The Association between Physical Activity and Self-Rated Health in Atlantic Canadians

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Introduction

Biological, psychological and social factors all influence an individual's perception of their health status.[1] Self-rated health (SRH) is a subjective measure of this perception, which utilizes a four- or five-point scale, ranging from "poor" to "excellent."[2] SRH is well-established in the field of public health; it can be used as a predictive indicator of a population's overall health and well-being, including future morbidity, mortality, functional decline, and utilization of health care services.[1,3-4] Previous research has demonstrated the relationship between lower levels of SRH and higher rates of mortality from chronic disease, including diabetes mellitus.[5]

Engaging in regular levels of physical activity (PA) can result in improvements in overall health, and reduce the risks associated with a sedentary lifestyle. Increased PA has the potential to prevent detrimental health conditions, including diabetes, cardiovascular disease, obesity, and some forms of cancer.[6–8] Regular PA is also positively associated with higher levels of SRH.[1,9] Recognizing the benefits associated with PA and the link between PA and SRH, this research brief explored the association between PA levels and SRH among Atlantic Canadians. We also explored the impact of chronic disease status on this association.

Methods

Study population

This population-based cross sectional study drew participant data from the Atlantic Partnership for Tomorrow's Health (PATH) study. Atlantic PATH is part of Canadian Partnership for Tomorrow Project, a national prospective cohort study examining the influence of genetic, environmental, and lifestyle factors in the development of cancer and chronic disease.[10] The study subjects in this analysis are Atlantic PATH participants

who were recruited from 2009-2015 in Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador. This analysis includes 18,652 participants who were aged 35-69 years, and provided information on variables including PA with the IPAQ long form, self-rated health, and sociodemographic characteristics.

Socio-demographic characteristics and habits

Sex, age, education, working status, marital status, household income, alcohol consumption, and smoking status were included as covariates in the analysis as they might account for part of the variance in PA levels.

Physical activity

Participants were asked to report their levels of physical activity using open-ended questions in the International Physical Activity Questionnaire (IPAQ long form) [11] The IPAQ asks participants to identify the frequency and duration of all vigorous, moderate, and walking PA (i.e., inclusive of occupational, domestic and leisure-time) within the last seven days. Participants were asked only to report activities that were in bouts of 10 minutes or more. Each question defined the specific intensity and domain, as well as provided examples. Using the IPAQ guidelines for data processing and analyses, daily and weekly metabolic equivalents of a task (MET) values were calculated for each domain. Total scores of physical activity in MET-minutes/week were calculated by summing all MET values across all domains. In accordance with the criteria of the IPAQ scoring protocol, categorical PA scores were defined as inactive, moderate active, and active.

Chronic conditions

Variables on prevalence of self-reported chronic disease were dichotomized as yes/no on the basis of the responses to a medical history questionnaire. The number of chronic conditions for each participant were summed based on the self-report of one or more chronic disease diagnoses. Chronic diseases included: cancer (skin cancer included), asthma, chronic obstructive pulmonary disease (COPD), chronic bronchitis, emphysema, liver cirrhosis, chronic hepatitis, myocardial infarction (MI), stroke, hypertension, type I and II diabetes, irritable bowel disease (IBD), irritable bowel syndrome (IBS), psoriasis, multiple sclerosis, arthritis, eczema,

systemic lupus erythematosus, and osteoporosis. Participants were then classified into three groups according to the number of chronic conditions they had (none, one, and two or more).

Self-rated health

Participants were asked to rate their health as excellent, very good, good, fair, or poor. Those who reported as fair or poor health were classified as having a poor SRH status.[12]

Statistical analyses

The primary analysis was stratified by sex because the prevalence of PA differed substantially between males and females. Additional analyses were conducted to explore whether associations between levels of PA and SRH extended to persons in different age groups. All descriptive statistics are presented as frequencies and percentages for categorical variables, and as means and standard deviations for continuous variables. The statistical methods used were Chi-squared test and logistic regression analysis. The overall risks (ORs) for poor SRH at different levels of PA were compared using logistic regression analysis after adjusting for general characteristics and chronic conditions. Statistical significance was accepted for P values <0.05, and statistical analyses were performed using SAS 9.4 for Windows (SAS, Carey, NC).

Results

Of all participants, 70% were women and 28% reported having at least two chronic conditions. Twelve percent of men and 11% of women were classified as physically inactive. An excellent health status was reported by 17% of men and 19% of women, and 7% of men and 6% of women reported their health to be fair or poor. Prevalence of multimorbidity was lower amongst men, 43% were healthy (no chronic conditions), and 24% reported multimorbidity (i.e. two or more chronic conditions); while 37% of women had no chronic conditions, and 30% reported two or more chronic health conditions (Table 1).

The results from both univariate models and adjusted models suggest that participants who are physically active are less likely to report poor SRH. This association was significant both for men and women. Additional analyses were conducted to explore whether the associations between levels of PA and SRH were similar in different age groups and among healthy participants or participants with chronic conditions. In all age

groups, the odds ratio for poor SRH was significantly lower in active subjects compared with inactive subjects. The association was similar between participants with chronic medical conditions and healthy participants (Table 2).

