JANUARY 2019

Sleep Health in Australia's Federal Parliament House

A report describing the sleep habits of individuals working at Parliament House, Canberra.

Data obtained from a research study undertaken from Monday 10th September 2018 to Tuesday 2nd October 2018.

Sleep Health Foundation
Improving people's lives through better sleep

Australasian Sleep Association

Preface

Over the past 24 months the Australasian Sleep Association and the Sleep Health Foundation have met with many federal politicians and their staff to discuss the problems posed by inadequate sleep and sleep disorders and to encourage making consideration of these an important component of the National Health Agenda. These discussions resulted in the Government recently announcing a *Parliamentary Inquiry into Sleep Health Awareness in Australia* by The Standing Committee on Health, Aged Care and Sport. The Inquiry is a world first in an underappreciated area of health and mental wellness that can affect people all ages, genders, ethnic backgrounds and socioeconomic circumstances.

During the many meetings and discussions that have been held a regular comment made by parliamentarians and their staff was the negative effect that their long working hours had on the quality and quantity of their own sleep, particularly during Parliamentary sitting times. These comments prompted the Australasian Sleep Association and the Sleep Health Foundation to undertake a study to objectively measure the sleep behaviours of those working in Parliament House, including Federal politicians, their staff and members of the media.

The results of this study are contained in this report. They will, along with the Parliamentary Inquiry, help encourage an upscaling in the national dialogue regarding sleep and its impact on our health and wellbeing. This is timely as there is abundant evidence that adequate sleep, a long underplayed issue, is as important for health as good nutrition and regular exercise. Indeed, sleep should be seen as the third pillar of good health, alongside exercise and a healthy diet.

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This report was made possible by the generous support of:

Australasian Sleep Association

Sleep Health Foundation

University of Western Australia

Canberra Sleep Clinic

Executive Counsel Australia

Actigraph LLC

Curtin University

The Western Australian Pregnancy Cohort (Raine) Study

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Western Australian Pregnancy Cohort (Raine) Study

Curtin University

Contents

List of Tables

List of Figures

Glossary

ASA	Australasian Sleep Association
BMI	Body Mass Index
CSC	Canberra Sleep Clinic
ECA	Executive Counsel Australia
N	Number
NSP:W	Parliamentary non-sitting period: weekday
NSP:WE	Parliamentary non-sitting period: weekend
SD	Standard Deviation
SHF	Sleep Health Foundation
SP:W	Parliamentary sitting period: weekday
SP:WE	Parliamentary sitting period: weekend
PSG	Polysomnography
UWA	University of Western Australia

Executive Summary

Inadequate sleep is a large, expensive and growing Australian public health problem that, to date, has been under-recognised by the community and its leaders.[1,2] Inadequate sleep is common with four out of 10 Australian adults reporting insufficient sleep on a daily or several-days-a-week basis.[3] The consequences of inadequate sleep include reduced concentration and vigilance, impaired decision-making and memory, increased irritability and depression, increased cardiometabolic risk, depressed immune function, greater susceptibility to dementia and some malignancies and reduced quality of life.[4-7] Social impacts of sleep loss include lost productivity, increased road and workplace accident risk, and increased work-related errors.[8-11] The financial costs of inadequate sleep are substantial and in 2016-17 were estimated to cause $26.2 billion in direct financial costs and a further $40.1 billion in non-financial (loss of well-being) costs.[12]

Inadequate or poor quality sleep is common in the workplace, particularly for shift workers, and of particular concern for people working in safety-critical occupations, such as occupational drivers, emergency service and health care workers, and the operators of potentially dangerous machinery.[8,9] Approximately 16% of the Australian workforce are shift workers and their accident rate is double that of non-shift workers[13]; it is highly likely that much of this additional risk is related to poor sleep, as shift work occurs in defiance of natural day/night wake/sleep circadian rhythms. Inadequate sleep increases accident risk. For occupational drivers where sleep is impaired (because of excessive work hours, shift rostering, failure to utilize available time off-duty for sleep or an unidentified sleep disorder) this accident risk is compounded, sometimes dangerously so. Sleep loss is associated with errors in decision making: in the case of health workers (e.g., doctors and nurses) this can lead to significant errors and patient harm including death.[4]

Given their long working hours, particularly when parliament is sitting, the sleep of politicians, staffers and members of the media is likely to suffer. This places them at risk of sleep-related impairment in psychomotor function, mood and cognition, particularly those higher functions related to interpretation of information and complex decision making. These are issues worth serious consideration, given the important role parliament has in decision making and setting a national example in standards of behaviour. However, to date, no studies have been undertaken to objectively measure the sleep and activity behaviours of Australian politicians or their staff. Such measurements are now possible with the availability of non-intrusive wrist-worn devices that can continuously collect and store sleep-related data for several weeks. While many such devices are on the market, it is essential that the data collected and analyses undertaken be valid and reliable. More recently, medical-grade sleep and activity monitors have been developed. These wrist-worn, accelerometer-based monitors have been extensively validated and are widely used in clinical sleep medicine and research, particularly for measurements of sleep duration. They are ideal for monitoring sleep and activity in individuals over a prolonged period (3 weeks).

Sleep data from 50 individuals, all working in parliament house, were recorded and analysed (from 15 Members of Parliament, 9 Senators, 22 parliamentary staff and 4 others). All wore a medical grade accelerometer device to continually measure their sleep over the course of a parliamentary sitting week and on weekdays and weekends when at home. The study showed that politicians, staffers and members of the media slept on average 6½ hours each weeknight when parliament was sitting. On average this was 24 minutes less per night compared to the weekend of a sitting week, or weekends or weekdays of a non-sitting week. Further, regardless of whether a weekday or weekend, sitting period or non-sitting period, the study also showed that half of all participants were not achieving the recommended 7-9 hours of sleep for adults.[14] Of particular concern is that during the weekdays of the sitting period some participants slept for as little as 3½ hours per night.

These findings are consistent with data from an Australian population based survey showing that inadequate sleep is common with four out of 10 Australian adults reporting insufficient sleep on a daily or several-days-a-week basis.[3]

As was the case in the current study where sleep duration was increased on the weekend, many studies have shown similar behaviours, presumably representing an attempt to recover from inadequate sleep achieved and built up over the preceding working week.[15-17] However, despite the longer sleep, half of all participants in the current study were still below the recommended 7-9 hours adult sleep duration on weekends.[14]

The findings from this study reflect the sleep behaviours of many Australians, demonstrating that sleep is less than required for healthy living, and optimal productivity, safety and mood, particularly during the working week. They suggest that re-prioritisation of time to allow for more sleep would be beneficial for the individuals involved, the work they do and the interactions they have. The current *Parliamentary Inquiry into Sleep Health Awareness in Australia* provides a unique opportunity to address this issue nationally through promoting awareness of sleep requirements and behavioural change amongst adults and children, health professionals, and in the workplace.

