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Correlates of Sitting Time in Working Age Australian Women: Who Should Be Targeted With Interventions to Decrease Sitting Time?

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Background: While there is emerging evidence that sedentary behavior is negatively associated with health risk, research on the correlates of sitting time in adults is scarce. ***Methods:*** Self-report data from 7724 women born between 1973–1978 and 8198 women born between 1946–1951 were collected as part of the Australian Longitudinal Study on Women's Health. Linear regression models were computed to examine whether demographic, family and caring duties, time use, health, and health behavior variables were associated with weekday sitting time. ***Results:*** Mean sitting time (SD) was 6.60 (3.32) hours/day for the 1973–1978 cohort and 5.70 (3.04) hours/day for the 1946–1951 cohort. Indicators of socioeconomic advantage, such as full-time work and skilled occupations in both cohorts and university education in the mid-age cohort, were associated with high sitting time. A cluster of 'healthy behaviors' was associated with lower sitting time in the mid-aged women (moderate/high physical activity levels, nonsmoking, nondrinking). For both cohorts, sitting time was highest in women in full-time work, in skilled occupations, and in those who spent the most time in passive leisure. ***Conclusions:*** The results suggest that, in young and mid-aged women, interventions for reducing sitting time should focus on both occupational and leisure-time sitting.

Keywords: sedentary behavior, lifestyle, observational study, socioeconomic factors, health behaviors

In epidemiological studies of physical activity (PA) and health, people are often categorized as 'active' (meeting a PA guideline), 'inactive' (reporting some PA but not meeting the guideline), or 'sedentary' (reporting no PA), based on responses to questions about their participation in moderate and vigorous physical activity (MVPA). In this context, sedentary behavior is conceptualized as a lack of MVPA. However, in recent years the term 'sedentary behavior' has been used to describe participation in activities requiring low energy expenditure, such as sitting or lying down, regardless of participation in MVPA.[1,2]

There is a rapidly growing body of evidence suggesting that more time spent in sedentary behaviors, independent of MVPA levels, is associated with increased health risk.[3–8] Cross-sectional studies in Australia, the US, and the UK have shown positive associations between increased TV time and body mass index (BMI),[5,6,8] blood pressure,[5,8] fasting insulin,[8] and breast density (a marker of breast cancer risk).[9] Prospective studies have also shown associations between sitting time and obesity,[3,4,10,11] biomarkers of cardiovascular disease risk,[11] and mortality.[12,13]

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Researchers are beginning to explore the feasibility and efficacy of interventions to reduce sitting time. Understanding the correlates of sitting time is vital for informing the development of these interventions and for identifying which population subgroups are most sedentary and thus most likely to benefit from interventions. To date, studies of the correlates of sitting time in adults have predominantly focused on TV viewing. Australian, US, and Scottish studies have shown that high TV time is associated with low socioeconomic status (eg, living in a deprived neighborhood,[14,15] low education levels,[16,17] low income[14–16]), other demographic characteristics (eg, being female,[17] older age,[16,17] no paid job[16,17]), and health risk factors (eg, low PA levels,[17] high energy intake,[16] overweight or obese[14,16,17]). However, in focusing only on TV viewing, these studies have not considered time spent sitting in other domains, such as transport and work. This is important because data from The Netherlands and Australia indicate that working adults spend about one-half to one-third of their workday sitting.[18,19]

The Australian Longitudinal Study on Women's Health (ALSWH) provides an opportunity to examine the correlates of sitting time, including sitting for leisure, during transport, and at work, in national samples of working age women. The aim of this study was to identify correlates of weekday sitting time in the ALSWH 1973–1978 and 1946–1951 cohorts. Demographic characteristics, family and caring duties and time use, as well

as health and health behavior variables, were considered as potential correlates.

Methods

Australian Longitudinal Study on Women's Health

The ALSWH is a prospective study of factors affecting the health and well-being of 3 cohorts of Australian women (born in 1973–1978, in 1946–1951, and in 1921–1926),[20] randomly selected from the national health insurance database,[21] with oversampling of women from rural and remote areas. More details about the study can be found at www.alswh.org.au. The study was approved by the University of Queensland and the University of Newcastle Ethics Committees, and written informed consent was received from all respondents.

Study Sample

These analyses used data collected from the 2003 survey of women born in 1973–1978 (when they were age 25–30 years old) and the 2001 survey of women born in 1946–1951 (when they were age 50–55 years old). These were the first surveys to assess sitting time in both cohorts. Women born between 1921–1926 were not included because they had reached retirement age before their first survey.

The first ALSWH survey in 1996 was completed by 14,739 women in the 1973–1978 cohort and 14,099 women in the 1946–1951 cohort. These women were broadly representative of the general population in their age groups,[20] although there was over-representation of Australian-born, employed, and university-educated women.[21] After losing women to follow-up, the third survey was completed by 9081 women in the 1973–1978 cohort and 11,200 women in the 1946–1951 cohort. Of these women, those who reported a limited ability to walk 100 m were excluded to ensure that women included in the analyses were not sitting because they were wheelchair-bound (n = 161 for 1973–1978 cohort; n = 182 for 1946–1951 cohort), leaving data from 8920 women in the 1973–1978 cohort and 11,018 women in the 1946–1951 cohort available for inclusion in these analyses.

Measures

Sitting Time. The following question was used to assess sitting time: 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 on a usual weekday? Established protocols were used to clean the data and values exceeding 16 hours/day were set to missing.[22] The question is similar to the one included in the International PA Questionnaire, which, in women, has been shown to have good reliability and moderate criterion validity against accelerometers (<100 counts per minute).[23]

Potential Correlates of Sitting Time. Variables hypothesized to be associated with sitting time included demographic characteristics, family and caring duties, time use, health, and health behavior variables. Variables were categorized as shown in Table 1.

Demographic variables included area of residence (derived from postal code), country of birth, highest level of education, income management, and occupation (from the Australian Standard Coding of Occupations[24]). Income management was assessed in ALSWH as a proxy for income status, because some women were reticent to report their actual income. Occupation was categorized as professional (manager, administrator), skilled (tradesperson, advanced clerical, or service worker), blue collar (laborer, production/transport worker, elementary/intermediate sales/service worker), or no paid job.

