Understanding physical active Franco-Ontarian smokers: Practical implications for health education and promotion

Keywords: Canada, Canadian Community Health Survey, Francophone, Physical activity, Smoking Cessation

**Abstract**

**Background:** Rates of smoking among Franco-Ontarians have traditionally been greater than their Anglophone counterparts. Physical activity has been found to reduce the long-term negative effects of smoking. The purpose of this study was to profile physically active Franco-Ontarian smokers with the intention of identifying smokers most likely to uptake physical activity.

**Methods:** Data from the Canadian Community Health Survey (CCHS) 2007-2008 were analyzed to compare selected socio-demographic characteristics of physically active Franco-Ontarian smokers to a) physically inactive smokers; b) physically active non-smokers; and c) physically inactive non-smokers. **Results:** A total of 1968 respondents were included in the current study; 133 of these respondents were classified as “Active Smokers”. Multiple logistic regression models revealed that “Active Smokers” were less likely to report being of low income status when compared to “Inactive Smokers”, while they were more likely to report having only “some postsecondary education” when compared to “Active Non-Smokers”. **Conclusions:** The promotion of physical activity among smokers should take into account the following points; a) physically active Franco-Ontarian smokers are slightly different from those of the general population, and b) target populations for promoting physical activity to Franco-Ontarians smokers should take into account level of income and education.

According to the World Health Organization, smoking is the main cause of preventable deathand kills over five million people globally every year (WHO, 2009). Notably, it is a risk factor for developing multiple types of cancers, heart disease, strokes, emphysema, chronic obstructive pulmonary disease, osteoporosis, diabetes, and infertility (Mackay & Eriksen, 2007). Despite such risks, in 2008, about 5.9 million Canadians (21.8%) were considered “smokers”, whether they were regular or occasional smokers (Sheilds, 2007).

Traditionally, rates of tobacco use among French-Canadians have been greater than their Anglophone counterparts (Wharry, 1997). More recently, in Ontario, Picard and Allaire (2005) reported that 27.1 % of Franco-Ontarians were daily smokers, compared to 23.3 % of Anglophones and only 14.7 % among allophones. Tobacco use alone has been a long-standing problem among French-Canadians(Wharry, 1997) and while this behaviour has been at the forefront of public health interventions among this population in the past (Health Canada, 1999), its high prevalence continues to persist. Smoking cigarettes is a highly addictive behaviour, and the psychological and physiological dependence is often very difficult to overcome (Brannon & Feist, 2000). Thus, attempts to develop strategies that will reduce the harmful effects and uptake of smoking are needed.

In general, physical activity and smoking have been found to be negatively associated (Kaczynski, Manske, Mannell, Grewal, 2008). Nevertheless, de Ruiter, Faulkner, Cairney, & Veldhuizen (2008) confirmed in a large sample of Canadians that nearly one quarter of daily smokers (n = 5441/22 659) self-reported that they engaged in sufficient amounts of leisure-time physical activity (>12,6 kcal/kg/day). These findings are similar to those of Ward and colleagues (­2003) who found that a substantial proportion of smokers among a sample of young adult military recruits also reported being physically active (15.8 %). Certainly, smokers are at risk for poorer health, but researchers have found that physical activity seems to limit the ill effects of smoking. Several harmful effects of smoking, such as a shorter life expectancy (Ferrucci et., 1999) and higher prevalence of chronic disease (Garcia-Aymerich, Lange, Benet, Schnohr, & Antó, 2007; Mahabir, Leitzmann, Pietinen, Albanes, Virtamo, & Taylor, 2004; Manson et al., 1999) have been found to be less pronounced in individuals who are moderately to vigorously active. Of further interest, recent findings suggest physically active smokers are proportionally more likely to attempt cessation in the year preceding the study (de Ruiter et al., 2008) and that interventions encouraging physical activity have been found to aid in the success of cessation programs (Ussher et al., 2008; Prapevassis et al., 2007). This being said, promoting physical activity to smokers is a worthy health promotion option. Nevertheless, doing so requires an investigation of which smokers are most likely to engage in physical activity (de Ruiter et al., 2008). Thus, the goal of this study is to build a profile of physically active Franco-Ontarian smokers according to certain socio-demographic variables.