Background

Sleep is a fundamental biological need which is essential for physical and mental recuperation from wakeful activities, memory consolidation and maintenance of health.[18] Poor or inadequate sleep can occur as the result of the impact of a clinical sleep disorder or from inadequate duration through choice or pressure from competing priorities. Inadequate sleep has a significant detrimental impact on physical and mental health and well-being. Not only do inadequate sleepers become irritable, sleepy and depressed, but cognition is impaired, particularly memory and decision-making.[19,20] Such individuals are at increased risk of accidents on the road, at home and in the workplace[21]; performance and productivity are reduced[8-11]; marital and familial disharmony is increased and libido is reduced[22,23]; there is a greater risk of cardiovascular diseases, including hypertension, stroke, heart attack and arrhythmias[24-26]; the prevalence of obesity and diabetes is increased[27-29]; there is a greater risk of dementia with more rapid progression of the disease[30,31]; and the prevalence of some cancers may be increased.[32,33]

Yet despite this, at least four out of 10 Australian adults report insufficient sleep on a regular basis (daily or several days per week) with young adults being disproportionately affected.[3] Children are particularly at risk, with most adolescents not having sufficient sleep on school nights, which significantly affects concentration and learning.[19] More than 1.5 million Australian adults, 9% of the adult population, suffer from symptomatic sleep disorders with a further 5.9 million regularly having excessive daytime sleepiness or insufficient sleep from other causes.[12,34]

Inadequate sleep is common in the workplace, particularly for shift workers, and is of particular concern for people working in safety-critical occupations such as occupational drivers, emergency service and health care workers and the operators of dangerous machinery.[8,9] Approximately 16% of the Australian workforce are shift workers and their accident rate is double that of non-shift workers: it is highly likely that much of this additional risk is sleep-related, as shift work occurs in defiance of natural day/night wake/sleep circadian rhythms. Driving exposure increases accident risk for occupational drivers: where sleep is impaired (either

because of excessive work hours, shift work issues, failure to utilize available time off duty for sleep or an unidentified sleep disorder) this accident risk is compounded, sometimes dangerously so. Sleep loss is associated with errors in decision making: in the case of health workers (e.g., doctors and nurses) this can lead to significant errors and patient harm including death.[4]

Given the long working hours to which they are exposed, particularly when parliament is sitting, the sleep of politicians, staffers and members of the media is likely to suffer. This places them at risk of sleep-related impairments in cognition, psychomotor function and mood, particularly those higher functions related to assessment of information and complex decision making. These are issues worth serious consideration, given the important role parliament has in decision making and setting a national example in standards of behaviour. However, to date, no studies have been undertaken to objectively measure the sleep and activity behaviours of Australian politicians or their staff.

The 'gold-standard' method of measuring sleep is in-laboratory polysomnography (PSG). This method requires the application of recording sensors around the head and face to define periods of sleep and wake. The technique allows determination of the different stages of sleep. Although providing comprehensive sleep-related data, PSG requires setup and analysis by trained sleep scientists, and therefore is unsuitable for repeated measurements in the same individual over many nights, as would be the case for the study of usual sleep patterns in politicians, staffers and others working in Australia's National Parliament House.

An alternative to PSG for distinguishing periods of wake from sleep is the use of wrist-worn activity monitors. These devices contain accelerometers that measure movement and operate on the general principle that sleep can be defined as periods of "no movement" while wake is defined by periods of "movement,"[35,36] A wrist-worn activity monitor permits non-intrusive and cost-effective assessment of sleep/wake patterns over several weeks. Several algorithms have been developed to convert accelerometer-based measurements of movement into periods of wake and sleep.[37,38] In general, these algorithms have high sensitivity (i.e., they can accurately detect sleep periods within the overall rest period) but poor specificity (i.e., they less accurately detect periods of wakefulness during the overall rest period).

While there are many wrist-worn activity devices on the market[39] it is essential that, for research studies, the data collected and analyses undertaken are valid and reliable. The use of medical-grade sleep and activity monitors ensures such quality as such wrist-worn, accelerometry monitors have been extensively validated and are widely used in clinical sleep medicine and research. They are ideal for monitoring sleep and activity in individuals over a prolonged period (i.e., 3 weeks).

Study Aim

The aim of this study was to determine the sleep habits of politicians, their staffers and others working in Parliament House.

Specifically, the study sought to compare the sleep obtained during parliamentary sitting weeks to non-sitting weeks.

Study Methodology

Participants

A total of 74 participants (44 males, 30 females) with average age 45.5±13.7 (±SD) years and body mass index (BMI) 27.8±7.6 kg/m2 agreed to participate in this study. All were provided with an information sheet about the study and its purpose, and each person provided written consent for their participation in the study.

At the time of writing this report, a total of 62 participants had returned their device. Due to some individuals not wearing their devices for the required time period and/or other technical problems, data from only 50 of these participants are included in the current report.

A summary of the device status is as follows:

- 74 devices were handed out
- 62 devices were returned
  - 4 were not worn at all
  - 7 were not worn across all 4 conditions
  - 1 was worn while overseas for duration of study
- The total number of participants included in report: 50

Ethical Approval

Ethical approval to undertake the study was obtained from the Human Research Ethics Committee of the University of Western Australia *(Appendix A)*. Potential participants were sent an introductory email *(Appendix B)* and Participant Information Sheet *(Appendix C)* inviting them to express their interest in participating in the study. Written consent was obtained from each participant *(Appendix D)* prior to them being enroled in the study. The Human Research Ethics Committee identification number for the study was RA/4/20/4710.

