

Sleep

Christiana Kartsonaki

Nuffield Department of Population Health, University of Oxford

LSHTM

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Introduction

- Sleep is encountered everywhere.

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- All animals sleep, sleep very tightly biologically controlled (Campbell and Tobler, 1984).
- Why have we evolved to sleep?

What can go wrong?

- Mice that are completely sleep deprived die.
- Humans that are completely sleep deprived also die – fatal familial insomnia.
- Circadian rhythm disorders: advanced sleep phase disorder (high penetrance genetic variants known), delayed sleep phase disorder, non-24-hour disorder.
- Other sleep disorders: insomnia, hypersomnias, parasomnias (including REM behaviour disorder), sleep apnea, narcolepsy.

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What can go wrong?

- Poor sleep causes disease, unhealthy people develop sleep problems.
- Insufficient sleep is associated with increased risks of depression, anxiety, suicide, accidents, cardiovascular disease, diabetes, obesity, hypertension, ...
- Less serious & more well known effects: poor performance at work, low mood, impaired reaction time and judgement.
- Consuming caffeine does not help with most of these – it just masks the effects of sleep deprivation.
- Our sleep changes over time, but only for the worse.

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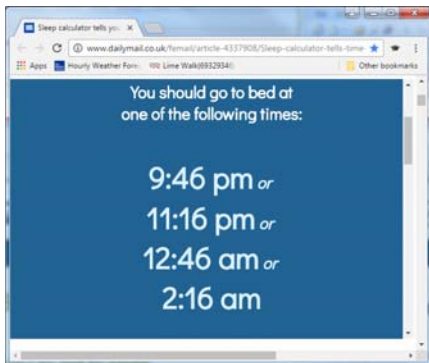
Screenshot of a web browser displaying a Daily Mail Online article. The browser address bar shows the URL: www.dailymail.co.uk/femail/article-4337908/Sleep-calculator-tells-time-4. The page features the MailOnline logo and navigation links for Home, News, U.S., Sport, TV & Showbiz, Australia, Femail, Health, Science, and Money. Below the navigation is a row of featured images with captions: 'EXCLUSIVE: Westminster killer's', 'From smiling Kent schoolboy to', 'EXCLUSIVE: MP's called against use of', and 'Boyfriend of Romanian tourist'. The main article headline reads: 'Clever sleep calculator tells you EXACTLY what time you should be in bed based on when you start work (and it isn't as early as you think)'. The sub-headline states: 'Calculator picks best time to drop off linked to body's 90-minute sleep 'cycles''. The article body contains the following bullet points:

- Calculator picks best time to drop off linked to body's 90-minute sleep 'cycles'
- If you start work at 9am, ideally you should try and go to bed around 10:46pm
- Tool is designed to ensure you don't wake mid-way through a cycle, which can leave you feeling groggy - even if you've had eight hours' sleep

By JO TWEEDY FOR MAILONLINE
PUBLISHED: 09:33, 22 March 2017 | UPDATED: 09:58, 22 March 2017



To wake up at 7am...



Relevance for diabetes

- Humans who are sleep deprived in experiments show a decrease in glucose clearance rate in the range of pre-diabetes (Spiegel et al, 1999).
- There is evidence that relatively short sleep and disordered sleep may be associated with an increased risk of diabetes (Cappuccio et al., 2010).
- In China the incidence of diabetes has increased significantly in recent decades.
- Little is known about the relevance of sleep for diabetes risk in China.

Prospective cohort study in China

open-ended

baseline survey done in 2004–2008



China Kadoorie Biobank

Design

- ▶ 0.5 million adults, aged 30–79 years, from 10 areas.
- ▶ Baseline survey: questionnaire, physical measurements and collection of blood sample.
- ▶ Resurveys of a sample of participants.
- ▶ Morbidity and mortality follow up for decades through registries and health record systems.

Consent for long-term storage of blood samples and follow-up through all health records.

China Kadoorie Biobank

10 survey sites in China



- ▶ mean age at baseline: 52
- ▶ 41% male
- ▶ 60% rural

- **baseline**: a range of physical measurements (e.g. height, weight, adiposity, blood pressure, lung function) together with a 10mL non-fasting blood sample (with last meal time recorded) were collected

- two **resurveys** in 2008 and 2013–14 → a representative 5% sample of survivors
 - repeat interview
 - physical measurements (e.g. 12-lead ECG, carotid IMT, bone density)
 - collection of biological samples

- samples stored at facilities in Beijing and Oxford

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Laptop-based questionnaire

- socioeconomic status
- tobacco
- alcohol
- food
- tea
- indoor air pollution
- physical activity
- reproductive history for women
- medical history
- mental health

China Kadoorie Biobank

Questionnaire

一、个人情况

1.6 你所接受过的最高教育是什么?

