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new dynamics of ageing
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SomnIA
Sleep in Ageing

SomnIA

Optimising Quality of Sleep Among Older People in the Community and Care Homes: An Integrated Approach

Key Findings for Policy and Practice

October 2010

SomnIA - Project Overview

SomnIA - Optimising quality of sleep among older people in the community and care homes: An integrated approach

Background

Good sleep is a pre-requisite for older people's well-being and ability to engage fully in daytime activities, whether living in their own homes or in a care home.

Increasing age is associated with progressive deterioration in the structure, 24-hour distribution, and quality of sleep. Among older people, untreated chronic sleep disturbance degrades their quality of life, inhibits recovery and rehabilitation following illness, and is an independent risk factor for falls and depression. However, older people, both at home and in care home settings, remain the most *likely* and most *vulnerable* recipients of hypnotic drugs which, in this age group, are associated with risks of impaired daytime functioning, falls and dependence. Among the very old, poor sleep quality *and* hypnotic drug use have been shown to exacerbate frailty and cognitive impairment.

The need to reduce hypnotic drug prescribing, and provide effective non-pharmacological approaches to sleep management are policy and practice objectives.

SomnIA Research

The 4 year interdisciplinary *SomnIA* collaborative project was funded by the New Dynamics of Ageing initiative. *SomnIA* involved a series of interlinked research studies to better understand the social, environmental and health factors influencing the quality of sleep of older people living in the community and care homes, and to examine non-pharmacological ways of improving sleep and therefore well-being and active ageing.

This booklet provides an overview of some of the key findings from the *SomnIA* programme of research, particularly highlighting the policy and practice implications of research findings.

Key Findings

- *Many factors contribute to poor sleep in older people including socio-economic disadvantage.* The main direct causes of sleep loss, however, seem to change with age as sleep disturbance through worry declines with age, but sleep loss because of pain increases. **(p 3-4)**

- *Strategies adopted by older people to cope with poor sleep.* Some older men and women tried a range of strategies to cope with poor sleep, such as napping during the day, relaxation techniques, regular exercise, avoiding tea and coffee in the evening, and taking over the counter medications. However, many older people believed that poor sleep was inevitable in later life and so would not try any strategies, or seek professional help. **(p 5-6)**

- *Factors influencing poor sleep in care homes*. The research has shown that the care home routines, staffing levels and care practices influence both the sleep and night-time experience of care home residents. In addition, individual factors influence sleep quality such as medication, level of dependency, health and continence. **(p 7-8)**

- *Self-Management of Insomnia.* A self-help programme for older people with long-term health conditions has shown that a series of booklets which provide advice based on cognitive behavioural therapy for insomnia (or 'CBT-I') can be effective in the management of chronic sleep problems. **(p 9-10)**

- *Daytime light exposure for older people.* Timed daily light exposure has some beneficial effects on sleep in older people living in the community. **(p 11-12)**

- *Residential care homes have low levels of artificial lighting*. A study of light supplementation increased the time that care home residents spent under brighter light conditions and produced no adverse effects. **(p 13-14)**

