Patterns and Trends in Walking Behaviour among Canadian Adults

Shirley N. Bryan, MKin,1 Peter T. Katzmarzyk, PhD, FACSM2

ABSTRACT

Objectives: Regular walking is associated with many health benefits and is of particular interest for the promotion of daily physical activity. The purpose of this study is to describe the epidemiology of walking for exercise among Canadian adults aged 18-55 years.

Methods: Nationally representative cross-sectional data from the National Population Health Survey and Canadian Community Health Survey from 1994/95 to 2007 were used for this study. The weighted and age-standardized prevalence of walking for exercise, walking duration, regular walking (at least 4 times a week) and deriving 100% of the total leisure-time physical activity energy expenditure (LTPAEE) from walking were calculated.

Results: Overall, 70% of Canadian adults walked for exercise at least once during the previous three months; however, only 30% of the population reported walking regularly, a figure that has remained relatively stable since 2001. Women, older adults, those with lower body mass index (BMI) and with lower total household income reported regular walking more often than their counterparts. Women, older adults and lower-income Canadians also tended to derive 100% of their total LTPAEE from walking more often than men, young adults and those in higher-income groups.

Conclusion: Walking is a popular physical activity for Canadian adults, regardless of age, sex, BMI or income group, however, the prevalence of regular walking varies between demographic subgroups. Public health strategies that focus on promoting walking for exercise should consider these results when defining target audiences and designing interventions.

Key words: Walking; leisure-time; physical activity; energy expenditure; Canadian Community Health Survey; National Population Health Survey

METHODS

This study utilized data from the National Population Health Survey (NPHS) 1994/95, 1996/97 and 1998/99 and the CCHS 2001, 2003, 2005 and 2007, conducted by Statistics Canada. The main purpose of the NPHS/CCHS surveys is to provide nationally representative data on health determinants, health status and health system utilization. Both surveys target Canadians ≥12 years of age living in private dwellings but exclude those living on Indian Reserves or Crown lands, residing in institutions, or living in certain remote regions, and those who are full-time members of the Canadian Forces. The sample of the NPHS/CCHS covers ~98% of the Canadian population.16 In this study, the sample was restricted to ages 18-55 years since this is the range included in the adult version of Canada’s Physical Activity Guide.11 After accounting for non-response, the total samples sizes were 10,972 (1994/95), 46,708 (1996/97), 9,646 (1998/99), 75,675 (2001), 74,383 (2003), 73,663 (2005) and 35,565 (2007).

Participant in leisure-time physical activities was assessed using questions based on the validated Minnesota Leisure-Time Physical Activity Questionnaire.15 Respondents were explicitly asked to report on their participation in “walking for exercise”, as well as a list of up to 20 other leisure-time activities (soccer, gardening, etc.) and up to three additional activities. For each activity, the respondent was asked about the frequency of participation (number of
Leisure-time physical activity energy expenditure (LTPAEE) and energy expenditure from walking (EEW) were calculated separately in met-min·wk⁻¹ as follows:

\[ \text{LTPAEE} (\text{met-min-wk}^{-1}) = \sum \frac{N_i \times D_i \times \text{MET}_i}{13} \]

where \( N_i \) is number of occasions of activity \( i \); \( D_i \) is the average duration, in minutes, of activity \( i \); \( \text{MET}_i \) is a constant value for metabolic energy cost of activity \( i \) and 13 is the number of weeks in the 3-month recall period. The MET values for each activity reported were assigned as per the Statistics Canada standard. Since duration was collected as a categorical variable, average duration was used in the calculation by taking the midpoint of the first three duration categories (7.5 min, 23.5 min and 45.5 min) and 60 minutes for category 4.

Prevalence and 95% confidence intervals (95% CI) of walking for exercise for each survey year were determined overall, by sex, age group (18-25, 26-35, 36-45 and 46-55 years), body mass index (BMI) (<25.0, 25.0-29.9 and ≥30.0 kg/m²) and total household income from all sources (<$15,000, $15,000-29,999, $30,000-49,999, ≥$50,000-79,999 and ≥$80,000+). BMI was calculated using self-reported weight (kg) divided by height squared (metres).