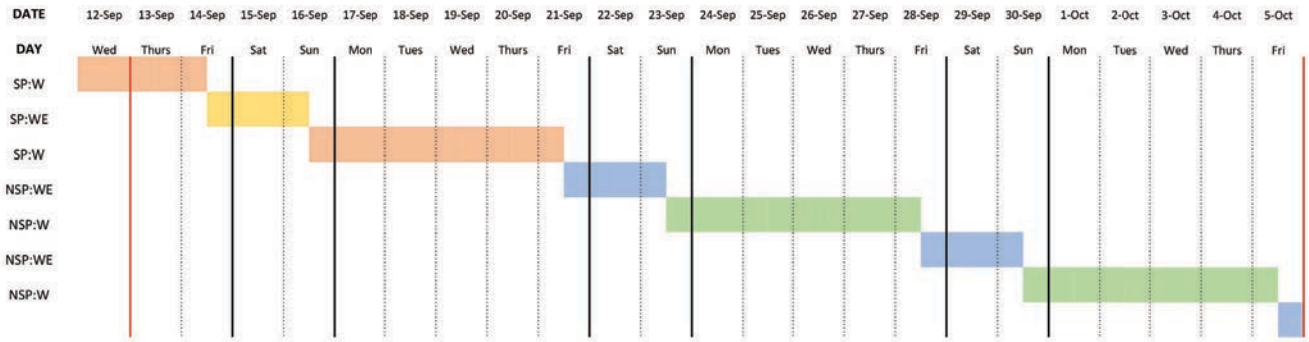
Study Period

Participants were studied from the 12th or 13th of September for approximately 1½ weeks while parliament was sitting (i.e., from Wednesday 12th September or Thursday 13th September to Friday 21st September) and for a further 2 weeks immediately following the parliamentary sitting period (i.e. from Saturday 22nd September to Friday 5th October) (see Figure 1. Visual representation of the study sampling period).

The study period was separated into 4 separate conditions:

1. Parliamentary sitting period: Weekday (SP:W): September 12th & 13th; 16th, 17th, 18th, 19th, 20th
2. Parliamentary sitting period: Weekend (SP:WE): September 14th, 15th
3. Parliamentary non-sitting period: Weekday (NSP:W): September 23rd, 24th, 25th, 26th, 27th; 30th & October 1st, 2nd, 3rd, 4th (one participant was studied on October 7th)
4. Parliamentary non-sitting period: Weekend (NSP:WE): September 21st, 22nd; 28th,29th; (one participant was studied on October 5th)

Figure 1. Visual representation of the study sampling period.



The four measurement conditions included: (1) parliamentary sitting period: weekday (SP:W, orange); (2) parliamentary sitting period: weekends (SP:WE, yellow); (3) parliamentary non-sitting period: weekday (NSP:W, green); and (4) parliamentary non-sitting period: weekend (NSP:WE, blue). The red lines indicate the first and last night of data collection (i.e., Wednesday 12th September & Friday 5th October, respectively). Dotted lines indicate midnight. Solid lines indicate midnight on the transition from weekday to weekend periods (i.e., Friday and Sunday night).

Measurements

Actigraphy

Two wrist-worn devices were used for this study: the GT9X Link *(Figure 2A)* or GT3X+ *(Figure 2B)*. Both devices are manufactured by Actigraph Corp and both devices have a triaxial accelerometer. The GT9X Link device has an LCD display to show time and has the option of connecting live with a bluetooth hub (not used as part of this study).

On Wednesday 12th or Thursday 13th of September each participant was given a pack containing: an Actigraph (either a GT9X Link or GT3X+ device based on personal preference, *Figure 2)*; a charging device; operating instructions *(Appendix E)*; a sleep diary *(Appendix F)*; and a pre-paid envelope for posting the device back to the Canberra Sleep Clinic. Participants were instructed to wear the device continuously on their non-dominant wrist from the day of receipt until the end of the study period (Friday 5th October), during both day and night.

Figure 2. The two Actigraph devices, GT9X Link (A) and the GT3X+ (B) worn by participants.

Sleep Diary

The participants were also asked to complete a sleep diary each morning *(Appendix F)* which recorded: (1) the time they first tried to fall asleep (i.e., 'lights off') the previous night; (2) the time they thought they fell asleep the previous night; (3) the time they woke up in the morning; and (4) any non-wear periods.

Analysis

De-identifed data from each device were downloaded and analysed using Actigraph's proprietary software (ActiLife Version 6). For each participant, "lights off" and "lights on" were set using the times provided in the sleep diary. Where the sleep diary differed from the activity recorded by the Actigraph device (e.g., lights off fell on an epoch scored as sleep), the time was adjusted manually.

For nights where the sleep diary was not available, bed and wake times were based on visual inspection of the raw data. Sleep and wake periods within this period were subsequently generated using the Cole-Kripke algorithm[38] within the ActiLife software.

For each participant, the following sleep measures were calculated for each night the device was worn:

- Sleep duration (minutes of sleep between "lights off" and "lights on")
- Sleep efficiency (minutes of total sleep time divided by minutes available for sleep between "lights off" and "lights on", then multiplied by 100 to obtain a percentage)
- Sleep latency (the amount of time in took to fall asleep, i.e. from "lights off" to the fist epoch of sleep)
- Wake after sleep onset (number of minutes awake between first epoch scored as sleep and "lights on")
- Number of awakenings (the number of times awake between first epoch score as sleep and "lights on"); and
- Length of awakenings.

Data from multiple nights under each condtion were then collated to provide average measures of each sleep variable for each condition:

- Weekdays during the parliamentary sitting period (SP:W);
- Weekends during the parliamentary sitting period (SP:WE);
- Weekdays during the parliamentary non-sitting period (NSP:W); and
- Weekends during the parliamentary non-sitting period (NSP: WE)

Study Results

Participant Demographics

Data from 50 participants are included in this report.

Table 1. Participant Characteristics

		Gender		Age	
	N (%)	Male	Female	Mean (SD)	Range
Member of Parliament	15 (30%)	12	3	53.1 (7.8)	40 – 68
Senator	9 (18%)	5	4	58.1 (7.0)	49 – 70
Staff	22 (44%)	10	12	41.2 (12.9)	24 – 60
Journalists	4 (8%)	1	3	40.8 (22.6)	22 – 69
TOTAL	50	28	22	47.9 (13.4)	22 – 70

N, number. SD, standard deviation.

Sleep Duration

Significant differences in sleep duration were noted between the 4 conditions.

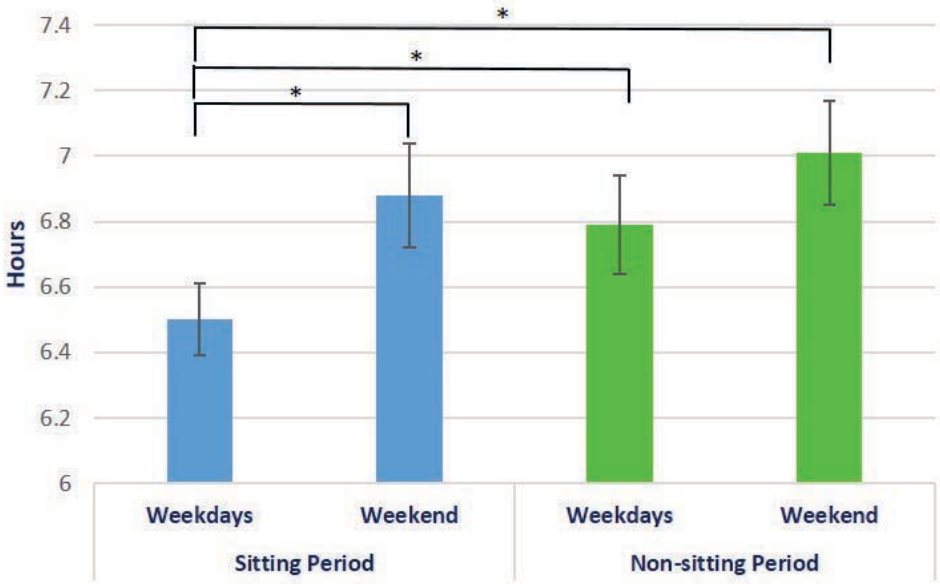
Table 2. Average sleep duration (minutes) for each condition