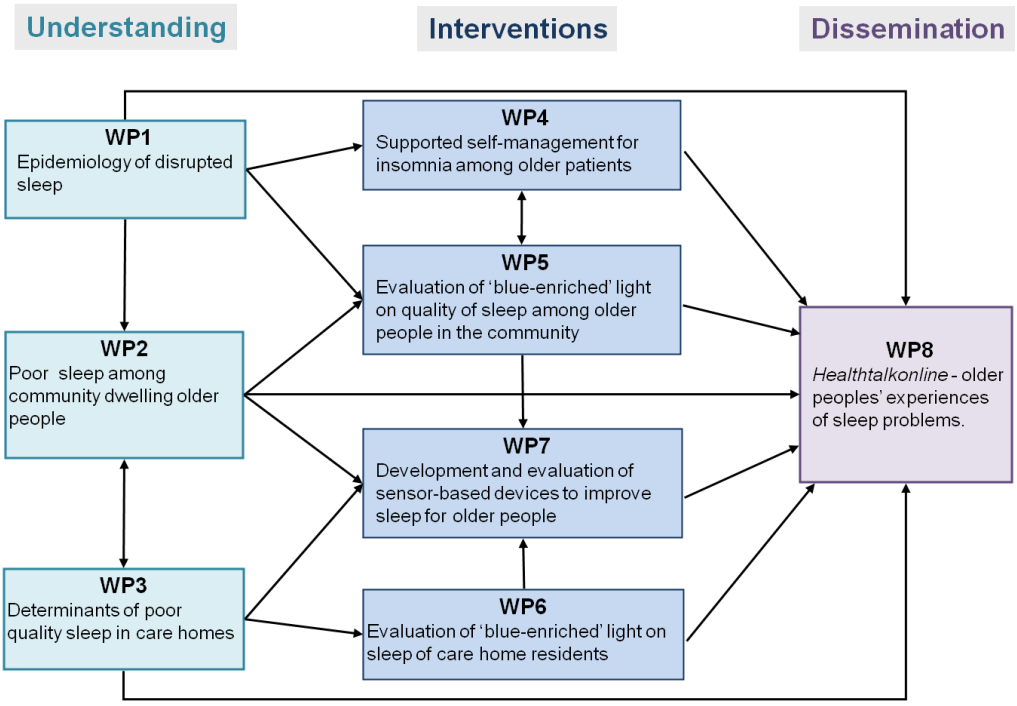
- *Sensor-based devices to aid sleep.* The project has shown that sensitively designed technology has much potential to support sleep. Four key examples developed and tested were pillows for playing music, automatic bedroom lighting, easy access to items needed during the night, and a portable hearing aid for care staff. **(p 15-16)**

- *Sleep for health and well-being.* Unlike other areas of health promotion, such as diet, smoking and exercise, there is a lack of easily accessible information for the general public about sleep. The *SomnIA* project has developed a web-module on 'Sleep Problems in Later Life' which is part of the *Healthtalkonline.org* website. **(p 17-18)**

Approach used in the *SomnIA* research

The *SomnIA* research comprised 8 inter-linked work packages, as illustrated below.

***SomnIA* Workpackages**



The *SomnIA* project was undertaken by a multidisciplinary team of researchers from 4 universities led by Professor Sara Arber (University of Surrey). The co-investigators were Professor David Armstrong (King's College London), Dr Ingrid Eyers (University of Surrey/University of Vechta, Germany), Professor Kevin Morgan (Loughborough University), Professor Roger Orpwood (Bath University) and Professor Debra Skene (University of Surrey).

In addition, *SomnIA* researchers worked closely with five project partners - from the voluntary sector (Age UK, The Residents and Relatives Association), industry (Philips Lighting), the NHS (Nottinghamshire Health Care NHS Trust) and the Health Experiences Research Group (University of Oxford).

Epidemiology of disrupted sleep (WP1)

Key message: ***Ageing is not necessarily related to poorer sleep. Sleep disturbance is influenced by a number of factors many operating over the life course.***

Researchers: Dr Alex Dregan and Professor David Armstrong

Background and rationale:

The extent of sleep problems in the population is relatively poorly understood. There are a number of large databases, however, which contain important information about the prevalence of sleep problems and analyses of these existing data sources was an efficient way of investigating population patterns of sleep disturbance.

What was done:

Databases containing information on sleep patterns were identified and analysed to identify the prevalence of sleep problems and their relationship to environmental, psychological and social factors.

Databases included:
- The English Longitudinal Survey of Ageing
- The European Social Survey
- The Health and Activity Survey
- The Health Survey for England
- The National Child Development Study
- The National Psychiatric Morbidity Survey

Key findings and implications for policy and practice:

- *Sleep loss through worry does not increase with age. Economic factors and financial insecurity however seem to worsen sleep at all ages*

  Using data from two longitudinal datasets (The Health and Activity Survey and the English Longitudinal Survey of Ageing) which followed two cohorts of individuals over a number of years, it was found that sleep loss through worry declined with age but this pattern was tempered by a temporary increase in sleep loss through worry for all age groups in the early 1990s. The economic downturn at that time was suggested as a possible explanation for this increase in sleep loss through worry.