deRuiter et al.(2008) found that in the general Canadian population active smokers were more likely to be young, male, and single. When determinants of these behaviours are considered in isolation, several researchers have found some differences among population sub-groups (Brownson, Eyler, King, Brown, Shyu, & Sallis, 2000; Pan, Cameron, DesMeules, Morrison, Craig, & Jian, 2009; King, Castro, Wilcox, Eyler, Sallis, Brownson, 2000; Johnson et al., 2004; Heaman & Chalmers, 2005). Specific to this study, Gauthier, Larivière, Pong, Snelling, & Young (2010) have reported varying socio-demographic determinants of physical activity among Francophones in Ontario (e.g.: social support towards physical activity had limited effects in the Francophone sample, which was not the case among Anglophones). On the other hand, DeWit and Beneteau (1999) identified diverse socio-demographic determinants among the Francophones in Ontario when they examined the prevalence of tobacco use (e.g., compared to Anglophones, Francophones aged 35 to 44 year were more susceptible to daily smoking). Nevertheless, absent from our understanding are details regarding socio-demographic determinants of physically active Franco-Ontarian smokers. Consequently, the objective of this study is to identify factors associated (socio-demographic determinants) to profiles based on physical activity behaviours and of tobacco use (physically active smokers versus inactive smokers; physically active smokers versus active non-smokers; physically active smokers versus inactive non-smokers).

**Methods**

Research questions

1. What are the socio-demographic characteristics of physically active smokers among Franco-Ontarian residents?
2. Do the socio-demographic characteristics of physically active Franco-Ontarian smokers differ from physically inactive smokers, active non-smokers and inactive non-smokers?

Data source

The data source used for this study was the Canadian Community Health Survey of 2007-2008, (CCHS, 2009). The CCHS is a cross-sectional survey in which information is self-reported in relation to health status, health care utilization and health determinants for the Canadian population (CCHS, 2009). This annual survey is designed and conducted by Statistics Canada. Data were collected in both years from January to December. We used data from the CCHS 2007-2008 Sharing File – Ontario Sample. This sub-set of data consisted of 41 800 respondents aged 12 and over. Persons who were excluded from the sampling frame included those living on Indian Reserves and on Crown Lands, institutional residents, full-time members of the Canadian Forces, and residents of certain remote regions. The sampling coverage is representative of approximately 98% of the provincial population. Informed consent was obtained from all participants.

Defining Variables

Grouping Variables

Francophones – The First Official Language Spoken was used to define Francophones. This variable is derived from the variables Language of Conversation, Mother Tongue and Language spoken at home (Forgues, Landry & Boudreau, 2009). Persons whose First Official Language Spoken was both French and English were included in our analyses (n=231), as previously done by other researchers (Picard & Allaire, 2005).

Physical Activity Status - This variable categorizes respondents as being “active”, “moderately active”, or “inactive” in their leisure time based on total daily energy expenditure (kcal/kg/day). Individuals expending greater than 3kcal/kg/day are classified as active, and this cut point is consistent with Canadian public health recommendations for amounts of daily physical activity (Public Health Agency of Canada, 2010) and has been applied by other researchers (Gilmour, 2007).When comparing physically active to inactive respondents, those who expended between 1.5kcal/kg/day and 2.9kcal/kg/day were excluded from our analyses. This exclusion was intended to simplify the interpretation of the results, as well as making the results comparable as those of other researches who have used the same categorization of physical activity status (de Ruiter et al., 2008).

Smoking Status – This variable indicates the type of smoker the respondent is based on his/her smoking habits. Daily and occasional smokers were classified as “smokers”, while former and never smokers were classified as “non-smokers”.

Demographic Characteristics

We examined socio-demographic characteristics of physically active smokers, physically inactive smokers, physically active non-smokers and inactive non-smokers. Variable selection was similar to those of de Ruiter et al. (2008) with the addition of a geographical location variable. Geographical location was included in order to capture a socio-ecological representation of determinants of health behaviour (Sallis, & Owen, 2002). Socio-demographic variables selected from the data source included gender, age (in years), marital status (married or common law, formerly married, and single), education (less than secondary school graduation, secondary school graduation, some postsecondary schooling, and postsecondary graduation), income (below low income cut-off and above low income cut-off), and geographical location (rural and urban). Low income cut-off (LICO) is an income threshold below which a family will likely devote most of its income, more so than the average family would, to necessities such as food, shelter and clothing (Statistics Canada, 2006). The LICO variable is derived from the combination of total household income by the household size (Government of Canada, 2009). For instance, the minimum necessary income for one person is greater than 21 666 $, while for five persons it is greater than 45 662 $. The geographic variable is dichotomous in the CCHS; the regions having a population concentration of 1000 persons or more and a density of population of 400 people or more per square kilometer are classified as “urban” (Statistics Canada, 2009).