Pattern of walking behaviour was examined based on duration, frequency and total volume (met-min wk⁻¹) of walking. For each survey year, the prevalence and 95% CIs for walking duration and regular walking (4+ times/week) were assessed by demographic characteristics. The percentage of EEW in relation to total LTPAEE was determined and the prevalence and 95% CIs were estimated by demographic variables for those with 100% of their LTPAEE being comprised only of walking.

All estimates were weighted to represent the Canadian household population aged 18-55 years and were age-standardized by the direct method to the 2006 Census population. In order to account for the complex survey design, SUDAAN was used to calculate all estimates and 95% CIs, and significant differences were determined from non-overlapping 95% CIs.

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**Table 1.** Age-standardized* Prevalence (%) and 95% Confidence Intervals (95% CI) of Leisure-time Walking† among Canadian Adults (18 to 55 Years)

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<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>65.0</td>
<td>64.4-65.5</td>
<td>65.0</td>
<td>64.2-64.6</td>
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<tr>
<td>Male</td>
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<td>62.8</td>
<td>60.9-64.7</td>
<td>57.0</td>
<td>56.2-57.8</td>
<td>61.8</td>
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<td>74.2</td>
<td>72.7-75.7</td>
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<td>77.7</td>
<td>76.1-79.2</td>
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<td>Age Group (yrs)</td>
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<tr>
<td>18-25</td>
<td>64.8</td>
<td>61.5-67.8</td>
<td>62.3</td>
<td>60.2-64.3</td>
<td>67.7</td>
<td>64.6-70.7</td>
<td>60.9</td>
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<td>26-35</td>
<td>66.2</td>
<td>63.9-68.4</td>
<td>66.6</td>
<td>67.8-68.3</td>
<td>69.9</td>
<td>67.4-72.2</td>
<td>65.1</td>
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<td>36-45</td>
<td>65.9</td>
<td>63.6-68.0</td>
<td>67.4</td>
<td>65.7-69.1</td>
<td>71.0</td>
<td>68.8-73.1</td>
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<tr>
<td>46-55</td>
<td>66.1</td>
<td>63.6-68.6</td>
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<td>65.8-69.5</td>
<td>71.5</td>
<td>69.0-73.8</td>
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<td>Body Mass Index (kg/m²)</td>
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<tr>
<td>&lt;25.0</td>
<td>66.5</td>
<td>64.7-68.2</td>
<td>64.6</td>
<td>65.2-67.6</td>
<td>70.8</td>
<td>68.9-72.6</td>
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<td>25.0-29.9</td>
<td>63.9</td>
<td>61.5-66.1</td>
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<td>63.8-67.2</td>
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<td>67.0-71.4</td>
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<td>≥30.0</td>
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<td>62.2-69.2</td>
<td>66.6</td>
<td>63.8-69.3</td>
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<td>61.9-69.1</td>
<td>65.8</td>
<td>62.1-69.3</td>
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<td>57.2-63.4</td>
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<td>70.6</td>
<td>67.0-73.9</td>
<td>62.7</td>
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<td>$30,000-49,999</td>
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<td>63.9-68.4</td>
<td>66.1</td>
<td>64.1-68.0</td>
<td>67.7</td>
<td>64.9-70.4</td>
<td>62.7</td>
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<tr>
<td>$50,000-79,999</td>
<td>67.5</td>
<td>64.8-70.0</td>
<td>68.5</td>
<td>66.4-70.5</td>
<td>71.4</td>
<td>68.7-73.8</td>
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<td>$80,000+</td>
<td>68.7</td>
<td>60.7-72.2</td>
<td>69.4</td>
<td>66.4-72.2</td>
<td>75.6</td>
<td>72.6-78.3</td>
<td>67.6</td>
</tr>
</tbody>
</table>

* Estimates and 95% confidence intervals have been standardized to the 2006 Census population.
† Participation in walking for exercise during leisure-time at least once in the 3 months prior to the interview.