- *For many, poor sleep patterns start early in life*

  The National Child Development Study recruited a cohort of new babies for follow-up in 1958. They (or their parents) responded to questionnaires at regular intervals in subsequent years. These questionnaires included questions on symptoms of insomnia so it was possible to trace the persistence of poor sleep patterns between the ages of 16 and 42. It was found that those reporting sleep disturbance at age 16 were also more likely to report sleep disturbance at age 42 suggesting a continuation of insomnia patterns over several decades.

- *The relationship between ageing and sleep varies considerably across different European countries*

  The European Social Survey asked respondents across 23 European countries about their sleep patterns. The response to this question was explored in relation to the age of the respondent and to other environmental, psychological and social factors. There was considerable variation in reports of sleep disturbance between different European countries; in some countries increasing age was associated with worsening sleep, in others with improving sleep patterns. Markedly worsening sleep with age was identified in East European countries in particular, while the experience of West European countries was more mixed with respondents in several countries reporting improved sleep with increasing age. These results most likely reflect the considerable variability of the ageing experience across Europe.

- *Sleep problems are strongly associated with socio-economic disadvantage, such as poor housing and unemployment*

  The responses of over 8000 people aged 16-74 in the national *Psychiatric Morbidity Survey* were analysed. Sleep problems were found to be strongly associated with socio-economic disadvantage, such as having a low income, lacking educational qualifications, living in poor housing and not being in paid employment. Socio-economic disadvantage was a major reason for the poorer reported sleep of people who were divorced and widowed. Health policy needs to address both the reasons for the poorer sleep of people living in more disadvantaged circumstances, and to what extent their poor sleep quality may have longer term adverse consequences for their health.

- *Sleep patterns are influenced by a complex interplay of different factors*

  Data from the Health Survey for England was used to explore the relationship between physical health, socio-economic, lifestyle and psychological factors with sleep disturbance in a nationally representative sample. The results indicated that there are both direct and indirect pathways from various risk factors to sleep disturbance. Efforts to prevent sleep problems might consider the complex relationships between sleep and socio-economic factors, health behaviour, and both mental and physical health.

Publications:

Arber, S., Bote, M. and Meadows, R. (2009) 'Gender and socio-economic patterning of self-reported sleep problems in Britain'. *Social Science and Medicine*, 68 (2): 281-289.

Dregan, A. and Armstrong, D. (2009) 'Age, cohort and period effects in the prevalence of sleep disturbances among older people: The impact of economic downturn.' *Social Science and Medicine*, 69: 1432-38.

Dregan, A. and Armstrong, D. (2010) 'Adolescence sleep disturbances as predictors of adulthood sleep problems – A cohort study'. *Journal of Adolescent Health*, 26 (5): 482-7.

Understanding the challenges of poor sleep in later life (WP2)

Key message: ***Older men and women expect to sleep less well as they age, which may prevent them from actively seeking professional help for sleep problems.***

Researchers: Susan Venn and Professor Sara Arber

Rationale:

It is known that sleep is central to health and well-being, yet sleep is likely to deteriorate with advancing age. In spite of Department of Health and NICE recommendations to reduce hypnotic drug prescribing, older people are the most vulnerable recipients of sleeping medication. The way older people perceive and manage the challenges of poor sleep, and the implications this has for targeted policy and practice interventions has been under-researched.

Background:

The primary focus was to explore the perspectives and opinions of older men and women with poor sleep who are living in their own homes. The aims were:

(a) To provide a detailed understanding of older people's experiences of poor sleep, sleep needs, perceptions of causes of poor sleep quality, strategies used to improve sleep, and attitudes to sleeping medication.