Women were asked about their marital status and their caring duties for people with a long-term illness, disability, or frailty. Women in the 1973–1978 cohort were also asked for the number of children they had and their pregnancy status. Women in the 1946–1951 cohort were also asked to report the frequency of providing care for grandchildren.

Women reported the hours they spent in the previous week in paid work (full-time, part-time, casual), doing home duties (own/family home), studying, and in passive leisure (eg, TV, listening to music, reading, relaxing).

BMI was calculated as kg/m^2 based on self-reported weight and height, and categorized in accordance with the World Health Organization classification.[25] Number of chronic diseases was derived from a list of health conditions, including diabetes, cancer, and heart disease, that women reported they had been told they had by a doctor in the previous 3 years.[26] They also reported whether they had sleeping problems or stiff or painful joints in the last 12 months.

The questions to assess PA were adapted from Active Australia questions, which have acceptable measurement characteristics.[27] They ask about walking, moderate-intensity, and vigorous-intensity physical activities in the last week. As reported previously,[28] responses were used to derive a PA score, which was categorized as shown in Table 1.

Energy intake (EI) was assessed using the Cancer Council of Victoria food frequency questionnaire.[29] EI was computed as described previously[30] and quintiles of EI were used in the analysis. Smoking and alcohol status were derived from standard questions.

Statistical Analysis

Linear regression modeling was used to examine the associations between potential correlates of sitting time (all categorical variables), and sitting time (continuous, normally distributed variable). First, separately for each cohort, univariate models were computed to examine associations between each potential correlate and sitting time. Variables that were significantly associated with sitting time were next included in a multivariable

Table 1 Sample Characteristics of Women Born Between 1973–1978 and Women Born Between 1946–1951[a]

		1973–1978 cohort (N = 7724)		1946–1951 cohort (N = 8198)	
		N	%[b]	N	%[b]
Demographics					
Area of residence	Urban	4536	59	3131	38
	Large rural town	785	10	1142	14
	Small rural town/remote area	2403	31	3925	48
Country of birth	Australia	7173	93	6343	77
	Other English speaking	275	4	1181	14
	Non-English speaking	276	4	674	8
Education	No formal education or school certificate	754	10	3769	46
	High school or leaving certificate	1479	19	1359	17
	Trade/apprenticeship/certificate/diploma	1939	25	1708	21
	University	3552	46	1326	16
Occupation	Professional	3523	45	2972	36
	Skilled	1188	16	1037	13
	Blue collar	1585	21	2062	25
	No paid job	1428	19	2091	26
Income management	Impossible/difficult all of the time	883	11	813	10
	Difficult some of the time	2277	30	2155	26
	Not too bad	3000	39	3646	45
	Easy	1564	20	1584	19
Family and caring					
Marital status	Married/partnered	1767	23	6763	82
	Single/separated/divorced/widow	5936	77	1435	18
Providing care for others	No	7305	95	6142	75
	Yes	419	5	2056	25
Number of children	None	5333	69	–	–
	1	1168	15	–	–
	2	873	11	–	–
	≥3	350	5	–	–
Pregnant	No	7127	92	–	–
	Yes	597	8	–	–
Caring for grandchildren	Never	–	–	1090	13
	Occasionally	–	–	2313	28
	Daily or weekly	–	–	4795	59
Time use					
Hours worked	Not in labor force	1308	17	1709	21
	Part-time	1994	26	2922	36
	Full-time	4422	57	3567	43
Home duties	No home duties	138	2	208	2
	Part-time	6449	84	6690	82
	Full-time	1137	15	1300	16

(continued)

Table 1 *(continued)*

		1973–1978 cohort (N = 7724)		1946–1951 cohort (N = 8198)	
		N	%[b]	N	%[b]
Time use *(continued)*					
Studying	No	5722	74	6757	82
	Yes	2002	26	1441	18
Passive leisure	No passive leisure	93	1	171	2
	1–15 hours/week	5146	67	5529	67
	>15 hours/week	2538	33	2498	31
Health					
BMI	Normal weight	4729	61	3691	45
	Overweight	1624	21	2652	32
	Obese	1041	14	1855	23
Number of chronic conditions	None	4671	61	3950	48
	1	2003	26	2591	32
	2	683	9	1119	14
	≥3	246	3	538	7
Sleeping poorly	No	5314	69	4447	54
	Yes	2410	31	3751	46
Stiff or painful joints	No	6043	78	4303	53
	Yes	1681	22	3746	47
Health behaviors					
Physical activity[c]	None	666	9	1382	17
	Very low	1420	18	1561	19
	Low	1354	18	1514	19
	Moderate	1790	23	1688	21
	High	2422	31	2053	25
Energy intake[d]	Very low	1548	20	1591	20
	Low	1620	21	1547	20
	Moderate	1458	19	1504	19
	High	1591	21	1697	22
	Very high	1507	20	1534	20
Smoking	Never smoked	4486	58	4434	54
	Ex-smoker	1412	18	2633	32
	Current smoker	1826	24	1131	14
Alcohol intake	Nondrinker	602	8	982	12
	Low risk drinker	4799	62	4485	55
	Rarely drinker	2049	27	2252	28
	Risky drinker	274	4	479	6

[a] Data collected in 2003 (1973–1978 cohort) and 2001 (1946–1951 cohort), except country of birth (1996 for both cohorts), education (1996 for 1946–1951 cohort), and alcohol intake (2000 for 1973–1978 cohort).

[b] Percentage may not add up to 100% due to rounding.

[c] None (<40 MET·min/week), very low (40 to <300 MET·min/week), low (300 to <600 MET·min/week), moderate (600 to <1200 MET·min/week), high (≥1200 MET·min/week).

[d] Very low (≤4800 KJ for both cohorts), low (>4800 to 6000 KJ in 1973–1978 cohort; >4800 to 5800 KJ in 1946–1951 cohort), moderate (>6000 to 7100 KJ in 1973–1978 cohort; >5800 to 6800 KJ in 1946–1951 cohort), high (7100–8800 KJ in 1973–1978 cohort; >6800 to 8300 KJ in 1946–1951 cohort), and very high (>8800 KJ in 1973–1978 cohort; >8300 KJ in 1946–1951 cohort).

model (one model for each cohort). The analyses were conducted using SPSS V16.0. Statistical significance was set at $P \leq .05$.