Condition	Mean	SD	Range
Sitting period: Weekday	389.8	48.2	216.0 – 474.9
Sitting period: Weekend	412.6	69.9	231.0 – 591.0
Non-sitting period: Weekday	407.3	63.0	174.0 – 545.7
Non-sitting period: Weekend	420.6	66.2	251.5 – 556.0

Significant differences were noted between:

- Sitting period: Weekday & Sitting period: Weekend: $t(49) = 2.81$, $p = 0.007$
- Sitting period: Weekday & Non-Sitting period: Weekday: $t(49) = 2.69$, $p = 0.01$

Figure 3. Average sleep duration (hours) for each condition.



Mean ± SD.
* indicates a statistically significant difference between the two conditions.

■ The Figure shows that compared to weekdays during the sitting period, sleep duration was significantly increased on weekends during the sitting period (by 23 minutes), on weekdays during the non-sitting period (by 18 minutes) and on weekends during the non-sitting period (by 31 minutes).

Recommended Sleep Duration

The National Sleep Foundation guidelines[14] recommend that adults aged between 18 and 64 years of age sleep between 7 and 9 hours each night. Approximately half of all participants were not having the recommended amount of sleep during both the sitting week (53% of participants) and non-sitting week (49% of participants). In fact, on the weekdays during the sitting period the average sleep duration was only 6.49 hours.

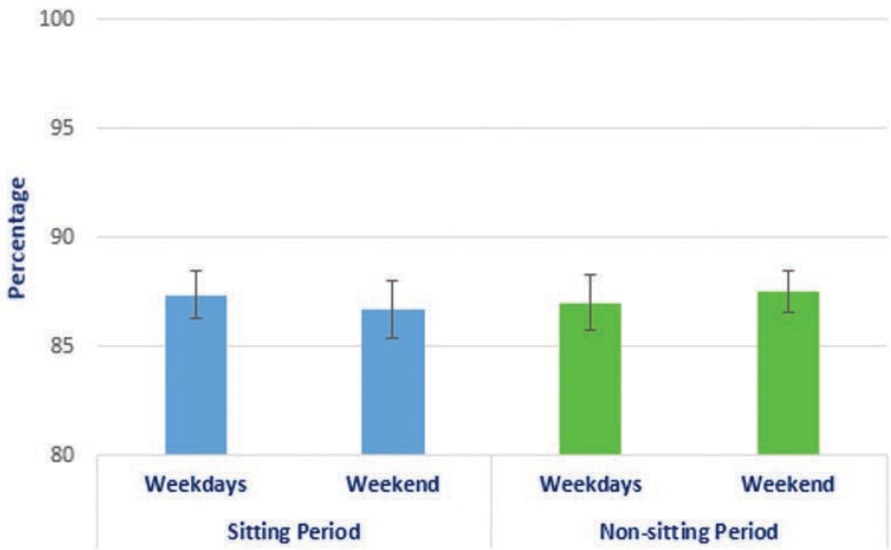
Sleep Efficiency

No significant differences in sleep efficiency were noted between the 4 conditions.

Table 3. Sleep efficiency (percentage) across conditions.

Condition	Mean	SD	Range
Sitting period: Weekday	87.4	7.9	53.7 – 97.8
Sitting period: Weekend	86.7	9.1	52.0 – 96.3
Non-sitting period: Weekday	87.0	8.8	42.0 – 97.1
Non-sitting period: Weekend	87.5	6.9	62.5 – 95.8

Figure 4. Average sleep efficiency (percentage) for each condition.



Mean ± SD

■ The Figure shows that sleep efficiency was not different between any of the conditions studied, being an average of 87.2%.

Recommended Sleep Efficiency

In terms of sleep quality, the National Sleep Foundation recommends that adults aged between 18 and 64 years have a sleep efficiency of greater than 85%.40 The majority (approximately 80%) of participants had sleep efficiency values within the recommended range.

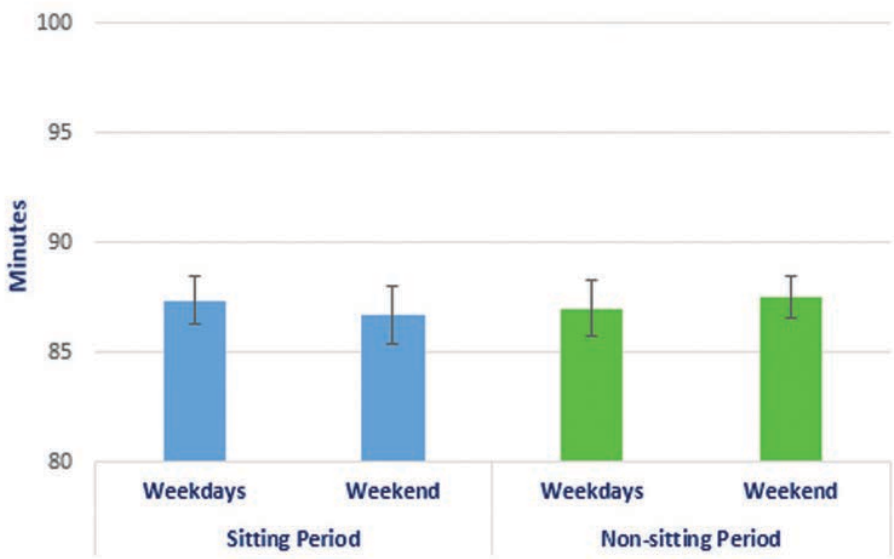
Sleep Latency

No significant differences in sleep latency were noted between the 4 conditions or between males and females.

Table 4. Average sleep latency (minutes) across conditions.

Condition	Mean	SD	Range
Sitting period: Weekday	5.4	1.5	3.1 – 12.1
Sitting period: Weekend	6.1	5.1	2.0 – 36.0
Non-sitting period: Weekday	5.3	1.5	2.3 – 10.0
Non-sitting period: Weekend	5.3	2.2	2.8 – 18.7

Figure 5. Average sleep latency (minutes) for each condition.