(b) To find out whether aspects of daily living (for example, light exposure, physical activities, food and drink consumption and social networks) are associated with poor sleep among older people.

What was done:

- A survey was conducted of the prevalence of poor sleep among 1158 people aged 65 and over sent out via ten GP practices in the Thames Valley area. Poor sleep was measured using the Pittsburgh Sleep Quality Index (PSQI).
- In-depth interviews were conducted with 62 older people, aged between 65 and 95 who had poor sleep (PSQI > 5) and lived in their own homes.
- Those who agreed, had their interviews videoed or audio recorded to be made available on the healthtalkonline website (www.healthtalkonline.org)
- Following the interview, 61 older men and women kept a two week audio diary of their sleep patterns.
- They also wore an actiwatch for two weeks (device that detects movement and light to assess sleep patterns) and completed two weeks of sleep, activity and food consumption diaries.

Key findings and implications for policy and practice:

When talking to older men and women about their sleep we found that people expected their sleep to deteriorate as they aged. But they also told us of many different social factors that influenced how they slept, and how they managed their poor sleep. Such factors included caring for partners during times of ill health, worries and concerns for family, and future concerns about their health and financial security. Retirement brought opportunities for daytime sleep, but napping was often met with mixed feelings of guilt for wasting time, alongside pleasure at being able to have more energy to do things during the day or evening.

- *Older people expect their sleep quality to deteriorate as they age:*

  Whilst sleep quality may deteriorate in later life, there may be other factors that influence the quality of older people's sleep, such as taking medications which impact on sleep. Therefore older people should be encouraged to seek medical advice to rule out other causes of poor sleep.

- *Older people are more likely to experience several health problems which influence their sleep quality:*

  Health professionals need to be aware that the number and type of health problems older people experience (especially cancer and musculoskeletal) strongly influence the quality of their sleep, and that poor sleep is not just a result of 'age'.

- *Older men and women would rather not go to their doctor for help with their poor sleep because of a belief they will be prescribed sleeping medication, which usually they would rather not take:*

  Health professionals should be encouraged to discuss a range of treatment options for poor sleep with older people, particularly when older people present with other health problems which may also impact on their sleep quality.

- *Caring for a partner or relative impacts substantially on older people's sleep:*

  It is important to raise the awareness of health professionals to the possible impact of undertaking caregiving at night on the sleep, health and wellbeing of older carers.

- *Going to the toilet more frequently at night is believed to be inevitable with age:*

  Older people should be encouraged to seek medical advice about increased frequency of urination at night because of the potential for other underlying causes.

- *There may be a stigma attached to 'napping' because older men and women often regard it as a sign of laziness. Therefore older people are less likely to say they take a nap, even though they may doze several times a day.*

  The value of taking a nap in later life could be promoted by health professionals as a way of maintaining alertness and enabling active ageing, with the proviso that long or frequent napping may impact on the quality of night-time sleep.

Publications:

Luff, R. (2010) 'Sleep in old age', ILC-UK @ BSG http://blog.ilcuk.org.uk/2010/07/12/ilc-uk-at-bsg-%e2%80%93-sleep-in-old-age/ 12 July 2010.

Meadows, R., Luff, R., Eyers, I., Venn, S., Cope, E. and Arber, S. (2010) 'An actigraphic study comparing community dwelling poor sleepers with non-demented care home residents', *Chronobiology International, 27(4): 1-13.*

Arber, S. and Venn, S. (2011) 'Caregiving at night: Understanding the impact on carers' sleep', *Journal of Aging Studies, 25.* Online.

Venn, S., Arber, S., and Meadows, R. (forthcoming) 'Ageing and sleep: (re-)defining daytime sleep'. In P. Twohig (Ed.) *Health, illness and disease: Inter-disciplinary perspectives*. Inter-disciplinary.net.

Venn, S. and Arber, S. (2011) 'Daytime sleep and active ageing in later life', *Ageing and Society*, 31. In press.