Results

Of the 8920 women in the 1973–1978 cohort and the 11,018 women in the 1946–1951 cohort who were eligible for the study, women were excluded if they had missing sitting time data (n = 364 for 1973–1978 cohort; n = 710 for 1946–1951 cohort) or missing data for any potential correlate (n = 832 for 1973–1978 cohort; n = 2110 for 1946–1951 cohort). The percentage of missing data were < 5% for each potential correlate. The analysis sample was thus 7724 and 8198 for the 1973–1978 cohort and 1946–1951 cohort, respectively. The women who were included in the analysis had higher socioeconomic status, had fewer health problems, and engaged in more healthy behaviors than those excluded, although differences were small (Appendix Tables 1 and 2). Characteristics of the women included in the analysis are presented in Table 1. Mean sitting time (SD) was 6.60 (3.32) hours/day for the 1973–1978 cohort and 5.70 (3.04) hrs/day for the 1946–1951 cohort.

In the 1973–1978 cohort, sitting time was significantly higher in women who lived in urban areas, who were born in a non-English speaking country, or who reported that income management was impossible or difficult (Table 2). Women in full-time work and those in skilled occupations sat more, whereas those in full-time home duties or in blue collar occupations sat less, than women in the respective referent category. Women without caring duties (ie, did not provide care for adults or children) sat more than women with these duties. Sitting time was also significantly higher in women who reported studying or doing > 15 hrs/wk of passive leisure, compared with women in the respective referent category. Health and health behavior variables were not associated with sitting time, except that sitting time was higher in those with sleeping problems and lower in current smokers, compared with the respective referent category.

In the 1946–1951 cohort, sitting time was significantly higher in women who were single, in urban women, and in women who reported that it was easy managing on their income (Table 3) . In contrast with the younger cohort, mid-age women born in a non-English speaking country sat less than their Australian-born counterparts. As in the young women, sitting time was higher for mid-age women in full-time work and for those in skilled occupations, and lower for those in full-time home duties, without jobs, or in blue collar occupations, compared with women in the respective referent category. Compared with women with low education (no formal education or school certificate), women with a university education sat more and those with a trade/apprenticeship or a certificate/diploma sat less. As in the young women, mid-aged women who reported studying, or doing > 15 hrs/wk of passive leisure sat more than women in the respective referent category. Women who reported moderate or high PA levels or were nondrinkers sat less, while overweight and obese women, women with ≥ 3 chronic conditions, and smokers sat more, than women in the respective referent category.

Discussion

This study provides initial evidence of the factors associated with sitting time in young and mid-age Australian women. A wide range of variables was correlated with sitting time, and although many of these are not easily modifiable, the results are useful for identifying groups of women who may benefit from targeted interventions to reduce sitting time and for identifying opportunities for intervention.

Most of the demographic and time-use variables that were significantly associated with sitting time were similar between the 2 age cohorts. Previous studies have shown that indicators of socioeconomic disadvantage, such as living in deprived neighborhoods,[14,15] low income,[14–16] no paid job,[16,17] and low education,[16,17] are associated with higher TV viewing time. In contrast, in the current study, indicators of socioeconomic advantage, such as full-time work and skilled occupations in both cohorts and university education in the mid-age cohort, were associated with high sitting time.

Two types of work—home duties and caring duties—however, were associated with lower sitting time. Young and mid-age women who worked full-time in home duties had relatively low sitting time and sitting time in the young women was lower for more children. Interestingly, sitting time was high in mid-age women who could easily manage on their income and in younger women who found it difficult to manage on their income. This may reflect the fact that many of these younger women, even those in full-time jobs requiring long hours of sitting, may be struggling to manage on their income, especially if they are establishing independent homes and repaying university fee loans. We conclude that relationships between socioeconomic position and sitting time in women reflect their paid work and unpaid family roles, with more highly educated full-time working women having a greater risk of high sitting time than women who are engaged in unpaid family caring duties.

Young and mid-aged women with sleeping problems reported higher sitting time. Lack of sleep may lead to an increase in sedentary behaviors due to tiredness, as has been hypothesized to be the case in children.[31] Overweight or obese mid-aged women sat more than those with a healthy weight, which is in line with recent suggestions that there may be a bidirectional or reverse relationship between sitting time and BMI in mid-aged people.[32,33] The higher sitting in mid-aged women with ≥ 3 chronic conditions could also reflect a bidirectional relationship, as sitting is a potential risk factor for chronic conditions,[34] but chronic conditions may also affect the ability to be physically active, thereby indirectly influencing sitting time.

Table 2 Correlates of Sitting Time in Women Born Between 1973–1978[a]

		Univariate (N = 7724)			Multivariable (N = 7724)		
		Mean sitting time (hrs/day)	95% CI	*P*	Mean sitting time (hrs/day)	95% CI	*P*
Demographics							
Area of residence	*Urban*	7.06	(6.96–7.16)		6.28	(5.82–6.74)	
	Large rural town	6.18	(5.96–6.41)	**<.001**	5.69	(5.19–6.19)	**<.001**
	Small rural town/remote area	5.87	(5.74–6.00)	**<.001**	5.59	(5.13–6.06)	**<.001**
Country of birth	*Australia*	6.56	(6.48–6.63)		5.62	(5.19–6.05)	
	Other English speaking	6.72	(6.31–7.13)	1.00	5.64	(5.08–6.20)	.90
	Non-English speaking	7.70	(7.31–8.06)	**<.001**	6.31	(5.75–6.87)	**<.001**
Education	*No formal education or school certificate*	5.58	(5.35–5.80)		5.74	(5.24–6.24)	
	High school or leaving certificate	6.30	(6.13–6.47)	**<.001**	5.97	(5.50–6.45)	.09
	Trade/apprenticeship/certificate/ diploma	6.51	(6.37–6.66)	**<.001**	5.81	(5.33–6.29)	.61
	University	6.99	(6.88–7.10)	**<.001**	5.90	(5.42–6.37)	.28
Occupation	*Professional*	6.99	(6.88–7.10)		5.72	(5.23–6.20)	
	Skilled	7.68	(7.50–7.87)	**<.001**	6.66	(6.16–7.15)	**<.001**
	Blue collar	5.96	(5.80–6.12)	**<.001**	5.31	(4.83–5.79)	**<.001**
	No paid job	5.46	(5.31–5.60)	**<.001**	5.74	(5.25–6.22)	.90
Income management	*Not too bad*	6.64	(6.52–6.75)		5.72	(5.25–6.19)	
	Easy	7.03	(6.86–7.20)	**.001**	5.80	(5.31–6.29)	.42
	Difficult some of the time	6.36	(6.23–6.49)	**.02**	5.83	(5.36–6.29)	.24
	Impossible/difficult all of the time	6.35	(6.13–6.58)	.16	6.07	(5.59–6.56)	**.005**
Family and caring							
Providing care for others	*No*	6.64	(6.57–6.72)		6.07	(5.62–6.51)	
	Yes	5.86	(5.55–6.17)	**<.001**	5.64	(5.13–6.16)	**.007**
Number of children	*None*	7.22	(7.13–7.31)		6.62	(6.15–7.08)	
	1	5.48	(5.32–5.64)	**<.001**	5.83	(5.35–6.31)	**<.001**
	2	5.14	(4.96–5.33)	**<.001**	5.70	(5.20–6.20)	**<.001**
	≥3	4.62	(4.33–4.90)	**<.001**	5.28	(4.72–5.84)	**<.001**
Pregnant	*No*	6.64	(6.57–6.72)		5.94	(5.26–6.28)	
	Yes	6.12	(5.87–6.36)	**<.001**	5.77	(5.26–6.28)	.20

