participation rates, retention, and increased overall success compared to the gender neutral initiatives. In our analysis, men who were in the healthcare field were twice as likely to engage in healthy behaviours suggesting that improved accessibility to health information and education may promote healthy exercise habits. Thus, health education efforts especially towards older men and physical activity subsidies for low income men may increase adoption of healthy exercise behaviours in Canada.

Diet: The overall goal of any healthy diet should be to increase length of life and decrease the risk of disease while maintaining sustainability. With evidence from various studies, there are a common

set of dietary principles that define healthful eating (Katz and Meller 2014). The WHO and the Canada Food Guide have advocated for the universal adoption of diets which limit consumption of high amounts of salt, saturated fat, and refined sugar and increases the intake of high value foods such as fruits and vegetables. While the standard for a healthy diet worldwide varies, using our definitions found only 38.3% of men in our study met the threshold of consuming a healthy diet. The consequences of such habits may be severe. Poor nutrition is independently associated with various health conditions including increased risk of cardiovascular disease, metabolic syndrome and its sequela, and cancers (Schwingshackl et al. 2017).

When looking at predictors of healthy diet behaviours, we found increasing age significantly increased healthy eating behaviours. One reason for this may be that older men tend to have more health-related issues and interface more with physicians compared to younger individuals. They are thus exposed to greater access to health information and may have to follow a specific diet dictated by their health condition (Sinclair, Lawson, and Burge 2008). Additionally, men who lived with parents and those living with partners and children had nearly 1.5 times increased risk of unhealthy eating behaviours (ORs 1.58 and 1.43 respectively) while those living with relatives had nearly a 2.3 times increased risk of practicing unhealthy health behaviours compared to men living with a partner. There is evidence that suggests food choice is influenced by social context. Umberson et al. (1992) found that marriage promotes healthier lifestyles for men especially given the increased social control provided by marriage. Furthermore, there is evidence to suggest

that people generally eat more in the presence of company and relatives than when eating alone, especially when the company is larger quantity of food (Herman, Roth, and Polivy 2003). While our study did not capture the eating habits of others in the household, it likely plays a substantial role in unhealthy eating habits.

Given Canadian diversity, the challenges of improving the diet quality of population are inherent. Cultural and regional influences, tastes, traditional cooking methods, and availability and affordability of healthy foods are all factors which determine diet and may vary across the country. Our findings provide a starting point for targeted interventions. In the present study, younger individuals had worse eating habits than older individuals, providing an opportunity for health education earlier in life. A cross-sectional study in Australia found that significant barriers to healthy diet in young men included ease of access of healthy foods, lack of time to prepare healthy foods, and high cost of healthy foods (Ashton et al. 2017). In addition to education, health initiatives in schools may provide another opportunity to create lifelong healthy eating habits. Given nearly 65% of men with unhealthy diet habits were in the pre-contemplation or contemplation stage of change, there is evidence of a motivated population to receive targeted behavior-changing initiatives.

Our study must be interpreted in the context of our study design. Given its online survey design, recall biases are inherently difficult to eliminate with participant self-reporting. Furthermore, accessibility to the internet was necessary for participation, perhaps introducing a selection bias for those with access to the internet. Furthermore, our study did not capture weight and height data for participants.

This would allow us to better correlate diet and exercise behaviours to outcomes, like body mass index (BMI). However, public health data suggests that unfit individuals have twice the risk of all-cause mortality regardless of BMI (Barry et al. 2014). Lastly, definitions of healthy diet and exercise vary geographically, demographically, and socially. Factors such as age, gender, co-morbidities may affect response to various diets. Given standardized tools are lacking in the literature, we created dichotomous categories based upon evidence associated with both dietary features and exercise parameters with mortality. These categories were also supported by the recommendations put forth by the Government of Canada and WHO, the two main educational bodies providing public health information to Canadians. Despite these limitations, our study is one of the largest cross-sectional studies to evaluate diet and exercise-related health behaviors and attitudes towards change and provides details of populations which may benefit greatly from targeted health interventions.

Conclusions

A significant proportion of Canadian men are engaging in unhealthy diet and exercise behaviours which will likely increase their risk of preventable morbidity and mortality. Identification of at-risk groups will allow for proper targeting of health-related information. A majority of these men are in the pre-contemplation or contemplation stage of change providing an opportunity for healthcare initiatives to promote education and access to programs pertaining to healthy exercise and dietary choices.

Authors' Qualifications

The authors' qualifications are as follows: Khushabu Kasabwala MD, Ryan Flannigan MD, Nahid Punjani MD MPH, Nick Black MA, and S. Larry Goldenberg, MD.

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