Understanding Sleep and Night-times in Care Homes (WP3)

Key message: ***The sleep of older people living in care homes is related to the care practices and routines within care homes, as well as resident's health and frailty.***

Researchers: Dr Ingrid Eyers, Theresa Ellmers, Emma Cope and Dr Rebekah Luff

Rationale:

Although care homes provide 24 hour care, much research focuses on the daytime hours and omits the night. Set within the context of increased levels of frailty of older people living in care homes and based on previous findings that highlight the disrupted nature of residents' sleep, this research was designed to understand some of the causes of poor sleep for older people living in care homes, by examining both their daytime activities as well as the night-time routines. By doing so, we aimed to highlight the complex and multi-faceted nature of sleep within a care home and ways in which resident sleep and their night-time experience could be improved.

Background:

The research examined two general areas relating to the sleep of care home residents:

(a) How issues common to individual residents, for example frailty, disability and incontinence, relate to their sleep.
(b) How living in a care home may relate to sleep, including night-time care, staffing levels, daytime activities and the care home routine.

What was done:

10 care homes in the South-East of England participated in the study, of which eight care homes were registered to provide nursing care and two to provide residential care. Three homes were owned by a local authority, five by larger care home chains, one was an independent business and one was run by a charity.

180 residents participated in parts of the study, with 145 completing 1 or more of the following:

- *Wearing actiwatches* (small activity monitors) to record levels of movement for 14 days
- *Daily sleep and activity diaries* over 14 consecutive days
- *The Pittsburg Sleep Quality Index* – a self-report sleep quality scale
- *General information,* such as age, gender, amount of support required from care staff, medication and continence care.

In addition, 38 residents from 4 care homes participated in audio recorded interviews.
Over 50 care staff across the 10 homes were interviewed as were each of the 10 managers.
Over 300 hours of observations were undertaken by researchers. Observations covered the 24 hour routine of each care home, with a focus on daytime activities, bedtimes and getting up times.

Key findings and implications for policy and practice:

Sleep in a residential care setting needs to be viewed as part of the full 24 hour time period as many residents may fall asleep during the day. Both the physical and social environment of a care home can impact on a residents' experience of sleep. This is combined with individual factors, such as disability, pain, continence and cognition that not only may affect sleep, but also the experience of time spent awake during the night.

There needs to be raised awareness of the fundamental importance of sleep for older people living in care homes and recognition by care providers of their role in helping residents achieve good sleep quality. Improvements could be made to social care policy, regulations, care home culture and staff training by adopting the view of care homes as 24 hour care environments and giving equal importance to both day *and* night time staffing and care practices.

- ***Living in a care home influences rest/wake patterns of older people***
  By comparing the actigraphy from older people living in care homes with that of older people who were self-reported 'poor sleepers' living in their own homes, it was found that care home residents had a more fragmented rest/wake pattern, that is, care home residents were generally more active in the night time hours and less active in the daytime hours than older people in their own home. This is indicative of more broken sleep and/or daytime inactivity or napping. The analysis took into account the health, dependency, continence and age of care home residents.

  This finding is important as it suggests that certain aspects of living in a care home relate to residents having broken night-times, which is not only due to their age and frailty.

- ***Time spent in bed and time spent in bed awake***
  By analysing the sleep diary data from 125 care home residents, it was found that the mean time residents spent in bed at night was 10hr 50mins. Longer hours in bed did not relate to more time spent actually asleep and residents on average reported spending over 2 hours in bed awake each night. The bedtimes and getting up times for those residents most dependent on staff for support were influenced by staffing levels and shift changes.

  Staffing levels and shift patterns often did not allow staff to give all residents choice over when they went to bed and got up, so residents compromised to fit in with the care home routine.

- ***Night-time care***
  Care practices and routines undertaken at night include issues of monitoring the well-being of residents and risk reduction. Staff balance resident choice against the care practices required of staff and the needs of the care home, but residents' sleep is not always prioritised. For example, regular staff checks are conducted at night to see if the resident is safe, in distress or needs continence care. The regularity of these checks and whether they involve waking residents is not currently well balanced against the importance of residents' sleep.