Table 1
Physical activity level, self-rated health, and number of chronic conditions; The Atlantic Partnership for Tomorrow's Health (PATH) cohort 2009 – 2015

	Male (n=5,695)	%	Female (n=12,957)	%	p-value[a]
Physical activity level					<.0001
Inactive	694	12.2	1361	10.5	
Moderately Active	1409	24.7	3820	29.5	
Active	3592	63.1	7776	60.0	
Self-rated health (SRH)					<.0001
Poor	52	0.9	90	0.7	
Fair	343	6.0	701	5.4	
Good	1808	31.7	3691	28.5	
Very good	2503	44.0	5988	46.2	
Excellent	989	17.4	2487	19.2	
Number of chronic conditions					<.0001
0	2423	42.5	4774	36.8	
1	1936	34.0	4240	32.7	
2+	1336	23.5	3943	30.4	

[a] p-values are from Chi-squared test

Table 2
Association of poor self-rated health (SRH) with physical activity men and women during 2009 – 2015

Physical activity level	% of Fair/poor SRH	Crude OR (95% CI)	Adjusted OR (95% CI)
Stratified by sex[b]			
Male (395/5695)			
Inactive	13.1	1(Reference)	1(Reference)
Moderately Active	7.4	0.53(0.39,0.71)	0.79(0.56,1.1)
Active	5.6	0.39(0.3,0.51)	0.5(0.37,0.67)
Female (791/12957)			
Inactive	12.7	1(Reference)	1(Reference)
Moderately Active	6.3	0.46(0.38,0.57)	0.58(0.46,0.73)
Active	4.8	0.35(0.29,0.42)	0.39(0.32,0.49)
Stratified by age[c]			
Age 35-49 years (295/6963)			
Inactive	7.3	1(Reference)	1(Reference)
Moderately Active	4.5	0.59(0.42,0.83)	0.66(0.46,0.95)

Active	3.5	0.47(0.34,0.64)	0.46(0.32,0.65)
Age 50-59 years (475/6724)			
Inactive	15.4	1(Reference)	1(Reference)
Moderately Active	7.3	0.44(0.33,0.57)	0.57(0.42,0.76)
Active	5.4	0.32(0.25,0.4)	0.39(0.29,0.51)
Age 60-69 years (416/4965)			
Inactive	17.4	1(Reference)	1(Reference)
Moderately Active	9.1	0.48(0.35,0.64)	0.61(0.44,0.86)
Active	6.6	0.33(0.26,0.43)	0.43(0.32,0.57)
Stratified by number of health conditions[d]			
No chronic condition (138/7197)			
Inactive	4.1	1(Reference)	1(Reference)
Moderately Active	2.2	0.52(0.32,0.84)	0.61(0.37,1.01)
Active	1.5	0.35(0.22,0.54)	0.39(0.24,0.62)
One chronic condition (253/6176)			
Inactive	8.1	1(Reference)	1(Reference)
Moderately Active	4.3	0.51(0.36,0.74)	0.63(0.43,0.93)
Active	3.3	0.39(0.28,0.54)	0.43(0.3,0.61)
Two or more chronic conditions (795/5279)			
Inactive	26.7	1(Reference)	1(Reference)
Moderately Active	15.5	0.5(0.4,0.63)	0.61(0.48,0.78)
Active	12.3	0.39(0.32,0.47)	0.43(0.35,0.54)

[b] For sex strata, adjusted for age (continuous), household income, education, working status, marital status, alcohol assumption, smoking status, and chronic medical conditions (none, one, two or more); [c] for age strata, adjusted for sex, household income, education, working status, marital status, alcohol assumption, smoking status, and chronic conditions (none, one, two or more); [d] For strata of number of chronic conditions, adjusted for sex, age, household income, education, working status, marital status, alcohol assumption, smoking status.

Discussion

Atlantic PATH's finding supports the literature which indicates that adults who engage in regular PA are less likely to have poor SRH[1,9]. This was true among all the variables examined for associations including age, sex, and, most interestingly, number of chronic health conditions. We found that participants were less likely to have low SRH if they were getting regular PA than those who were inactive, even among those with two or more chronic health conditions. There is evidence of this among people with type 1 diabetes, type 2 diabetes, or without diabetes who engage in regular PA; they have higher SRH than adults who are inactive.[1] These findings indicate that PA may help improve perceived health status of people with one or more chronic conditions.

This is an important finding as SRH has been shown to be an important component of an individual's perceived general health and well-being.[1,3-4] Additionally, it is important to note that our results support the literature to date that states PA is both safe and beneficial for adults with chronic disease when performed according to their level of ability.[1]

Conclusion

The study results suggest that inactivity was associated with poor SRH in Atlantic Canadians. The association is independent of sex, age, and most notably, number of health conditions.

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