



## Nine year changes in sitting time in young and mid-aged Australian women: Findings from the Australian Longitudinal Study for Women's Health



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### ABSTRACT

**Objective.** To examine changes in sitting time (ST) in women over nine years and to identify associations between life events and these changes.

**Methods.** Young (born 1973–78,  $n = 5215$ ) and mid-aged (born 1946–51,  $n = 6973$ ) women reported life events and ST in four surveys of the Australian Longitudinal Study on Women's Health between 2000 and 2010. Associations between life events and changes in ST between surveys (decreasers  $\geq 2$  h/day less, increasers  $\geq 2$  h/day more) were estimated using generalized estimating equations.

**Results.** Against a background of complex changes there was an overall decrease in ST in young women (median change  $-0.48$  h/day, interquartile range [IQR] =  $-2.54, 1.50$ ) and an increase in ST in mid-aged women (median change  $0.43$  h/day; IQR =  $-1.29, 2.0$ ) over nine years. In young women, returning to study and job loss were associated with increased ST, while having a baby, beginning work and decreased income were associated with decreased ST. In mid-aged women, changes at work were associated with increased ST, while retiring and decreased income were associated with decreased ST.

**Conclusions.** ST changed over nine years in young and mid-aged Australian women. The life events they experienced, particularly events related to work and family, were associated with these changes.

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### Introduction

There is increasing evidence that time spent in sedentary behaviors (sitting or reclining with low energy expenditure), (Owen, 2012) is associated with poor health outcomes, including obesity, type 2 diabetes, cardiovascular disease and premature mortality (Chau et al., 2013; Ford and Caspersen, 2012; Pavey et al., 2012; Thorp et al., 2011; van der Ploeg et al., 2012; Williams et al., 2008). Over the past 20 years, time spent in sedentary behavior has increased, largely as a result of screen based activities such as watching television and using computers, sedentary modes of transport and sedentary occupations (Chau et al., 2012; Church et al., 2011; Shields and Tremblay, 2008). While studies have reported the prevalence and demographic correlates of sitting time

(ST) (Bauman et al., 2011; Bowman, 2006; Clark et al., 2010) and accelerometer-derived sedentary time (Hagstromer et al., 2007; Matthews et al., 2008), very little is known about factors associated with changes in sitting during adulthood.

Life events, historically defined as life stressors, have been associated with health outcomes including higher mortality, smoking, stress and poorer self-rated physical and mental health (Bell and Lee, 2006; Dobson et al., 2005; Lantz et al., 2005; Zautra et al., 1990). Engaging in moderate and vigorous physical activity (PA) has been shown to be influenced by various life events, such as decreasing activity following marriage, declining health, the birth of the first child and transitioning from school to university or the workforce (Bell and Lee, 2006; Brown et al., 2009; Butler et al., 2004). It is conceivable that these life events may also influence ST. While the association of these life events with ST has not previously been examined, higher ST has been associated with a number of socio-demographic correlates including educational level, country of birth, type and hours of work, stress levels and health behaviors such as smoking and drinking (Uijtdewilligen et al., 2014). In addition to targeting certain socio-demographic groups, identifying

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triggers for changes in ST such as life events would provide researchers with a target for the timing of preventive strategies for prolonged ST.

The aim of this study was to describe the changes in ST over nine years in young and mid-aged women, and to identify life events which predict an increase or decrease in ST over time.

## Methods

### Participants

The Australian Longitudinal Study on Women's Health (ALSWH) is a prospective cohort study, which assesses women's physical and mental health, psychosocial aspects of health (such as socio-demographic and lifestyle factors) and their use of health services. The aim of the study was to examine the relationships between these factors and to inform governments on implications for health policy and practice. In 1996, three cohorts of women, young (born 1973–1978), mid-aged (born 1946–1951) and older (born 1921–1926), were recruited. The sample was randomly drawn from the Australian national Medicare health insurance database which includes all Australian citizens and permanent residents (Brown et al., 1998). Women from rural and remote areas were intentionally over sampled; however, the recruited sample was broadly nationally representative (Brown et al., 1998). The women completed a mailed survey every three years. More information is available at: <http://www.alswh.org.au/>. The study has ethical approval from the Universities of Queensland and Newcastle Ethics Committees, and informed consent was received from all respondents.

At the first survey (1996), participant numbers were 14 247 in the young cohort and 13 715 in the mid-aged cohort. Data for this paper were taken from the 2000, 2003, 2006 and 2009 surveys of the young cohort and the 2001, 2004, 2007 and 2010 surveys of the mid-aged cohort, as these surveys included life events and ST questions. As ST was only collected for one survey in the older cohort, this group could not be examined. Only data from women who answered the ST questions in all four surveys were included in the analyses (37% of the

original young cohort and 51% of mid-aged cohort). Flow charts of the participants included in the analyses and reasons for non-response at each stage for young and mid-aged participants are included in Fig. 1.