  There is the potential to improve the overnight care practices and procedures which can significantly impact on care home residents' night time experience and their sleep. For example, raising staff awareness about the significance of sleep for residents' health and wellbeing ,and supporting staff to engage in care practices that minimise night-time disturbances.

- ***Improving the night-time experience of residents***
  Interviews with residents and their daily sleep diaries highlighted how aspects of pain/ discomfort, physical disability and continence issues impacted on how care home residents experience sleep and the night-time. From a resident's perspective, findings identify the lack of resources and strategies available to residents to help themselves cope with sleep disruption or long wakeful periods in bed.

  These issues are being addressed in workpackage 7 (see pages 15-16).

Publications:

Meadows, R., Luff, R., Eyers, I., Venn, S., Cope, E. and Arber, S. (2010) 'An actigraphic study comparing community dwelling poor sleepers with non-demented care home residents', *Chronobiology International, 27(4): 1-13.*

Luff, R., Ellmers, T., Eyers, I., Cope, E., and Arber, S. (forthcoming, 2011) 'Time spent in bed at night by care home residents: choice or compromise?' *Ageing and Society*, 31.

Self-management for insomnia symptoms associated with chronic disease: A Randomised Controlled Trial (WP4)

Key message: ***The severity of insomnia symptoms associated with chronic disease can be reduced by self-help strategies based on Cognitive Behavioural Therapy for Insomnia (or CBT-I) delivered in booklet form.***

Researchers: Professor Kevin Morgan, Pamela Gregory, Dr Maureen Tomeny, Claire Gascoigne and Dr Beverley David

Background and rationale:

Sleep disturbances (problems getting to sleep or staying asleep, or waking too early in the morning) are the most commonly reported psychological symptoms in Britain. When these symptoms become persistent (lasting longer than, say, 4 weeks) and are accompanied by daytime consequences (for example, fatigue, tiredness, irritability), then the condition of 'insomnia' can be diagnosed. Insomnia affects about 8-12% of all adults. This overall prevalence rate, however, is not evenly distributed across the population. Levels of insomnia increase steadily with age, rising from 3-5% of those age 18-25 to around 25-30% of those age 65 and over. Among older people the risk of persistently disturbed sleep is further increased by chronic health problems, with recent estimates suggesting that up to 50% of all those with long term conditions (like arthritis, diabetes, heart disease, cancer, etc.) also suffer from insomnia.

In recent years considerable emphasis has been placed on the value of 'self-management' and shared experience among those living with chronic health conditions. This growth in a self-help culture includes the UK 'Expert Patients Programme' (see: http://www.expertpatients.co.uk/) which, through structured training courses, aims to help patients take control of their health and provide 'tools and techniques' to improve the day-to-day management of chronic conditions. While the need to improve sleep quality and reduce daytime fatigue is clearly valued by this programme, current training courses do not include psychological approaches to sleep management. To meet this need, the present trial was designed to assess the effectiveness of Cognitive Behavioural Therapy for Insomnia (CBT-I) when delivered in a self-help format to people living with chronic conditions.

What was done:

We recruited a total of 188 volunteers (these were people aged 55-87 diagnosed with chronic health conditions, and who had experienced symptoms of insomnia for at least the previous 3 months). These patients were randomly divided into 2 groups:

1) The "CBT" self-help group (containing 98 people) received 6 booklets by post (1 each week) explaining the principles of CBT-I, and self-help techniques to improve sleep quality. A telephone support 'hotline', offering advice on how best to use the booklets, was also available to people in this group.

2) The "Treatment as Usual" group (containing 95 people) received a single sheet of sleep hygiene advice (the basic 'dos' and 'don'ts' for optimising sleep quality).

3) In order to assess the possible impact of the self-help programme we measured outcomes on a range of factors. These assessments were conducted in both groups on completion of the self-help programme, then 3 months and 6 months later.

