



Patterns and predictors of sitting time over ten years in a large population-based Canadian sample: Findings from the Canadian Multicentre Osteoporosis Study (CaMos)

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ABSTRACT

Our objective was to describe patterns and predictors of sedentary behavior (sitting time) over 10 years among a large Canadian cohort. Data are from the Canadian Multicentre Osteoporosis Study, a prospective study of women and men randomly selected from the general population. Respondents reported socio-demographics, lifestyle behaviors and health outcomes in interviewer-administered questionnaires; weight and height were measured. Baseline data were collected between 1995 and 1997 ($n = 9418$; participation rate = 42%), and at 5- ($n = 7648$) and 10-year follow-ups ($n = 5567$). Total sitting time was summed across domain-specific questions at three time points and dichotomized into “low” (≤ 7 h/day) and “high” (> 7 h/day), based on recent meta-analytic evidence on time sitting and all-cause mortality. Ten-year sitting patterns were classified as “consistently high”, “consistently low”, “increased”, “decreased”, and “mixed”. Predictors of sedentary behavior patterns were explored using chi-square tests, ANOVA and logistic regression. At baseline (mean age = 62.1 years \pm 13.4) average sitting was 6.9 h/day; it was 7.0 at 5- and 10-year follow-ups (p for trend = 0.12). Overall 23% reported consistently high sitting time, 22% consistently low sitting, 14% decreased sitting, 17% increased sitting with 24% mixed patterns. Consistently high sitters were more likely to be men, university educated, full-time employed, obese, and to report consistently low physical activity levels. This is one of the first population-based studies to explore patterns of sedentary behavior (multi-domain sitting) within men and women over years. Risk classification of sitting among many adults changed during follow-up. Thus, studies of sitting and health would benefit from multiple measures of sitting over time.

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1. Introduction

Research suggests that greater time spent in sedentary behavior (activities in a sitting or reclining posture requiring low energy expenditure) (Owen, 2012; Sedentary Behaviour Research Network, 2012), is associated with higher risk of type 2 diabetes, cardiovascular disease, and all-cause mortality (Biswas et al., 2015; Ekelund et al., 2016). Evidence suggests that the prevalence of sedentary behavior has increased, while physical activity has decreased in daily life, at work and outside of work; sedentary behavior is predicted to continue on these trajectories (Ng and Popkin, 2012).

For targeted interventions it is important to identify those people with consistently high or low levels of sitting time; that is high and low risk groups, respectively. Using data from time use surveys, repeated cross-sectional studies have examined trends in sitting time. Chau et al. (2012) reported a slight increase in overall non-occupational sedentary behavior in Australian adults between 1997 and 2006 and van der Ploeg et al. (2013) found that between 1975 and 2005 in the Dutch adult population the proportion of non-work related time spent sitting remained relatively constant. Both studies found that the percentage of sedentary leisure time spent with screen based activities increased significantly. Using data from the Eurobarometer study, Milton et al. (2015) reported a decrease in the prevalence of prolonged sitting (defined as ≥ 7.5 h/day) over three time points between 2002 and 2013 for 17 countries. For another 10 countries they had data for two time points (2005 and 2013) that showed the same trend. Systematic

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reviews of correlates of sitting time found a positive relationship with age, body mass index, socio-economic status and smoking, an inverse relationship with physical activity and mixed results for neighborhood walkability and safety (O'Donoghue et al., 2016; Rhodes et al., 2012).

Nonetheless, to the best of our knowledge, only four large population-based cohort studies have examined patterns of sedentary behavior within individuals over time. An Australian cohort study examined effects of life events on sitting patterns in women in two age groups: work changes were related to increased, but retirement to decreased sitting in mid-aged women. For young women, return to work was related to increased sitting; having a baby, beginning work and decreased income were associated with decreased sitting (Clark et al., 2014). A Spanish cohort of older adults with two years of follow-up found that compared with consistently sedentary participants, those who were consistently non-sedentary were younger, more physically active, had a lower BMI, and had less chronic diseases (León-Muñoz et al., 2013). In post-menopausal women in the USA, those who maintained high levels of sitting or increased sitting over six years were more likely to be white, current smokers, and employed relative to those with consistently low or decreased sitting time (Lee et al., 2016). The Norwegian HUNT study found that adults with consistently high sitting time over 11 years tended to be middle-aged and men, university-educated, overweight or obese, do “light exercise” at least 1 h/week, do “hard exercise” up to 2 h/week, and have “good” or “very good” general health (Grunseit et al., 2017).