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**Figure 1.** Duration of walking (minutes) on each occasion among Canadian adults (18-55 yrs) between 1994/95 and 2007

**Figure 2.** Distribution of walking frequency in the three months prior to the survey among Canadian adults between 1994/95 and 2007
Table 2. Age-standardized* prevalence (%) and 95% Confidence Intervals (95% CI) of Walking Regularly (at Least 4 Times Each Week) among Canadian Adults (18-55 Years) 

<table>
<thead>
<tr>
<th>Category</th>
<th>1994/95 %</th>
<th>1996/97 %</th>
<th>1998/99 %</th>
<th>2000/01 %</th>
<th>2003/04 %</th>
<th>2005/06 %</th>
<th>2007/08 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>10.4</td>
<td>9.4-11.4</td>
<td>10.3</td>
<td>10.0-12.6</td>
<td>9.0</td>
<td>8.6-9.4</td>
<td>9.0</td>
</tr>
<tr>
<td>Male</td>
<td>10.6</td>
<td>9.7-12.0</td>
<td>10.4</td>
<td>10.0-12.8</td>
<td>9.4</td>
<td>8.9-9.9</td>
<td>9.4</td>
</tr>
<tr>
<td>Female</td>
<td>11.9</td>
<td>10.6-13.3</td>
<td>11.5</td>
<td>10.7-12.4</td>
<td>10.5</td>
<td>9.7-10.9</td>
<td>10.5</td>
</tr>
</tbody>
</table>

* Estimates and 95% confidence intervals have been age-standardized to the 2006 Census population.

Table 3. Age-standardized* Prevalence (%) and 95% Confidence Intervals (95% CI) of Walking Regularly (at Least 4 Times Each Week) among Canadian Adults for Whom 100% of Their Leisure-time Physical Activity Energy Expenditure Was Obtained through Walking 

<table>
<thead>
<tr>
<th>Category</th>
<th>1994/95 %</th>
<th>1996/97 %</th>
<th>1998/99 %</th>
<th>2000/01 %</th>
<th>2003/04 %</th>
<th>2005/06 %</th>
<th>2007/08 %</th>
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<tbody>
<tr>
<td>Total</td>
<td>10.4</td>
<td>9.4-11.4</td>
<td>10.3</td>
<td>10.0-12.6</td>
<td>9.0</td>
<td>8.6-9.4</td>
<td>9.0</td>
</tr>
<tr>
<td>Male</td>
<td>10.6</td>
<td>9.7-12.0</td>
<td>10.4</td>
<td>10.0-12.8</td>
<td>9.4</td>
<td>8.9-9.9</td>
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<tr>
<td>Female</td>
<td>11.9</td>
<td>10.6-13.3</td>
<td>11.5</td>
<td>10.7-12.4</td>
<td>10.5</td>
<td>9.7-10.9</td>
<td>10.5</td>
</tr>
</tbody>
</table>

* Estimates and 95% confidence intervals have been age-standardized to the 2006 Census population.

RESULTS

The prevalence of walking for exercise fluctuated between 1994/95 and 2003, after which it remained relatively stable at around 70% (Table 1). For all survey years, a higher proportion of women reported walking compared to men (range 72.5%-78.0% for women, 57.0%-63.4% for men). Adults in the youngest age group reported the highest (range 66.1%-72.8%) and the lowest BMI category reported regular walking more often than those in the highest BMI category (range 21.2%-26.6%). The prevalence was higher among those in the older age categories, with those in the oldest age group more than doubling those in the youngest, a trend that was seen for all survey years except 2007. The prevalence was higher in the higher BMI groups; however, there was no distinct trend seen between years. A consistent trend was seen between income groups, with prevalence being highest among the lowest income group (range 21.2%-26.6%) and lowest among the highest income category (range 4.1%-8.0%).
DISCUSSION

In the current study, up to 70% of adults reported walking for exercise at least once during the recall period, a figure that has remained stable since 2001. As previously reported by Gilmour,\textsuperscript{12} this study confirms that walking is more prevalent among women than men. A study among US adults found only a small increase in walking prevalence among women (6.6%) and men (3.8%) between 1987 and 2000 and, similar to the present study, no difference in walking frequency or duration of walking per week was noted between survey years.\textsuperscript{15}

The finding that walking is more prevalent among women, older adults and those in higher income groups is consistent with several other studies.\textsuperscript{13-15} For example, Rafferty et al. reported that walking was more prevalent among women compared to men (46.5% versus 30.0%), was higher among older age groups and those with higher education and income in the 1998 Behavioural Risk Factor Surveillance System.\textsuperscript{13} The lower prevalence of walking in the American study compared to the present study may be reflective of differences in study design as only respondents who reported walking as either their first or second activity were included.\textsuperscript{13} These results are contrary to a few recently published reports that assessed total daily walking within all domains of daily physical activity.\textsuperscript{20,21} Craig et al. showed that in 2004, 30% of Canadian adults walked at least 1 hour/day and the prevalence was lower among women and low-income earners, older adults and those with higher education.\textsuperscript{20} An American study also found that regular walking (≥5 days/week, ≥30 minutes/day) decreased with advancing age in women and with increasing BMI in both sexes, and was higher in men and those with less education.\textsuperscript{21} Since these studies measured walking within all domains of physical activity, they likely captured walking in occupational settings, which may explain the higher prevalence among men and those with less education since the current study only included leisure-time walking.\textsuperscript{21}