Mean ± SD

■ The Figure shows that sleep latency was not different between any of the conditions studied, being an average of 5.5 minutes.

Recommended Sleep Latency

The National Sleep Foundation suggests that that adults aged between 18 and 64 years should take less than 30 minutes to fall asleep.[40] The majority of participants fell asleep in less than 10 minutes.◗

◗ It is likely that sleep latency is underestimated in this sample. To accurately measure sleep latency, it is important to obtain accurate information for the time an individual went to bed with the intention to go to sleep (using a sleep diary), however, approximately 35% of nights were missing sleep diary information.

Time Spent Awake After Sleep Onset

No significant differences in average wake time after sleep onset were noted between the 4 conditions or between males and females.

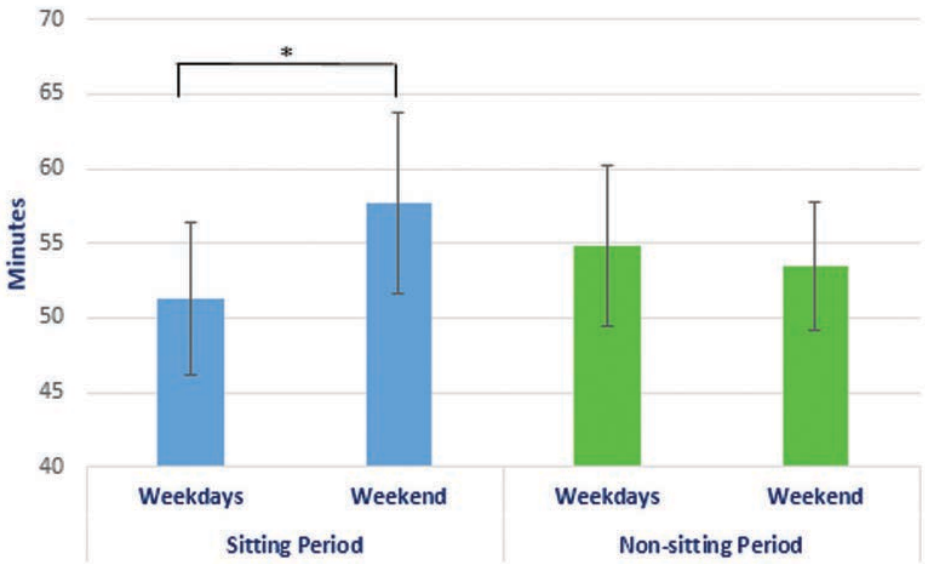
Table 5. Average time spent awake after sleep onset (minutes) in each condition.

Condition	Mean	SD	Range
Sitting period: Weekday	51.3	35.8	6.3 – 193.2
Sitting period: Weekend	57.7	43.1	11.5 – 185.0
Non-sitting period: Weekday	54.8	38.0	10.7 – 235.8
Non-sitting period: Weekend	53.5	30.3	20.0 – 161.5

Significant differences were noted between:

– Sitting period: Weekday & Sitting period: Weekend: $t(49) = 2.06$, $p = 0.045$

Figure 6. Average time spent awake after sleep onset (minutes) for each condition.



Mean ± SD.
* indicates a statistically significant difference between the two conditions.

■ The Figure shows that the time spent awake after falling asleep increased on weekdays during the sitting period (51.3 minutes) to the weekend during the sitting period (57.7 minutes).

Recommended Time Awake after Sleep Onset

The National Sleep Foundation suggests that waking up for a total of 20 minutes or less during the night is indicative of good sleep quality for adults aged between 18 and 64 years.[40] The majority of participants had woken for 21 minutes or more during the night.

Number of Awakenings

Significant differences in the average number of awakenings were noted between the 4 conditions.

No significant differences were noted between males and females.

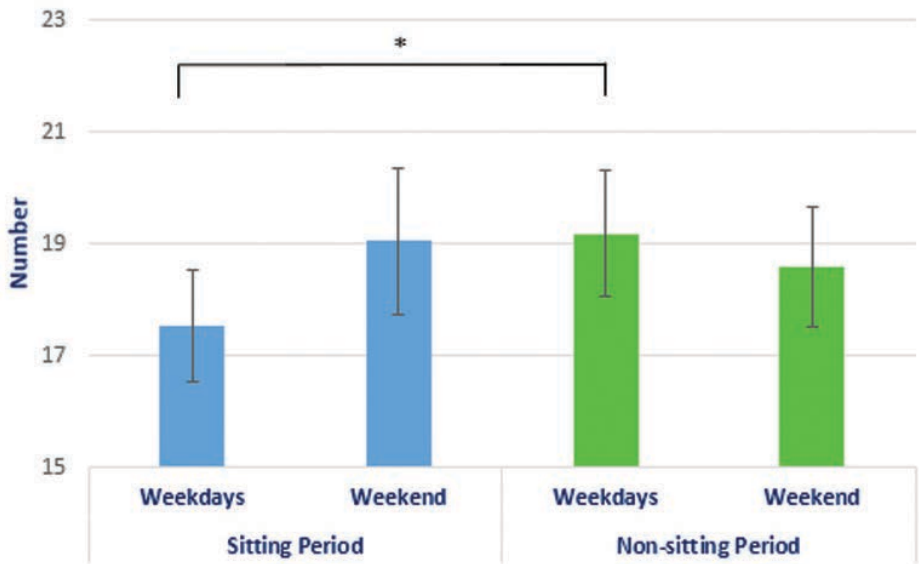
Table 6. Average number of awakenings for each condition.

Condition	Mean	SD	Range
Sitting period: Weekday	51.3	35.8	6.3 – 193.2
Sitting period: Weekend	57.7	43.1	11.5 – 185.0
Non-sitting period: Weekday	54.8	38.0	10.7 – 235.8
Non-sitting period: Weekend	53.5	30.3	20.0 – 161.5

Significant differences were noted between:

– Sitting period: Weekday and Non-sitting period: Weekday, $t(49) = 2.71$, $p = 0.009$

Figure 7. Average number of awakenings for each condition.



Mean ± SD.
* indicates a statistically significant difference between the two conditions.

■ The Figure shows a significant increase in the number of awakenings on weekdays during the sitting period (17.5) compared to weekdays during the non-sitting period (19.2).

Recommended Number of Awakenings

There are no recommended values for the number of awakenings.