(continued)

Table 2 *(continued)*

		Univariate (N = 7724)			Multivariable (N = 7724)		
		Mean sitting time (hrs/day)	95% CI	*P*	Mean sitting time (hrs/day)	95% CI	*P*
Time use							
Hours worked	*Full-time*	7.31	(7.21–7.41)		6.47	(5.99–6.95)	
	Part-time	5.73	(5.60–5.87)	**<.001**	5.52	(5.05–5.99)	**<.001**
	Not in labor force	5.54	(5.39–5.70)	**<.001**	5.58	(5.08–6.07)	**<.001**
Home duties	*Part-time*	6.88	(6.80–6.96)		5.88	(5.45–6.32)	
	Full-time	4.91	(4.75–5.06)	**<.001**	5.28	(4.82–5.74)	**<.001**
	No home duties	7.59	(7.03–8.16)	**.031**	6.40	(5.73–7.07)	.052
Studying	*No*	6.46	(6.38–6.55)		5.66	(5.20–6.11)	
	Yes	7.00	(6.85–7.41)	**<.001**	6.05	(5.58–6.53)	**<.001**
Passive leisure	*1–15 hours/week*	6.27	(6.18–6.37)		5.63	(5.29–5.97)	
	>15 hours/week	7.28	(7.16–7.41)	**<.001**	6.84	(6.49–7.19)	**<.001**
	No passive leisure	5.49	(4.36–6.61)	.41	5.10	(4.09–6.11)	0.28
Health							
Sleeping problems	*No*	6.52	(6.44–6.61)		5.70	(5.24–6.16)	
	Yes	6.77	(6.64–6.91)	**.002**	6.01	(5.54–6.47)	**<.001**
Health behaviors							
Energy intake	*Very low*	6.88	(6.72–7.05)		5.85	(5.37–6.33)	
	Low	6.73	(6.57–6.90)	1.00	5.84	(5.36–6.32)	.93
	Moderate	6.56	(6.39–6.73)	**0.07**	5.81	(5.33–6.29)	.75
	High	6.49	(6.33–6.65)	**.01**	5.84	(5.36–6.32)	.95
	Very high	6.33	(6.17–6.50)	**<.001**	5.94	(5.47–6.41)	.41
Smoking	*Never smoked*	6.71	(6.61–6.81)		5.92	(5.45–6.38)	
	Ex-smoker	6.58	(6.41–6.75)	.57	6.04	(5.57–6.52)	.19
	Current smoker	6.37	(6.20–6.51)	**<.001**	5.61	(5.14–6.08)	**.001**
Alcohol intake	*Low risk drinker*	6.76	(6.66–6.85)		5.83	(5.37–6.29)	
	Rarely drinker	6.30	(6.16–6.44)	**<.001**	5.85	(5.39–6.31)	.77
	Risky drinker	7.14	(6.76–7.53)	.37	6.08	(5.49–6.66)	.19
	Nondrinker	6.13	(5.86–6.40)	**<.001**	5.66	(5.17–6.16)	.23

[a] Data collected in 2003, except country of birth (1996) and alcohol intake (2000). [b] Very low (≤4800 KJ), low (>4800-6000 KJ), moderate (>6000-7100 KJ), high (7100-8800 KJ), and very high (>8800 KJ). *Note. Italic* indicates the referent category. **Boldface** indicates significant difference in sitting time compared with the referent category for that variable.

Table 3 Correlates of Sitting Time in Women Born Between 1946–1951[a]

		Univariate (N = 8198)			Multivariable (N = 8198)		
		Mean sitting time (hrs/day)	95% CI	*P*	Mean sitting time (hrs/day)	95% CI	*P*
Demographics							
Area of residence	*Urban*	6.13	(6.02–6.24)		6.08	(5.84–6.32)	
	Large rural town	5.59	(5.42–5.77)	**< 0.001**	5.60	(5.32–5.87)	**< .001**
	Small rural town/remote area	5.39	(5.30–5.48)	**< 0.001**	5.49	(5.24–5.73)	**< .001**
Country of birth	*Australia*	5.67	(5.59–5.74)		5.78	(5.56–6.01)	
	Other English speaking	6.08	(5.91–6.25)	**<.001**	5.95	(5.68–6.22)	.071
	Non-English speaking	5.36	(5.13–5.59)	**.041**	5.43	(5.13–5.73)	**.002**
Education	*No formal education or school certificate*	5.55	(5.46–5.65)		5.66	(5.42–5.90)	
	High school or leaving certificate	5.88	(5.72–6.05)	**.003**	5.82	(5.55–6.09)	.081
	Trade/apprenticeship/certificate/ diploma	5.49	(5.35–5.63)	1.00	5.43	(5.17–5.69)	**.009**
	University	6.20	(6.03–6.36)	**<.001**	5.97	(5.69–6.25)	**.004**
Occupation	*Professional*	5.89	(5.78–6.01)		5.59	(5.34–5.84)	
	Skilled	7.04	(6.85–7.24)	**<.001**	6.80	(6.50–7.09)	**<.001**
	Blue collar	5.32	(5.20–5.45)	**<.001**	5.36	(5.10–5.63)	**0.014**
	No paid job	5.16	(5.04–5.28)	**<.001**	5.14	(4.87–5.41)	**<.001**
Income management	*Not too bad*	5.63	(5.53–5.72)		5.65	(5.40–5.89)	
	Easy	6.02	(5.86–6.18)	**<.001**	5.93	(5.66–6.20)	**.001**
	Difficult some of the time	5.62	(5.50–5.75)	1.00	5.67	(5.42–5.93)	.96
	Impossible/difficult all of the time	5.62	(5.41–5.83)	1.00	5.64	(5.35–5.92)	.73
Family and caring							
Marital status	*Married/partnered*	5.59	(5.51–5.66)		5.55	(5.32–5.78)	
	Single/separated/divorced/widow	6.24	(6.08–6.41)	**<.001**	5.90	(5.63–6.16)	**<.001**
Providing care for others	*No*	5.77	(5.69–5.84)		5.78	(5.55–6.02)	
	Yes	5.50	(5.37–5.63)	**.001**	5.66	(5.41–5.91)	.086
Caring for grandchildren	*Never*	5.38	(5.21–5.56)		5.63	(5.35–5.91)	
	Occasionally	5.64	(5.52–5.77)	.060	5.76	(5.51–6.01)	.21
	Daily or weekly	5.80	(5.71–5.89)	**<.001**	5.77	(5.54–6.01)	.15