Statistical Analyses

Group differences were assessed using Pearson Chi-Square to compare all categorical variables (i.e., Gender, Marital Status, Education, Income, and Geographical Location). A One-way Anova were used to compare average age. Three binary logistic regression analyses were used in order to account for reciprocal influences of independent variables. The active smokers formed an independent variable with a) the inactive smokers, b) the active non-smokers, and c) the inactive non-smokers. Standard errors for all estimates were calculated using balanced repeated replication (BRR) with a set of replicate weights supplied by Statistics Canada due to the complex sampling strategy of the CCHS Cycle 4.1 (2007-2008). Stata SE 9.0 was used for theses analyses.

**Results**

Descriptive Statistics

The CCHS 2007-2008 Ontario Sharing File consisted of 41 800 respondents. Among these respondents, 2 694 were considered Franco-Ontarians and 1968 respondents were included in this study. Of this number, 133 were active smokers, 337 were inactive smokers, 553 were active non-smokers and 945 were inactive non-smokers. Relevant cross-tabulations were also conducted to further our understanding of the relationship between physical activity and smoking behaviours (see Table 1). There was a significant relationship between physical activity levels and smoking status (X2=7.2; p<0.01). The number of physically inactive Franco-Ontarians is proportionally greater in the “smoker” group.

[Insert table 1 here]

Comparing Physically Active Smokers, Inactive Smokers, Physically Active Non-Smokers and Inactive Non-Smokers

In Table 2, we compared several socio-demographic characteristics of the sub-groups observed. Pearson X2 tests and On-way analyses of variance revealed that the distribution of gender, marital status, education, income, and mean age are different in these sub-populations. On average, physically active smokers were younger (mean = 40.3 years) than physically inactive non-smokers (mean = 48.6 years). Active smokers were proportionally greater in number in the “single” category (35.9%) than inactive non-smokers (19.5%). Furthermore, they are proportionally less likely to possess a postsecondary diploma (37.3%). However, there are more physically active smokers in the income category “above low income cut-off” (81.7%), comparatively to what is found among inactive smokers (58.3%). Nevertheless, the percentages within the physically active smokers group are relatively similar to that of active non-smokers group (89.1%).

[Insert table 2 here]

In Table 3, three binary logistic regression models are presented. The analyses compared physically active smokers to inactive smokers (Model 1), physically active smokers to active non-smokers (Model 2), and physically active smokers to inactive non-smokers (Model 3). The first logistic regression model confirms that even after adjusting for other variables inserted in the model, Franco-Ontarians that were in the category “lower than LICO” were more likely to be inactive. Since there was a high degree of co-linearity between income and education, we have excluded the variable “education”.

The second logistic regression model confirms that after adjusting for other variables inserted in the model, among active Franco-Ontarians, persons in the category “some postsecondary education” were more inclined to smoke. Again, due to co-linearity between income and education, income has been excluded. The third logistic regression model confirms that after adjusting for other variables inserted in the model, active smokers are on average younger than inactive non-smokers.

[Insert Table 3]

**Discussion**

The goal of this paper was to create a profile of active Franco-Ontarian smokers according to certain socio-demographic variables. Researchers have already demonstrated that physical activity has numerous physiological benefits for smokers (Ferruci, et al., 1999; Garcia-

Aymerich, et al., 2007; Mahabir et al., 2004; Manson et al., 1999), can lead to cessation (de Ruiter et al., 2008) and can support them during the smoking cessation process (Ussher et al., 2008; ­­Prapevassis, 2007). We sought to expand on these findings by examining a sub-population that had been previously labelled at-risk due to a relatively higher rate of daily smokers when compared to the general population. More specifically, we sought to inform intervention strategies by exploring which smokers were more likely to engage in an active lifestyle. When socio-demographic predictors of physical activity (Gauthier et al., 2010) and smoking (DeWit & Beneteau, 1999) among Franco-Ontarians have been compared to Anglophones, some variations have been identified. Thus, our contribution to this body of literature was to identify factors (socio-demographic determinants) associated to specific profiles defined on the basis of physical activity and smoking behaviours, with an emphasis on the socio-demographic profile of physically active smokers.