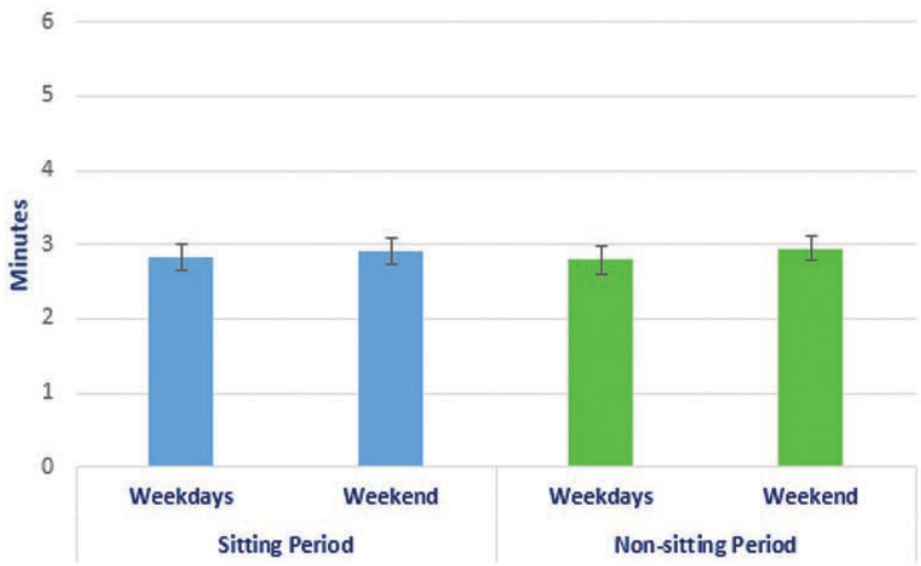
Length of Awakenings

No significant differences in the average length of awakenings were noted between the 4 conditions.

Table 7. Average length of awakenings (minutes) for each condition

Condition	Mean	SD	Range
Sitting period: Weekday	2.8	1.2	1.4 – 7.5
Sitting period: Weekend	2.9	1.3	1.3 – 8.6
Non-sitting period: Weekday	2.8	1.2	1.1 – 9.5
Non-sitting period: Weekend	3.0	1.1	1.2 – 6.4

Figure 8. Average awakening length (minutes) for each condition.



Mean ± SD.

■ The Figure shows that the time of each awakening was not different between any of the conditions studied, being an average of 2.9 minutes.

Recommended Number of Awakenings

There are no recommended values for the length of awakenings.

Interpretation & Recommendations

The study showed that politicians, staffers and journalists slept on average 6½ hours each weeknight when parliament was sitting. On average this was 24 minutes less per night compared to the weekend of a sitting week, or weekends or weekdays of a non-sitting week. Further, regardless of whether a weekday or weekend, or sitting period or non-sitting period, the study also showed that half of all participants were not achieving the recommended 7-9 hours of sleep for adults.[14] However, of particular concern is that during the weekdays of the sitting period some participants slept for as little as 3½ hours per night.

These findings are consistent with data from an Australian population based survey showing that inadequate sleep is common with four out of 10 Australian adults reporting insufficient sleep on a daily or several-days-a-week basis.[3] As was the case in the current study, many previous studies have demonstrated longer sleep on weekends than workdays, presumably representing an attempt to recover from a sleep debt resulting from cumulative inadequate sleep over the preceding working week.[15-17] However, despite the longer weekend sleep, in the current study half of all participants were still not achieving the recommended 7-9 hours of sleep for adults.[14] We now have a good understanding of the consequences of inadequate sleep, which can impair health, [4-7] productivity and road and workplace safety, and lead to more work-related errors.[8-11]

The study focused on sleep duration, although other sleep-related measures were obtained, including sleep efficiency, sleep latency, time awake after sleep onset, and number and length of awakenings during the sleep period. Notably, in contrast to sleep duration, most of these other measures were not statistically different between weekdays and weekends, or between sitting and non-sitting periods. An exception was a 6 minute increase in the time spent awake after initially falling asleep (i.e., time awake after sleep onset), which was observed in the weekend relative to the weekday, but only during the sitting period; and 1.7 more awakenings in the weekdays during the non-sitting period relative to the weekdays during the sitting period. These small differences were most likely a consequence of the longer sleep achieved on the weekend than weekdays when parliament was sitting.

While the high-quality wrist-activity monitors used in this study permit non-intrusive assessment of sleep/wake patterns over several weeks, the algorithms used to convert wrist/arm movement to periods of wake and sleep have limitations. In general, they can more accurately detect sleep periods than periods of wakefulness during the night-time period. It is likely, therefore that the measurements incorporating wake periods, such as sleep efficiency, sleep latency, time awake after sleep onset, and number and length of awakenings, are more susceptible to error than the measure of sleep duration.

The findings from this study reflect the sleep behaviours of many Australians, demonstrating that sleep duration is less than required for healthy living, and optimal productivity, safety and mood, particularly during the working week. They suggest that re-prioritisation of time to allow for more sleep would be beneficial for the individuals involved, the work they do and the interactions they have. While this is an issue shared by many Australians, it is particularly important in safety critical workplaces and in those where crucial decision making is central to its function. There can be no better example of the latter than our national parliament. The current *Parliamentary Inquiry into Sleep Health Awareness in Australia* provides a unique opportunity to address this issue nationally through promoting awareness of sleep requirements and behavioural change amongst adults and children, health professionals and in the workplace.

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Appendix A: Human Research Ethics Committee Approval Letter

Human Ethics

Office of Research Enterprise

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CRICOS Provider Code: 00126G

Our Ref: RA/4/20/4710

07 August 2018

Professor Peter Eastwood
School of Human Sciences
MBDP: M309

Dear Professor Eastwood

HUMAN RESEARCH ETHICS APPROVAL - THE UNIVERSITY OF WESTERN AUSTRALIA

Sleep quantity and quality in Australian Federal Politicians and their staff during and after a parliamentary sitting period

Ethics approval for the above project has been granted in accordance with the requirements of the *National Statement on Ethical Conduct in Human Research* (National Statement) and the policies and procedures of The University of Western Australia. Please note that the period of ethics approval for this project is five (5) years from the date of this notification. However, ethics approval is conditional upon the submission of satisfactory progress reports by the designated renewal date. Therefore initial approval has been granted from 07 August 2018 to 06 August 2019.

You are reminded of the following requirements:

1. The application and all supporting documentation form the basis of the ethics approval and you must not depart from the research protocol that has been approved.
2. The Human Ethics office must be approached for approval in advance for any requested amendments to the approved research protocol.
3. The Chief Investigator is required to report immediately to the Human Ethics office any adverse or unexpected event or any other event that may impact on the ethics approval for the project.
4. The Chief Investigator must submit a final report upon project completion, even if a research project is discontinued before the anticipated date of completion.