<input type="radio"/> 未正规上过学	<input type="radio"/> 高中(包括中专/技校)
<input type="radio"/> 小学	<input type="radio"/> 大专
<input type="radio"/> 初中	<input type="radio"/> 大学(包括研究生)

1.7 你目前所从事的主要是哪方面的职业?

<input type="radio"/> 农林牧渔劳动者	<input type="radio"/> 离/退休
<input type="radio"/> 工人	<input type="radio"/> 家务
<input type="radio"/> 行政及管理人员	<input type="radio"/> 私营业主
<input type="radio"/> 专业技术人员	<input type="radio"/> 待业/下岗
<input type="radio"/> 销售及服务工作人员	<input type="radio"/> 其它或不易分类者

1.8 包括你自己在内,你全家共有几口人共同生活在一起?

人

1.9 你目前婚姻状态如何?

<input type="radio"/> 已婚	<input type="radio"/> 分居/离婚
<input type="radio"/> 丧偶	<input type="radio"/> 未婚

1.10 去年你全家一年的总收入(包括各种来源)约为多少?

<input type="radio"/> <2,500 元	<input type="radio"/> 10,000-19,999 元
<input type="radio"/> 2,500-4,999 元	<input type="radio"/> 20,000-34,999 元
<input type="radio"/> 5,000-9,999 元	<input type="radio"/> ≥35,000 元

1.11 你目前是否有任何医疗保险并有以下财产和消费?

医疗保险(公费、医保、商业保险及合作医疗)	<input type="radio"/> 是	<input type="radio"/> 否
自家楼房(农村点)/五年内新装修单元房(城市点)	<input type="radio"/> 是	<input type="radio"/> 否
带冲水马桶的家庭自用卫生间	<input type="radio"/> 是	<input type="radio"/> 否
私人电话(座机或手机)	<input type="radio"/> 是	<input type="radio"/> 否
机动车辆(包括拖拉机、摩托车和汽车)	<input type="radio"/> 是	<input type="radio"/> 否
五年内曾自费外出旅游度假	<input type="radio"/> 是	<input type="radio"/> 否

<上一步 (B) ***** 锁定 下一步 >

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Data sources for disease outcomes

- Death registries
- National health insurance databases
- Disease registries
- Self-reported

Event adjudication For vascular disease, cancer and other major diseases, event information is checked from medical notes and/or re-assessed by a doctor.

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Assessment of sleep characteristics

During the past month, did you have any of the following for ≥ 3 days each week?

- Taking >30 minutes to fall asleep after going to bed or waking up in the middle of the night.
- Waking up early and not being able to go back to sleep.
- Needing to take medication (including herbal or sleeping pills) at least once a week to help sleep.
- Having difficulty staying alert while at work, eating or meeting people during daytime.

Individuals who answered 'yes' to any of the above were considered to have disordered sleep.

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Assessment of sleep characteristics

- Do you usually take a daytime nap? [Yes, usually; Yes, but only in summer; No]
- Do you snore during sleep? [Yes, frequently; Yes, sometimes; No/Don't know]
- How many hours do you typically sleep per day (including naps)? (in whole hours)

Participants were classified as taking daytime naps if they selected 'Yes, usually' and they were classified as snoring if they selected 'Yes, frequently' or 'Yes, sometimes'.

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Assessment of prevalent diabetes

- Immediate on-site testing of random plasma glucose (RPG) level.
- Participants with glucose levels ≥ 7.8 mmol/L and < 11.1 mmol/L were invited to return for a fasting plasma glucose (FPG) test the next day.
- Previously diagnosed diabetes was defined by the answer to the question 'Has a doctor ever told you that you had diabetes?'.
- Among participants without previously diagnosed diabetes, screen-detected diabetes was defined as RPG ≥ 7.0 mmol/L and time since last eating ≥ 8 h, or ≥ 11.1 mmol/L with time since last eating < 8 h, or a FPG ≥ 7.0 mmol/L on subsequent testing.

Discussion

- Sleep duration decreased and prevalence of sleep disorder increased with age.
- Poor health and especially poor mental health status were associated with shorter sleep and higher prevalence of sleep disorder.
- Short sleep was associated with an increased risk of developing diabetes.
- Difficulty falling asleep, waking too early, needing medication to fall asleep, difficulty staying alert during daytime, daytime napping and snoring were associated with an increased risk of developing diabetes.
- Relative risks not very large, but given how common diabetes is they correspond to substantial absolute risks.
- Sleep duration subjective. Self-reported sleep duration may be affected by perceived sleep quality and other factors. Accelerometers.

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China Kadoorie Biobank Collaborative Group

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10 Regional Co-ordinating Centres

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