Our descriptive findings suggest that Franco-Ontarians are relatively similar to the general Canadian population with regards to rates of “physically active smokers”. Particularly, de Ruiter et al. (2008) found that 3.9 % of the Canadian population were “physically active smokers” and that 22.6 % of smokers were “active”. Among Franco-Ontarians, 4.9 % were physically active smokers, with 22% (n=133/640) of Franco-Ontarian smokers reporting recommended amounts of physical activity (>3 kcal/kg/day). Thus, much like initially suggested by de Ruiter et al.(2008), promoting physical activity to smokers is certainly not an insurmountable task as there are smokers who engage in an active lifestyle. It is important to note that during our study we have deemed necessary, from a health promotion perspective, to include even the “occasional smokers” in our analyses. de Ruiter et al. (2008)however, had excluded “occasional smokers”. The negative consequences of tobacco use are just as severe in occasional smokers (Bjerredgaard et al., 2006) and therefore, accounting for the fact that physical activity can counteract the harms of smoking, it seemed important to us to include all categories of smokers in this study.

While many of our findings are similar to those of others who have explored this realm of physical activity research (de Ruiter et al., 2008; Ward et al., 2003), our findings are unique as they are specific to the Franco-Ontarian population. Findings from our study suggest that active smokers, compared to “inactive smokers” are less likely to be of low income status, while age, gender, and marital status did not contribute to our understanding of this distinct sub-population. However, when de Ruiter et al. (2008), explored income adequacy among smokers by physical activity status, the differences were deemed relatively small. Nevertheless, these authors point out that age, gender, and marital status variables helped distinguish “active smokers” from their inactive counterparts. This difference between the results of de Ruiter et al. (2008) and our own could be explained by the differences in the sample sizes (n=22 559 vs. n=1968) and the heterogeneity of de Ruiter et al.’s (2008) sample who has evaluated the respondents on a trans-Canadian level. Furthermore, our choice to include occasional smokers may have hindered our ability to identify other distinctions between these two groups of interest. Otherwise, our analyses demonstrate that income is a distinctive key factor between active smokers and those who are inactive. Generally speaking, income adequacy is an important determinant of physical activity (Gilmour, 2007) and it has been found to be the most frequently reported barrier to an active lifestyle (Chinn, White, Harland, Drinkwater & Raybould, 1999). It would appear that such findings hold true when Franco-Ontarian smokers are examined in isolation.

In addition, we found that active smokers, when compared to active non-smokers, were less likely to have a post-secondary education. Therefore, our analyses also suggest that activity interventions should differ slightly based on smoking status. Education has been found to be an important determinant of physical activity and smoking. For instance, Pan et al., (2009) found that higher education levels were positively associated to higher rates of physical activity. Likewise, educated persons have been found to be less likely to initiate smoking (Qi, Phillips, & Hopman, 2006) and more likely to give up this behaviour later in life (Breslau, & Peterson, 1996). The fact that active Franco-Ontarian smokers are less educated than their active non-smoking counterparts has important implications for practice. For example, one could suspect that given their education levels are lower, cognitive abilities and levels of literacy may also be compromised (Nutbeam, 2000) and level of literacy in health is strongly related to the efficiency of health promotion programs aiming at behavioral changes (Nutbeam, 2000; Nubeam, 2008). Despite the fact that health literacy is essential to the success of a health promotion program for all, it seems imperative to have an acute sensitivity towards the level of literacy required to consult documents and initiatives aimed at smokers. The effectiveness of programs tailored for smokers will depend on its appropriateness for persons with lower educational attainment. In addition, one should also consider that the Canadian French dialect differs considerably from the French language spoken internationally, even slight nuances can be found between provinces and territories within Canada. Thus, it would be imperative that the “language” used in health education and promotion material be sensitive to its target population; Franco-Ontarians.

Future directions of research include identifying which physical activity contexts are preferred by Franco-Ontarian smokers (e.g., solitary or group activities). Specifically, Gauthier et al (2010) identified differing patterns with regard to social influences (such as peer and family support) on physical activity when comparing Francophones to Anglophones in the province of Ontario. Thus, the influence of significant others in adopting an active lifestyle needs to be examined. Indeed, qualitative studies could more precisely shed light on this phenomenon.

**Conclusion**

Franco-Ontarians have for many years been identified as a target population for cessation programs. New and innovative cessation strategies are warranted. Our findings suggest that (a) physically active Franco-Ontarian smokers are slightly different from those of the general population, and (b) physical activity promotion to Franco-Ontarian smokers should consider income and levels of education. This study has only given us a relatively descriptive profile of active smokers with the intention of generating future research avenues. Promotion of physical activity within the general population is a laborious process and will likely present multiple difficulties for smokers. Nevertheless, it goes without saying that the potential benefits of this type of health promotion initiative would undoubtedly surpass any challenge.