Any conditions of ethics approval that have been imposed are listed below:

Special Conditions

None specified

The University of Western Australia is bound by the *National Statement* to monitor the progress of all approved projects until completion to ensure continued compliance with ethical principles.

The Human Ethics office will forward a request for a Progress Report approximately 30 days before the due date.

If you have any queries please contact the Human Ethics office at humanethics@uwa.edu.au.

Please ensure that you quote the file reference – RA/4/20/4710 – and the associated project title in all future correspondence.

Yours sincerely

Appendix B: Expressions of Interest Letter

THE UNIVERSITY OF WESTERN AUSTRALIA

Sleep Health FOUNDATION

Date

Dear ……

ASSESSING YOUR SLEEP IN PARLIAMENT

The Australasian Sleep Association, Sleep Health Foundation, University of Western Australia and Canberra Sleep Clinic are working together on a project to monitor the sleep and activity patterns of 100 Federal parliamentarians and 100 of their staff.

We would like to do this over a 3 week period – 2 weeks while parliament is sitting (beginning September 10), and for one week afterwards. There would be no draw down on your time other than to wear a sleep tracking 'watch' (an actigraph) for a three-week period and (optional) to complete a sleep diary each morning. We would plan to hand you your watch on Monday 10 September, when you are at Parliament House and would liaise with you and your staff to find a convenient time to do this.

YOUR PERSONALISED SLEEP REPORT

The data will be collected by Australia's leading sleep researchers, assisted by scientists from the Canberra Sleep Clinic. You will receive a personalised sleep report with recommendations, including a referral to your GP if required. The de-identified data will be compiled into a manuscript to be published in a peer-reviewed medical journal and also released publicly and we hope to release the results at a bipartisan event in Parliament in the last sitting week in Novomber.

We believe that this exciting and historic project will underscore to all Australians, just how long are the working hours of our Parliamentarians and their staff, and how important the role of sleep is to all of us. It certainly has been an issue raised in our many meetings with MPs and Senators over the past 18 months.

WOULD YOU LIKE TO BE INVOLVED?

Please find attached further information and a consent form. If you would like to participate please feel free to sign the consent form and mail it back to us at the address below. Alternatively we will be in Parliament House on Monday September 10 and can work with you and your team to find a time to have you sign the consent form and hand you your watch.

Address for return of signed consent form:

Parliamentary Sleep Study

Canberra Sleep Clinic

Equinox Business Park

Gnd, floor building 2/70 Kent St

Deakin ACT 2600

If you would like to participate or discuss any aspect of this study please feel free to contact Dr Kathleen Maddison on (08) 6488 6000.

Warm regards,

Professor Peter Eastwood

Appendix C: Participant Information Sheet

Professor Peter Eastwood
School of Human Sciences
Centre for Sleep Science
The University of Western Australia
35 Stirling Highway, Crawley WA 6009
www.sleepcentre.science.uwa.edu.au

Participant Information Form

Project title: Sleep quantity and quality in Australian Federal Politicians and their staff during and after a parliamentary sitting period

Name of Researchers: Professor Peter Eastwood, Dr Kathleen Maddison, Professor Leon Straker, Dr Stuart Miller, Dr Nic Malagutti, Professor Maree Barnes, Professor Dorothy Bruck.

Invitation: You are invited to participate in a study examining the Sleep quantity and quality of Australian Federal Politicians and their staff during and after a parliamentary sitting period. The study is a collaborative effort between *The University of Western Australia*, *The Australasian Sleep Association*, *The Sleep Health Foundation*, the *Canberra Sleep Clinic* and *Executive Counsel Australia*.

What is the Project About? The study aims to collect data on the sleep health of politicians and staffers including comparing sleep during parliament sitting weeks and non-sitting weeks. The purpose of the study is to heighten the profile of Sleep Health in Parliament House and to generate data for a media release and scientific publication on the sleep and activity levels of politicians and their staff.

What does your Participation Involve?

We would monitor your sleep and activity patterns over a 3 week period - 2 weeks of which will be while parliament is sitting in Canberra and then for the week after the sitting period. We will use a small wrist-worn device (like a fitbit) to do this, however the device we will use (Actigraph) is a medical and research grade device.

We will fit the device during the first sitting week of parliament (i.e. Wed Sept 12th and Thursday Sept 13th). You will need to recharge the device every 7 days (this takes about 2 hours) and we will provide you a charger to do this. We will also provide you with Pre-Paid Padded Envelope for you to return the device back to Canberra Sleep Clinic at the end of the study.

If possible, we would also like you to complete a sleep diary each morning. This diary asks 3 questions: (1) the time you first tried to fall asleep i.e. 'lights off' the previous night; (2) the time you thought you actually fell asleep; and (3) the time you finally woke up in the morning.

Voluntary Participation and Withdrawal from the Study

The University of Western Australia
M459 Perth WA 6009 Australia
T +61 8 6488 3703
E humanethics@uwa.edu.au
CRICOS Provider Code 00126G

Please note that your participation in this study is completely voluntary and that you can withdraw from the study at any time, without giving an explanation. Your data will be destroyed after withdrawal unless otherwise agreed.

Your Privacy

Your participation in this study and any information you provide will be treated in a confidential manner. Information from this project will be published but your name and identifying details will not be used in any publication arising out of the research without your consent. Further, the data will be kept in a de-identified format, in a password protected computer or a secure server for minimum seven years.

Possible Benefits

Once your data have been collected and analysed we will provide you a report of your results. There are no other benefits to your participation in this study.

Possible Risks and Risk Management Plan

There are no risks with you participating in this study.

Contacts

If you would like to participate or discuss any aspect of this study please feel free to contact Dr Kathleen Maddison on (08) 6488 6000.

Sincerely,

Professor Peter Eastwood

Chief Investigator

Approval to conduct this research has been provided by the University of Western Australia, in accordance with its ethics review and approval procedures. Any person considering participation in this research project, or agreeing to participate, may raise any questions or issues with the researchers at any time. In addition, any person not satisfied with the response of researchers may raise ethics issues or concerns, and may make any complaints about this research project by contacting the Human Ethics office at UWA on (08) 6488 4703 or by emailing to humanethics@uwa.edu.au. All research participants are entitled to retain a copy of any Participant Information Form and/or Participant Consent Form relating to this research project.

Appendix D: Participant Consent Form

Professor Peter Eastwood
School of Human Sciences
Centre for Sleep Science
The University of Western Australia
35 Stirling Highway, Crawley WA 6009
http://sleepcentre.science.uwa.edu.au

Participant Consent Form

Project title - Sleep quantity and quality in Australian Federal Politicians and their staff during and after a parliamentary sitting period

I, _____ have read the information provided and any questions I have asked have been answered to my satisfaction. I agree to participate in this research project, realizing that I may withdraw at any time without reason and without prejudice.