This study found that women, older adults, those with higher BMI and in lower income groups more often derived 100% of their weekly LTPAEE from walking. This finding has important implications for public health interventions since these populations tend to have the lowest prevalence of physical activity participation; however,\textsuperscript{22} further research is required to determine whether these subgroups are performing sufficient volumes of walking to realize the full range of health benefits. Further analysis of the activities contributing to the LTPAEE of men, younger adults and higher income groups is also required to ascertain whether these groups are performing sufficient activity to attain health benefits.

There are several limitations in these analyses that should be noted. First, the NPHS/CCHS surveys collect self-reported data using face-to-face or telephone interviews, and the proportion of telephone interviews has changed across survey years. Results of a mode study found that significantly more people were classified as inactive when interviewed face-to-face (42.3%) compared to those who were interviewed over the telephone (34.4%).\textsuperscript{23} It is unknown what effect the mode of collection has on the estimates of walking prevalence. Second, the estimates of walking behaviour reported here may be underestimated since other facets that make up total daily energy expenditure (commuting, occupation, household tasks, etc.) were not accounted for. Third, assumptions related to activity intensity, time and duration were made in the calculation of LTPAEE and EEW. Since intensity was not asked during the interview, it was assumed that all respondents performed the activities at the same intensity. Also, since activity duration was collected as a categorical variable, the actual time was not available, so an average time was used. Frequency was reported as the number of occasions over a three-month period, so for this analysis it was assumed that the frequency was equally distributed over the three months. Fourth, the CCHS/NPHS questionnaire has not been validated as a means of measuring walking behaviour explicitly. Finally, the results are applicable to the population included in the sample of the CCHS/NPHS; therefore, results may not reflect the walking patterns among those not included in the survey.

In conclusion, this study demonstrates that although walking has been a consistently popular activity among Canadian adults, regardless of age, sex, BMI or income group, only 30% of respondents walk regularly. Regular walking was higher among women, those in the older age groups and those with lower BMI and with higher household income. Deriving 100% of energy expenditure from walking was more prevalent among women, older adults and those in the highest BMI category. The popularity of walking among all population subgroups underscores the importance of public health interventions to promote walking as a viable means to increase participation in daily physical activity among Canadian adults.

REFERENCES

PATTERNS AND TRENDS IN WALKING


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RÉSUMÉ

Objectifs : Associée à de nombreux bienfaits pour la santé, la marche régulière présente un intérêt particulier pour la promotion de l’activité physique quotidienne. Cette étude vise à décrire l’épidémiologie de la marche de santé chez les adultes canadiens de 18 à 55 ans.


Résultats : Dans l’ensemble, 70 % des adultes canadiens avaient marché pour faire de l’exercice au moins une fois pendant les trois mois précédents; cependant, seulement 30 % de la population disait marcher régulièrement. Les femmes, les adultes âgés, les personnes ayant un faible indice de masse corporelle et les personnes ayant un faible revenu total du ménage ont dit marcher régulièrement plus souvent que les autres répondants. Les femmes, les adultes âgés et les Canadiens à faible revenu avaient aussi plus souvent tendance à dépenser l’énergie totale de l’activité physique en marchant comparativement aux hommes, aux jeunes adultes et aux personnes ayant un revenu élevé.

Conclusion : La marche est une activité physique populaire chez les adultes canadiens, peu importe l’âge, le sexe, l’indice de masse corporelle et le groupe de revenu; cependant la prévalence de la marche régulière varie d’un segment démographique à l’autre. Les stratégies de promotion de la marche devraient en tenir compte pour définir leur public cible et concevoir leurs interventions.

Mots clés : marche; loisirs; activité physique; dépense d’énergie; Enquête sur la santé dans les collectivités canadiennes; Enquête nationale sur la santé de la population

Il est temps d’y penser
Nous avons tous une bonne raison d’agir.

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