**Strengths and Limitations**

The current study possesses many strong points. First, the CCHS data is collected every two years. That is, the results can be followed and compared on an extended time period. Statistics Canada also deploys great efforts to provide reliable estimations using a detailed sample distribution strategy, randomisation, and weighted estimations for precise representation. The methodological rigor makes this type of data source an interesting option.

Nevertheless, secondary data does come with certain limitations, such as the self-reported nature of the data and the parameters around which variables are available. The self-reported nature of the survey can bring about inaccuracies in the reported levels of physical activity. Furthermore, as researchers, we are limited by what is included in the data set that has been collected. Relative to the current study, it would have been interesting to have access to certain “modifiable” variables such as motivation, self-efficacy, and susceptibility. It is evident that other studies are required in order to advance our knowledge in the area of the promotion of physical activity in smokers, but nevertheless, our results may serve as a point of entry.

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Table 1 Descriptive Statistics for Activity Status by Smoking Status (% according to the sample distribution) (n=1968)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Activity Status | |  |
|  | Active |  | Inactive |
| Non-Smoker | 82.7% (n=553) |  | 73.0% (n=945) |
| Smoker | 17.3% (n=133) |  | 27.0 % (n=337) |

p < 0.01

Table 2 Descriptive Statistics for Groups of Interest (n=1968)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Physically Active Smokers | Physically Inactive Smokers | Physically Active Non-Smokers | Physically Inactive Non- Smokers |
| Total Number | n = 133 | n = 337 | n=553 | n=945 |
| % from total Franco-Ontarian population (n= 2694) | 4.9 % | 12.5 % | 20.5 % | 35.1% |
| Gender, % (n=1968)\*  Men  Women | 54.7%  45.3% | 57.8%  42.2% | 54.9%  45.1% | 44.9%  55.1% |
| Age, Years, Mean (n=1968)\*\* | 40.3 | 42.6 | 38.9 | 48.6 |
| Marital Status, % (n=1967)\*\*  Married or Common Law  Formerly Married  Single | 53.1%  11.1%  35.9% | 53.2%  14.3%  32.5% | 49.6%  12.8%  37.6% | 68.9%  11.6%  19.5% |
| Education, % (n=1960)\*\*  Less than Sec. School Grad.  Sec. School Graduation  Some Post-Sec. School  Post-Sec. School Graduation | 29.2%  18.0%  15.4%  37.3% | 18.2%  30.5%  8.2%  43.2% | 31.9%  10.3%  3.8%  54.1% | 23.8%  13.4%  10.2%  52.6% |
| Income, % (n=1447)\*\*  Above LICO  Below LICO | 81.7%  18.3% | 58.3%  41.7% | 89.1%  10.9% | 74.4%  25.6% |
| Geographical Location, % (n=1968)  Rural  Urban | 21.3%  78.7% | 17.2%  82.8% | 17.0%  83.0% | 17.0%  83.0% |

\*p < 0,05

\*\*p < 0,01

N.B LICO= *Low Income Cut-Off*

Table 3 Binary Logistic Regression Analyses: Smoking Status x Physical Activity Status

|  |  |  |  |
| --- | --- | --- | --- |
|  | Model 1 : Active Smoker / Inactive Smoker | Model 2 : Active Smoker / Active Non-Smoker | Model 3 : Active Smoker / Inactive Non-Smoker |
| Gender, %  Men  Women | 1.00  1.06 | 1.00  .95 | 1.00  .60 |
| Age, Years, Mean | .99 | 1.00 | **.97\*\*** |
| Marital Status, %  Married or Common Law  Formerly Married  Single | 1.00  .93  .76 | 1.00  .88  .62 | 1.00  1.87  1.13 |
| Education, %\*\*  Less than Sec. School Graduation  Sec. School Graduation  Some Post-Sec. School  Post-Sec. School Graduation | -  -  -  - | 1.00  1.60  **4.79\*\***  .61 | 1.00  1.09  .98  .53 |
| Income, %  Above LICO  Below LICO | 1.00  **.32\*** | -  - | -  - |
| Geographical Location, %  Rural  Urban | 1.00  1.16 | 1.00  .73 | 1.00  .69 |

\*p < 0.05

\*\*p < 0.01

N.B. LICO= Low Income Cut-Off