(continued)

Table 3 *(continued)*

		Univariate (N = 8198)			Multivariable (N = 8198)		
		Mean sitting time (hrs/day)	95% CI	*P*	Mean sitting time (hrs/day)	95% CI	*P*
Time use							
Hours worked	*Full-time*	6.28	(6.17–6.39)		6.13	(5.88–6.38)	
	Part-time	5.21	(5.12–5.31)	**<.001**	5.32	(5.07–5.57)	**<.001**
	Not in labor force	5.31	(5.18–5.44)	**<.001**	5.72	(5.42–6.01)	**.001**
Home duties	*Part-time*	5.91	(5.84–5.99)		6.06	(5.85–6.28)	
	Full-time	4.68	(4.54–4.81)	**<.001**	5.27	(5.01–5.53)	**<.001**
	No home duties	5.28	(4.86–5.70)	**.008**	5.83	(5.42–6.25)	.27
Studying	*No*	5.66	(5.59–5.73)		5.62	(5.39–5.85)	
	Yes	5.88	(5.73–6.04)	**.013**	5.82	(5.56–6.09)	**.015**
Passive leisure	*1–15 hours/week*	5.37	(5.29–5.45)		5.54	(5.32–5.76)	
	>15 hours/week	6.52	(6.41–6.64)	**<.001**	6.78	(6.55–7.01)	**<.001**
	No passive leisure	4.54	(4.04–5.03)	**.001**	4.84	(4.39–5.30)	**.002**
Health							
BMI	*Normal weight*	5.45	(5.35–5.54)		5.44	(5.19–5.68)	
	Overweight	5.69	(5.57–5.80)	**.007**	5.60	(5.35–5.85)	**.024**
	Obese	6.26	(6.11–6.41)	**<.001**	6.13	(5.87–6.39)	**<.001**
Number of chronic conditions	*None*	5.65	(5.55–5.74)		5.62	(5.38–5.86)	
	1	5.61	(5.49–5.72)	1.00	5.55	(5.31–5.80)	.38
	2	5.89	(5.71–6.07)	.11	5.77	(5.50–6.05)	.11
	≥3	6.15	(5.88–6.41)	**.002**	5.94	(5.62–6.26)	**.017**
Sleeping problems[b]	*No*	5.65	(5.56–5.74)		5.67	(5.43–5.91)	
	Yes	5.76	(5.67–5.86)	.087	5.78	(5.53–6.02)	.09

(continued)

Table 3 *(continued)*

		Univariate (N = 8198)			Multivariable (N = 8198)		
		Mean sitting time (hrs/day)	95% CI	*P*	Mean sitting time (hrs/day)	95% CI	*P*
Health behaviors							
Physical activity[c]	*None*	6.00	(5.83–6.17)		5.90	(5.64–6.16)	
	Very low	5.92	(5.76–6.08)	1.00	5.84	(5.57–6.10)	.56
	Low	5.85	(5.69–6.00)	1.00	5.81	(5.54–6.08)	.38
	Moderate	5.64	(5.50–5.78)	**.011**	5.65	(5.38–5.91)	**0.016**
	High	5.28	(5.15–5.40)	**<.001**	5.41	(5.16–5.67)	**<.001**
Smoking	*Never smoked*	5.61	(5.53–5.70)		5.65	(5.41–5.89)	
	Ex-smoker	5.75	(5.64–5.87)	.19	5.66	(5.41–5.91)	0.88
	Current smoker	5.92	(5.73–6.10)	**.008**	5.86	(5.59–6.13)	**.034**
Alcohol intake	*Low risk drinker*	5.82	(5.73–5.91)		5.82	(5.58–6.06)	
	Rarely drinker	5.61	(5.48–5.73)	**.042**	5.67	(5.43–5.92)	.057
	Risky drinker	5.89	(5.60–6.17)	1.00	5.78	(5.45–6.12)	.81
	Nondrinker	5.29	(5.11–5.48)	**<.001**	5.61	(5.34–5.89)	**.049**

[a] Data collected in 2003, except country of birth (1996) and education (1996).

[b] Having sleeping problems was associated with sitting time in the univariate analysis, which included all women who provided sitting time data (n = 10,308), but the variable was not significant ($P = 0.09$) in the smaller sample included in the multivariable analysis and whose data are shown here for both the univariate and multivariate models (n = 8198).

[c] None (<40 MET·min/week), very low (40 to <300 MET·min/week), low (300 to <600 MET·min/week), moderate (600 to <1200 MET·min/week), high (≥1200 MET·min/week).

Note. Italic indicates the referent category. **Boldface** indicates significant difference in sitting time compared with the referent category for that variable.

In the mid-aged women, there was evidence of a cluster of healthy behaviors associated with lower sitting time: women with moderate or high activity levels and those who did not smoke or drink had lower sitting times. In contrast, smoking was associated with lower sitting time in the younger women. A potential explanation is that, in this age-group, smoking may be an indication of socioeconomic status, with women who smoke being less likely to be in full-time work, and in less skilled occupations. However, our analyses were adjusted for these variables.