I understand that all identifiable information that I provide is treated as confidential and will not be released by the investigator in any form that may identify me unless I have consented to this. The only exception to this principle of confidentiality is if this information is required by law to be released.

_____ _____
Participant signature Date

Approval to conduct this research has been provided by the University of Western Australia, in accordance with its ethics review and approval procedures. Any person considering participation in this research project, or agreeing to participate, may raise any questions or issues with the researchers at any time.

In addition, any person not satisfied with the response of researchers may raise ethics issues or concerns, and may make any complaints about this research project by contacting the Human Ethics Office at the University of Western Australia on (08) 6488 3703 or by emailing to humanethics@uwa.edu.au

All research participants are entitled to retain a copy of any Participant Information Form and/or Participant Consent Form relating to this research project.

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Appendix E: Actigraphy Instructions for Participants

Your Activity Monitor (GTX3)

Thank you for wearing the activity monitor for the next 21 days.

Activity monitors are used to record your activity and sleeping patterns. They are similar to pedometers but are more accurate and record information about sleep and activity intensity.

- We would like you to wear the monitors for the **next 21 nights and days**, starting now. Adjust the belt/strap so it is comfortable.
- The activity monitors need to be worn all the time on the **non-dominant wrist**, when you are awake, asleep, doing sport or anything else.
- The black screw on the side of the activity monitor needs to face up.
- The monitor is water resistant but is NOT water proof enough to dive 1 meter underwater. Whilst you do not need to remove the monitor if you are showering/swimming, we advise that you do as the belt/strap can become uncomfortable when wet.
- The monitor has a battery inside so keep it away from fire. If it gets dirty rinse it in water - do not use cleaning materials or bleach.

Charging your Device

- Please recharge your device after 1.5 - 2 weeks (20th – 22nd September).
- Use a coin to unscrew the USB port by turning counter-clockwise and connect the device to a computer or wall outlet using the mini USB cable.
- The device is fully charged once the green LED stays steady (approximately 2 - 3 hours). Please do not wear the device whilst it is charging.
- Once charged, close the USB port by turning clockwise.

If possible, please complete the Sleep Diary each morning.

Please post the activity monitors and diary in the pre-paid express post bag back to the Study Co-ordinator (during the first week of October).

If you have any problems, please phone us on (08) 6488 8689 or Kath.Maddison@health.wa.gov.au

INFORMATION_Actigraph_GTX3_20180910_V3

Your Activity Monitor (GTX9)

Thank you for wearing the activity monitor for the next 21 days.

Activity monitors are used to record your activity and sleeping patterns. They are similar to pedometers but are more accurate and record information about sleep and activity intensity.

- We would like you to wear the monitors for the **next 21 nights and days**, starting now. Adjust the belt/strap so it is comfortable.
- The activity monitors need to be worn all the time on the **non-dominant wrist**, when you are awake, asleep, doing sport or anything else.
- The monitor is water resistant but is NOT water proof enough to dive 1 meter underwater. Whilst you do not need to remove the monitor if you are showering/swimming, we advise that you do as the belt/strap can become uncomfortable when wet.
- The monitor has a battery inside so keep it away from fire. If it gets dirty rinse it in water - do not use cleaning materials or bleach.

Charging your Device

- Please recharge your device after 1.5 - 2 weeks (20th – 22nd September).
- Connect dock to a computer or wall outlet using the mini USB cable.
- Plug the device into the dock so that the ActiGraph logo is facing up. Once connected the red light on the right side of the dock will turn yellow and the battery icon will blink to indicate charging.
- The device is fully charged once the yellow light turns green and the battery icon will show as full (approximately 2 - 3 hours).

If possible, please complete the Sleep Diary each morning.

Please post the activity monitors and diary in the pre-paid express post bag back to the Study Co-ordinator (during the first week of October).

If you have any problems, please phone us on (08) 6488 8689 or Kath.Maddison@health.wa.gov.au

INFORMATION_Actigraph_GTX9_20180910_V3

Appendix F: Participant Sleep Diary

Project title: Sleep quantity and quality in Australian Federal Politicians and their staff during and after a parliamentary sitting period

Your name: _____

Your email: _____

Please fill out this diary each morning just after you have woken.

Day, Date	Time you tried to go to sleep last night e.g. 'light out'	Time you think you fell asleep last night	Time you finally work up in the morning	Times you did not wear the watch

Please return this form with your watch and charger in the pre-paid postpack provided to you (anytime during the week beginning October 1st).

Sleep Diary September 2018v3

About the Supporters

Australasian Sleep Association (ASA)

The Australasian Sleep Association is the peak scientific body in Australia and New Zealand representing clinicians, scientists and researchers in the broad area of Sleep. The Association aims to provide a high standard of research, education and training, as well as setting clinical standards and guidelines.

Sleep Health Foundation (SHF)

The Sleep Health Foundation is a not-for-profit charity that promotes sleep, advocacy and raising awareness of sleep disorders. The Foundation actively engages in forming partnerships with organisations to encourage better sleep health and supports research and development through dedicated funding programs.

University of Western Australia (UWA)

The University of Western Australia is Group of 8 university that has a strong emphasis on increasing research outcomes. In particular, the University supports new and innovative research programs, projects and centres, such as its Centre for Sleep Science.

Canberra Sleep Clinic (CSC)

The Canberra Sleep Clinic is a clinical sleep laboratory with current sleep technology and healthcare guidelines. The Clinic plays an integral role in providing sleep-health diagnoses, advice and solutions within the community of Canberra.

Executive Counsel Australia (ECA)

Executive Counsel Australia is an advocacy group that creates strategies and campaigns on behalf of companies and organisations to appeal to the State Government on policy development of particular issues. The group acts as a communication conduit between the community, business, and other groups, and the Government.

Actigraph LLC

Actigraph is a provider of medical-grade wearable activity and sleep monitoring devices for the global research community, and actively support sleep research programs. Their monitors are scientifically validated, and in conjunction with their specialised software they are able to provide in-depth sleep and activity data.

Curtin University

Curtin University is the largest university in Western Australia with more than 56,000 students, around a quarter of whom come from a country other than Australia. Curtin is globally recognised for its strong connections with industry, high-impact research and wide range of innovative courses.

The Western Australian Pregnancy Cohort (Raine) Study

The Raine Study is one of the largest successful prospective cohorts of pregnancy, childhood, adolescence and now early adulthood to be carried out anywhere in the world. The cohort was established between 1989 and 1991 to determine how events during pregnancy and childhood influence health in later life. 2900 pregnant women entered the study and 2868 live births were recruited into the Raine Study cohort. The cohort is now 29 years old.

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