Using data from a large Canadian population cohort of women and men, this study examines 10-year patterns and predictors of sedentary behavior in adults over three time points as opposed to only two time points like in the four cohort studies mentioned above. This is a unique, Canada-wide, prospective 20-year population-based study of adult women and men whose primary purpose was to determine risks for osteoporotic fracture.

2. Methods

2.1. Participants

Data were from the Canadian Multicentre Osteoporosis Study (CaMos), a cohort study of non-institutionalized adults (2/3 women) aged 25 years and above, randomly selected from the general population living within 50 km of nine Canadian cities. Methods were previously published (Kreiger et al., 1999). Briefly, participants reported their socio-demographic information, lifestyle behaviors and disease history using interviewer administered questionnaires. Sitting information was available in 9418 participants at baseline (1995–1997), in 7648 participants at year 5 follow-up (2000–2002) and in 5567 participants at year 10 follow-up (2005–2007) (Fig. 1). CaMos was granted ethical approval by McGill University and each local institution. All participants provided signed informed consent.

2.2. Measures

2.2.1. Independent variables

Participants reported their date of birth, sex, ethnicity, education, employment, smoking, physical activity, sleep and self-rated health at baseline; height and weight were measured. Created time-dependent variables included employment status categorized as “continuously working”, “continuously retired”, “retired during follow-up”; BMI rated “consistently non-obese”, “obese to non-obese”, “non-obese to obese”, and “could not be classified”; self-rated health was classed as “good to excellent”, “consistently fair/poor”, “increasing”, and “decreasing”. Physical activity was classed as “consistently high” (≥ 7 h/week of moderate-to-vigorous physical activity), “consistently low” (< 7 h/week), “increasing”, and “decreasing”.

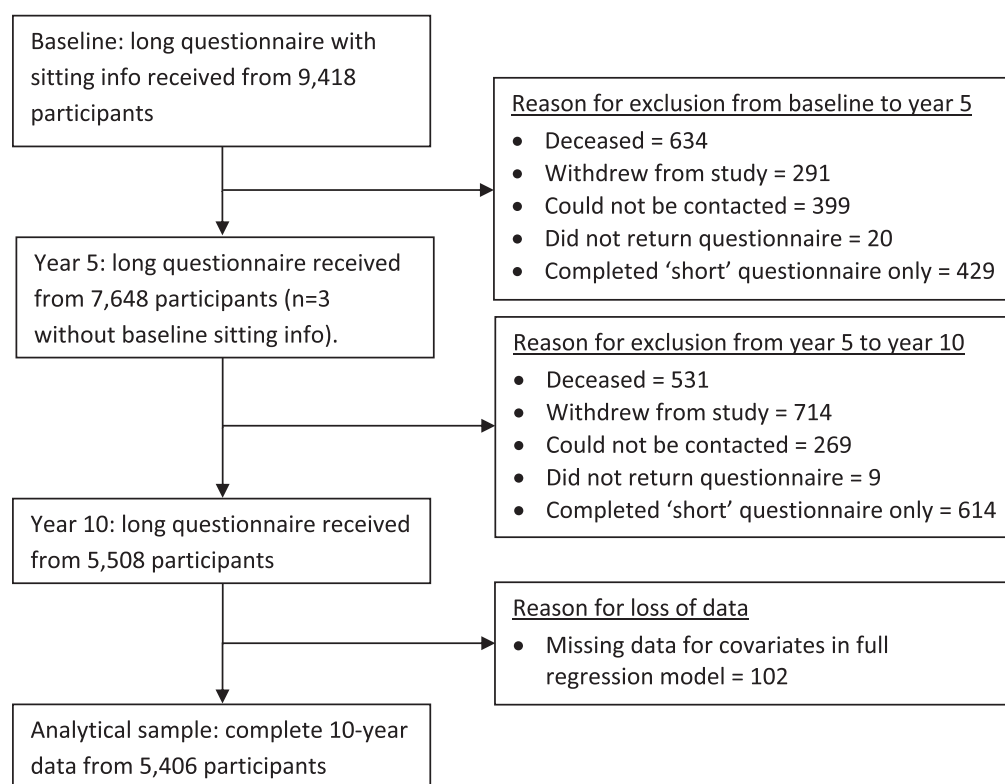


Fig. 1. Selecting the analytical sample, Canadian Multicentre Osteoporosis Study (CaMos), Canada, 1995–2007.

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