It is not yet clear what amount of sitting time would be a meaningful difference in health risk,[34] and although statistically significant, some of the differences in sitting time among the different categories of some variables were small. We found the largest differences in average sitting time, 1 to 1.25 hours, for working hours, different occupations, and time spent in passive leisure in both age groups. Combinations of work and passive leisure resulted in even greater differences in sitting time. For example, full-time working mid-aged women in skilled occupations and engaging in > 15 hrs/week of passive leisure sat for 8.8 (SD 3.1) hrs/day (n = 158), whereas mid-aged women in professional occupations who did not work full-time and engaged 1 to 15 hrs/week in passive leisure sat only 4.9 (SD 2.8) hrs/day (n = 839). These findings suggest both occupational sitting and leisure-time sitting offer opportunities for intervention.

The major strength of this study was the use of large national samples of working age women. Because ALSWH addresses a myriad of variables that are important for women, we were able to include some unconventional variables that may be associated with sitting time. Moreover, because data from women at 2 contrasting life-stages were included in the analyses, we were able to examine potential age and generational differences in sitting-time correlates. The main limitation is the reliance on self-report data, which are vulnerable to bias and measurement error. Self-report data are, however, pragmatic for large population-based studies.[35] In addition, the reliability and validity of the sitting question has not been tested although it is similar to the IPAQ sitting question, which has been shown to have acceptable reliability and validity in women.[23]

In conclusion, young and mid-aged women who are in full-time work, in skilled occupations, and those who report high levels of passive leisure should be targeted in interventions to decrease sitting time. These findings suggest that interventions for reducing sitting time should focus on both occupational and leisure-time sitting.

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References

1. Ainsworth BE, Haskell WL, Whitt MC, et al. Compendium of physical activities: an update of activity codes and MET intensities. *Med Sci Sports Exerc*. 2000;32(9, Suppl):S498–S504.
2. Pate RR, O'Neill JR, Lobelo F. The evolving definition of "sedentary". *Exerc Sport Sci Rev*. 2008;36(4):173–178.
3. Blanck HM, McCullough ML, Patel AV, et al. Sedentary behavior, recreational physical activity, and 7-year weight gain among postmenopausal U.S. women. *Obesity (Silver Spring)*. 2007;15(6):1578–1588.
4. Hu FB, Li TY, Colditz GA, Willett WC, Manson JE. Television watching and other sedentary behaviors in relation to risk of obesity and type 2 diabetes mellitus in women. *JAMA*. 2003;289(14):1785–1791.
5. Jakes RW, Day NE, Khaw KT, et al. Television viewing and low participation in vigorous recreation are independently associated with obesity and markers of cardiovascular disease risk: EPIC-Norfolk population-based study. *Eur J Clin Nutr*. 2003;57(9):1089–1096.
6. Kronenberg F, Pereira MA, Schmitz MK, et al. Influence of leisure time physical activity and television watching on atherosclerosis risk factors in the NHLBI Family Heart Study. *Atherosclerosis*. 2000;153(2):433–443.
7. Sugiyama T, Healy GN, Dunstan DW, Salmon J, Owen N. Joint associations of multiple leisure-time sedentary behaviours and physical activity with obesity in Australian adults. *Int J Behav Nutr Phys Act*. 2008;5:35.
8. Thorp AA, Healy GN, Owen N, et al. Deleterious associations of sitting time and television viewing time with cardio-metabolic risk biomarkers: AusDiab 2004-2005. *Diabetes Care*. 2010;33(2):327–334.
9. López P, Van HL, Colangelo LA, Wolfman JA, Hendrick RE, Gapstur SM. Physical inactivity and percent breast density among Hispanic women. *Int J Cancer*. 2003;107(6):1012–1016.
10. Crawford DA, Jeffery RW, French SA. Television viewing, physical inactivity and obesity. *Int J Obes Relat Metab Disord*. 1999;23(4):437–440.
11. Fung TT, Hu FB, Yu J, et al. Leisure-time physical activity, television watching, and plasma biomarkers of obesity and cardiovascular disease risk. *Am J Epidemiol*. 2000;152(12):1171–1178.
12. Katzmarzyk PT, Church TS, Craig CL, Bouchard C. Sitting time and mortality from all causes, cardiovascular disease, and cancer. *Med Sci Sports Exerc*. 2009;41(5):998–1005.
13. Patel AV, Bernstein L, Deka A, et al. Leisure time spent sitting in relation to total mortality in a prospective cohort of US adults. *Am J Epidemiol.* 2010;172:419–429.
14. King AC, Goldberg JH, Salmon J, et al. Identifying subgroups of U.S. adults at risk for prolonged television viewing to inform program development. *Am J Prev Med*. 2010;38(1):17–26.
15. Stamatakis E, Hillsdon M, Mishra G, Hamer M, Marmot M. Television viewing and other screen-based entertain-