### Measures

#### Outcome measures

ST was measured by asking: *How many hours each day do you typically spend sitting down while doing things like visiting friends, driving, reading, watching television or working at a desk or computer i. On a usual weekday; ii. On a usual weekend day?* ST data were cleaned using previously described procedures (van Uffelen et al., 2010). Changes in ST were calculated for each inter-survey period (i.e. between surveys from 2000 and 2003, 2003 and 2006, 2006 and 2009 in the young cohort and between surveys from 2001 and 2004, 2004 and 2007, 2007 and 2010 in the mid-aged cohort) and participants were categorized as: *decreasers* (ST was  $\geq 2$  h less on the subsequent survey), *stable* ( $<2$  h change in ST between subsequent surveys) or *increasers* (ST was  $\geq 2$  h more on the subsequent survey). Two hours was chosen to represent a change in sitting as previous studies have shown detrimental health associations with increases in ST of 2 h (Ford and Caspersen, 2012; Thorp et al., 2010).

#### Predictors

Life events were modified from Norbeck's Life Events Questionnaires (Norbeck, 1984). Events appropriate to the life stage of each cohort were included (e.g. birth of first child in the young cohort, going through menopause in the mid-age cohort). The complete list of life events is available on the ALSWH website ([www.alswh.org.au/for-researchers/surveys](http://www.alswh.org.au/for-researchers/surveys)). Participants were asked whether they had experienced any of the events in the previous 12 months with response options of yes/no.

#### Covariates

Age, area of residence, country of birth, highest education level, marital status, work status, smoking, alcohol intake, physical activity, height and weight were self-reported. For alcohol status, women were categorized as: nondrinker;

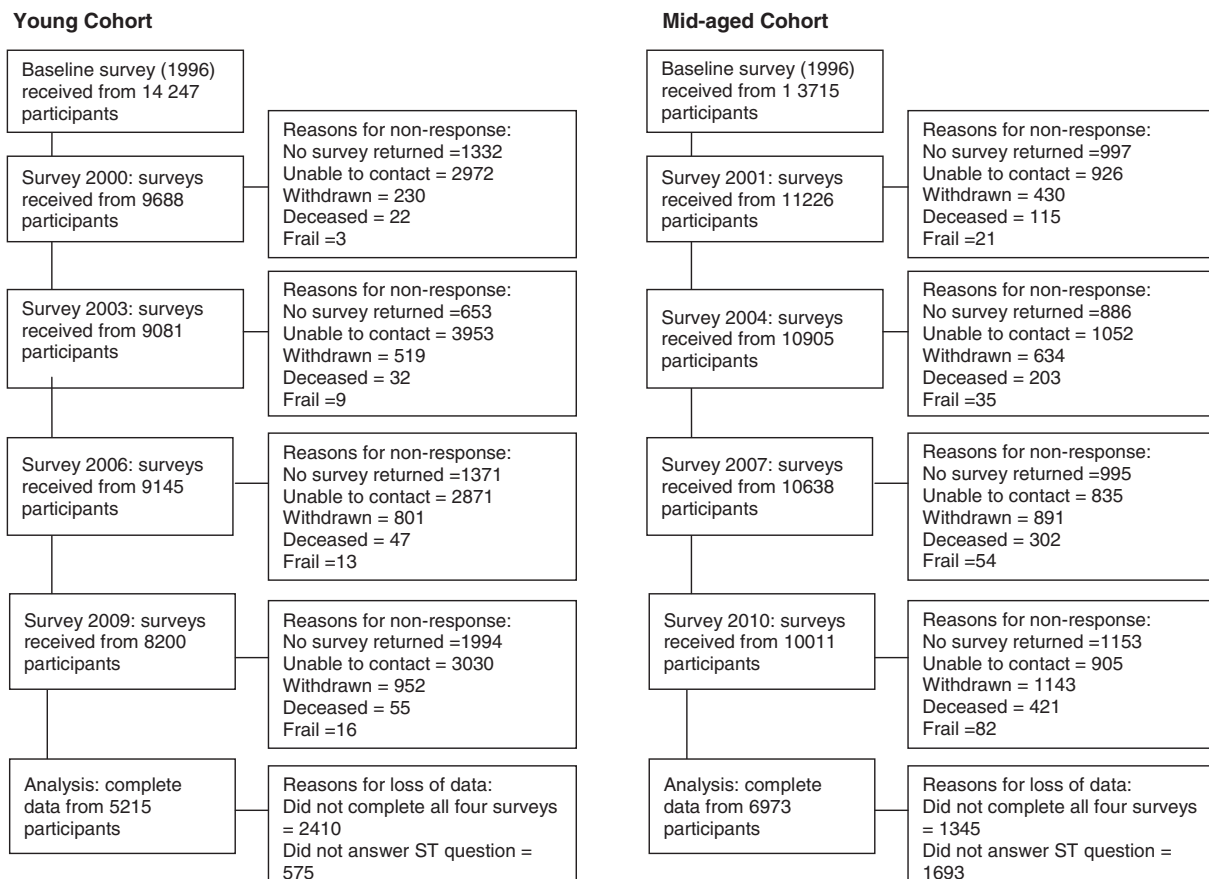


Fig. 1. Flow charts of participants in the Australian Longitudinal Study on Women's Health (2000–2010).

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