ment in relation to multiple socioeconomic status indicators and area deprivation: the Scottish Health Survey 2003. *J Epidemiol Community Health*. 2009;63(9):734–740.
16. Bowman SA. Television-viewing characteristics of adults: correlations to eating practices and overweight and health status. *Prev Chronic Dis*. 2006;3(2):A38.
17. Salmon J, Bauman A, Crawford D, Timperio A, Owen N. The association between television viewing and overweight among Australian adults participating in varying levels of leisure-time physical activity. *Int J Obes Relat Metab Disord*. 2000;24(5):600–606.
18. Brown WJ, Miller YD, Miller R. Sitting time and work patterns as indicators of overweight and obesity in Australian adults. *Int J Obes Relat Metab Disord*. 2003;27(11):1340–1346.
19. Jans MP, Proper KI, Hildebrandt VH. Sedentary behavior in Dutch workers: differences between occupations and business sectors. *Am J Prev Med*. 2007;33(6):450–454.
20. Lee C, Dobson AJ, Brown WJ, et al. Cohort profile: the Australian Longitudinal Study on Women's Health. *Int J Epidemiol*. 2005;34(5):987–991.
21. Brown WJ, Bryson L, Byles JE, et al. Women's Health Australia: recruitment for a national longitudinal cohort study. *Women Health*. 1998;28(1):23–40.
22. van Uffelen JG, Watson MJ, Dobson AJ, Brown WJ. Sitting time is associated with weight, but not with weight gain in mid-aged Australian women. *Obesity.* 2010;18:1788–1794.
23. Rosenberg DE, Bull FC, Marshall AL, Sallis JF, Bauman AE. Assessment of sedentary behavior with the International Physical Activity Questionnaire. *J Phys Act Health*. 2008;5(Suppl 1):S30–S44.
24. Australian Bureau of Statistics. Australian Standard Classification of Occupations (ASCO): ABS Catalogue No. 1220.0. Canberra, Australia: Australian Government Publishing Service; 1997.
25. World Health Organization. Obesity: preventing and managing the global epidemic. Geneva; 2000. WHO technical report series 894.
26. Australian Bureau of Statistics. 1989-1990 National health survey users' guide. Canberra, Australia: ABS; 1991. Report No. 4363.0.
27. Brown WJ, Burton NW, Marshall AL, Miller YD. Reliability and validity of a modified self-administered version of the Active Australia physical activity survey in a sample of mid-age women. *Aust N Z J Public Health*. 2008;32(6):535–541.
28. Heesch KC, Miller YD, Brown WJ. Relationship between physical activity and stiff or painful joints in mid-aged women and older women: a 3-year prospective study. *Arthritis Res Ther*. 2007;9(2):R34.
29. Ireland P, Jolley D, Giles G, et al. Development of the Melbourne FFQ: a food frequency questionnaire for use in an Australian prospective study involving an ethnically diverse cohort. *Asia Pac J Clin Nutr*. 1994;3:19–31.
30. Brown WJ, Williams L, Ford JH, Ball K, Dobson AJ. Identifying the energy gap: magnitude and determinants of 5-year weight gain in midage women. *Obes Res*. 2005;13(8):1431–1441.
31. Must A, Parisi SM. Sedentary behavior and sleep: paradoxical effects in association with childhood obesity. *Int J Obes (London)*. 2009;33(Suppl 1):S82–S86.
32. Ekelund U, Brage S, Besson H, Sharp S, Wareham NJ. Time spent being sedentary and weight gain in healthy adults: reverse or bidirectional causality? *Am J Clin Nutr*. 2008;88(3):612–617.
33. Mortensen LH, Siegler IC, Barefoot JC, Gronbaek M, Sorensen TI. Prospective associations between sedentary lifestyle and BMI in midlife. *Obesity (Silver Spring)*. 2006;14(8):1462–1471.
34. Owen N, Bauman A, Brown W. Too much sitting: a novel and important predictor of chronic disease risk? *Br J Sports Med*. 2009;43(2):81–83.
35. Bauman A, Phongsavan P, Schoeppe S, Owen N. Physical activity measurement—a primer for health promotion. *Promot Educ*. 2006;13(2):92–103.

Appendix

Table 1 Comparison of Women From the 1973–1978 Birth Cohort Whose Data Were Included in the Analysis and Women Whose Data Were Excluded[a]

	Included (N = 7724)		Excluded (N = 1357)		
	N	%[b]	N	%[b]	*P*[c]
Demographics					
Area of residence					**<.001**
Urban	4536	59	699	52	
Large rural town	785	10	157	12	
Small rural town/remote area	2403	31	498	37	
Missing	–	–	3	0.2	
Country of birth					.41
Australia	7173	93	1213	89	
Other English speaking	275	4	44	3	
Non-English speaking	276	4	37	3	
Missing	–	–	63	5	
Education					**<.001**
No formal education or school certificate	754	10	180	13	
Higher school or leaving certificate	1479	19	249	18	
Trade/apprenticeship/certificate/diploma	1939	25	335	25	
University	3552	46	379	28	
Missing	–	–	214	16	
Occupation					**<.001**
Professional	3523	46	430	32	
Skilled	1188	15	187	14	
Blue collar	1585	21	323	24	
No paid job	1428	19	301	22	
Missing	–	–	116	9	
Income management					**<.001**
Impossible/difficult all of the time	883	11	199	15	
Difficult some of the time	2277	30	443	33	
Not too bad	3000	39	468	35	
Easy	1564	20	200	15	
Missing	–	–	47	4	
Family and caring					
Marital status					.28
Married/partnered	1767	23	290	21	
Single/separated/divorced/widow	5936	77	1052	78	
Missing	–	–	15	1	
Providing care for others					**.003**
No	7305	95	1263	93	
Yes	419	5	94	7	

(continued)

Table 1 *(continued)*

	Included (N = 7724)		Excluded (N = 1357)		
	N	%[b]	N	%[b]	*P*[c]
Family and caring *(continued)*					
Number of children					**<.001**
None	5333	69	831	61	
1	1168	15	276	20	
2	873	11	173	13	
≥3	350	5	77	6	
Pregnant					.40
No	7127	92	1052	78	
Yes	597	8	97	7	
Missing	–	–	208	15	
Time use					
Hours worked					**<.001**
Not in labor force	1308	17	104	8	
Part-time	1994	26	598	44	
Full-time	4422	57	601	44	
Missing	–	–	54	4	
Home duties					**.01**
No home duties	138	2	24	2	
Part-time	6449	84	993	73	
Full-time	1137	15	222	16	
Missing	–	–	118	9	
Studying					.12
No	5722	74	892	66	
Yes	2002	26	278	21	
Missing	–	–	187	14	
Passive leisure					.18
No passive leisure	93	1	12	1	
1–15 hours/week	5146	67	867	64	
>15 hours/week	2538	33	433	32	
Missing	–	–	45	3	
Health					
BMI					.06
Normal weight	4729	61	785	58	
Overweight	1624	21	255	19	
Obese	1041	14	206	15	
Missing	–	–	111	8	
Number of chronic conditions					**.04**
None	4671	61	764	56	
1	2003	26	373	28	
2	683	9	148	11	
≥3	246	3	47	4	
Sleeping poorly					.10
No	5314	69	886	65	
Yes	2410	31	446	33	
Missing	–	–	25	2	

(continued)

Table 1 *(continued)*

	Included (N = 7724)		Excluded (N = 1357)		
	N	%[b]	N	%[b]	*P*[c]
Health *(continued)*					
Stiff or painful joints					**.02**
No	6043	78	1009	74	
Yes	1681	22	323	24	
Missing	–	–	25	2	
Health behaviors					
Physical activity[d]					**.001**
None	666	9	147	11	
Very low	1420	18	225	17	
Low	1354	18	207	15	
Moderate	1790	23	257	19	
High	2422	31	428	32	
Missing	–	–	93	7	
Energy intake[e]					**.03**
Very low	1548	20	281	21	
Low	1620	21	255	19	
Moderate	1458	19	238	18	
High	1591	21	269	20	
Very high	1507	20	309	23	
Missing	–	–	5	0.4	
Smoking					**<.001**
Never smoked	4486	58	685	51	
Ex-smoker	1412	18	262	19	
Current smoker	1826	24	377	28	
Missing	–	–	33	2	
Alcohol intake					**<.001**
Nondrinker	602	8	129	10	
Low risk drinker	4799	62	723	53	
Rarely drinker	2049	27	413	30	
Risky drinker	274	4	55	4	
Missing	–	–	37	3	

[a] Data collected in 2003, except country of birth (1996) and alcohol intake (2000).

[b] Percentage may not add up to 100% due to rounding.

[c] *P*-values refer to differences in proportions between categories listed in the rows, using Pearson's chi square tests.

[d] None (<40 MET·min/week), very low (40 to <300 MET·min/week), low (300 to <600 MET·min/week), moderate (600 to <1200 MET·min/week), high (≥1200 MET·min/week).

[e] Very low (≤4800 KJ), low (>4800 to 6000 KJ), moderate (>6000 to 7100 KJ), high (7100 to 8800 KJ), and very high (>8800 KJ).

Table 2 Comparison of Women From the 1946–1951 Birth Cohort Whose Data Were Included in the Analysis and Women Whose Data Were Excluded[a]

	Included (N = 8198)		Excluded (N = 3002)		
	N	%[b]	N	%[b]	*P*[c]
Demographics					
Area of residence					**.004**
Urban	3131	38	1065	36	
Large rural town	1142	14	370	12	
Small rural town/remote area	3925	48	1515	51	
Missing	–	–	52	2	
Country of birth					**<.001**
Australia	6343	77	2242	75	
Other English speaking	1181	14	312	10	
Non-English speaking	674	8	318	11	
Missing	–	–	130	4	
Education					**<.001**
No formal education or school certificate	3769	46	1627	54	
Higher school or leaving certificate	1359	17	466	16	
Trade/apprenticeship/certificate/diploma	1708	21	508	17	
University	1326	16	313	10	
Missing	–	–	88	3	
Occupation					**<.001**
Professional	2972	36	801	27	
Skilled	1073	13	302	10	
Blue collar	2062	25	730	24	
No paid job	2091	26	834	28	
Missing	–	–	335	11	
Income management					**<.001**
Impossible/difficult all of the time	813	10	434	15	
Difficult some of the time	2155	26	857	29	
Not too bad	3646	45	1164	39	
Easy	1584	19	405	14	
Missing	–	–	142	5	
Family and caring					
Marital status					**<.001**
Married/partnered	6763	82	2315	77	
Single/separated/divorced/widow	1435	18	628	21	
Missing	–	–	59	2	
Caring for grandchildren					**<.001**
Never	1090	13	505	17	
Occasionally	2313	28	895	30	
Daily or weekly	4795	59	1526	51	
Missing	–	–	76	3	
Providing care for others					.28
No	6142	75	2281	76	
Yes	2056	25	721	24	

(continued)

Table 2 *(continued)*

	Included (N = 8198)		Excluded (N = 3002)		
	N	%[b]	N	%[b]	*P*[c]
Time use					
Hours worked					**<.001**
Not in labor force	1709	21	833	28	
Part-time	2922	36	1050	35	
Full-time	3567	43	1041	35	
Missing	–	–	78	3	
Home duties					**<.001**
No home duties	208	2	119	4	
Part-time	6690	82	1943	65	
Full-time	1300	16	513	17	
Missing	–	–	427	14	
Studying					**.002**
No	6757	82	2241	75	
Yes	1441	18	394	13	
Missing	–	–	367	12	
Passive leisure					**<.001**
No passive leisure	171	2	144	5	
1–15 hours/week	5529	67	1855	62	
>15 hours/week	2498	31	803	27	
Missing	–	–	200	7	
Health					
BMI					**.005**
Normal weight	3691	45	1101	37	
Overweight	2652	32	842	28	
Obese	1855	23	665	22	
Missing	–	–	394	13	
Number of chronic conditions					**<.001**
None	3950	48	1321	44	
1	2591	32	949	32	
2	1119	14	465	16	
≥3	538	7	267	9	
Sleeping poorly					.37
No	4447	54	1434	48	
Yes	3751	46	1259	42	
Missing	–	–	309	10	
Stiff or painful joints					**<.001**
No	4303	53	1347	45	
Yes	3746	47	1428	48	
Missing	–	–	227	8	

(continued)

Table 2 *(continued)*

	Included (N = 8198)		Excluded (N = 3002)		
	N	%[b]	N	%[b]	*P*[c]
Health behaviors					
Physical activity[d]					**<.001**
None	1382	17	549	18	
Very low	1561	19	497	17	
Low	1514	19	386	13	
Moderate	1688	21	477	16	
High	2053	25	564	19	
Missing	–	–	529	18	
Energy intake[e]					.095
Very low	1591	20	586	20	
Low	1547	20	524	18	
Moderate	1504	19	548	18	
High	1697	22	532	18	
Very high	1534	20	561	19	
Missing	–	–	251	8	
Smoking					**.044**
Never smoked	4434	54	1567	52	
Ex-smoker	2633	32	920	31	
Current smoker	1131	14	462	15	
Missing	–	–	53	2	
Alcohol intake					**<.001**
Nondrinker	982	12	451	15	
Low risk drinker	4485	55	1323	44	
Rarely drinker	2252	28	840	28	
Risky drinker	479	6	136	5	
Missing	–	–	252	8	

[a] Data collected in 2003, except country of birth (1996) and education (1996).

[b] Percentage may not add up to 100% due to rounding.

[c] *P*-values refer to differences in proportions between categories listed in the rows, using Pearson's chi square tests.

[d] None (<40 MET·min/week), very low (40 to 300 MET·min/week), low (>300 to <600 MET·min/week), moderate (600 to <1200 MET·min/week), high (≥1200 MET·min/week).

[e] Very low (≤4800 KJ), low (>4800 to 5800 KJ), moderate (>5800 to 6800 KJ), high (>6800 to 8300 KJ), and very high (>8300 KJ).