Key findings:

- Patients in the self-help group reported consistent improvements in their sleep quality on completion of the self-help programme, and 3 and 6 months later.
- Where present, these positive effects were seen at all three assessments (immediately after, at 3 months and at 6 months), suggesting lasting improvements in some patients.
- Improvements in sleep symptoms were related to the nature of the long-term health condition, with some patients benefiting much more than others.
- Most patients found the self-help material (which was delivered by post) accessible and helpful.
- Most patients who completed the trial in the self-help group said they would recommend the programme to others.

Important considerations. Some patients 'dropped out' of the study before the end (at the 6-month assessment, 30% in the self-help group and 46% in the 'treatment as usual' group no longer wished to participate). While this is not unusual in a clinical trial, the possible impact of such 'attrition' has to be taken into consideration when interpreting the results. In addition, some patients in the 'treatment as usual' group clearly felt a benefit from the sleep hygiene advice provided (which diminished the differences between the groups).

Implications for policy:

- Most patients with chronic conditions experience problems with their sleep. These results suggest that self-help CBT-I can have a positive and wide-ranging impact on insomnia and related symptoms among older people with chronic health problems. Self-help CBT-I approaches could usefully be integrated into the Expert Patient Programme.
- Providing written, evidence based information on the optimal management of sleep problems should be considered for all patients reporting insomnia symptoms in primary care settings.
- Cognitive Behavioural Therapy (CBT) approaches to sleep management could usefully

Examining the ability of light to improve sleep in older people (WP5)

Key message: ***Daily light exposure has some beneficial effects on sleep in older people living in the community.***

Researchers: Katharina Lederle, Dr Benita Middleton and Professor Debra J. Skene

Rationale:

Many older people suffer from sleep problems and decreased daytime alertness which may, in part, be caused by a dysfunction of their circadian body clock. Currently, pharmacological medication is the only option offered to treat these problems; however this can have adverse side-effects. Reports have shown that administration of bright light, not only has the ability to reduce sleep problems, but can also enhance daytime performance. Research studies have shown short wavelength blue light to be most effective in influencing the body's timing system. In addition, ageing is accompanied by many changes within the eye including alterations in pupil size, lens transmission, and the number of retinal photoreceptors.

Older people thus require more light than younger people and therefore should seek to spend time outdoors to maximise their daylight exposure, or alternatively artificial blue-enriched light can be obtained by having special lights in the home that have more short wavelength blue light.

Background:

This study evaluated the effectiveness of two light conditions differing in their wavelength composition as a non-pharmacological treatment, in terms of improving sleep, activity, and mood and alertness in older people (over 60 years) with self-reported sleep problems (Pittsburg Sleep Quality Index, PSQI > 5). The two lighting conditions studied were a blue-enriched white light and a more traditional white light.

The aims were:

a) To compare the effects of light exposure and no-light condition (weeks before and after light exposure) on sleep, activity and mood and alertness on older community -dwelling people.

b) To compare the effects of two light conditions (blue-enriched white light and control white light) on sleep, activity and mood, and alertness in older community-dwelling people with self-reported sleep problems.

c) To assess the practicality of administering daily light exposure in older people's homes.

What was done:

- 33 healthy older people (average age 66.5; 23 women, 10 men) participated in an at-home study of 11 weeks. Following a baseline week, each light treatment was administered for 3 weeks; daily light exposure was for 2 hours in the morning and 2 hours in the evening. A 2-week washout period (no lights) followed each light treatment.

- The two light conditions (blue-enriched white and traditional, control white light) were assessed at two different light intensities: 12 older people received both light conditions at 400 lux (dimmer light, similar to indoor room lighting) and 21 older people received both light conditions at 1100 lux (a brighter light, 2-3 times brighter).

- The participants completed daily sleep diaries, mood and alertness scales and wore an actiwatch (device to detect movement and light, AWL) continuously to assess objective sleep and circadian activity levels.

- The urinary metabolite of melatonin, 6-sulphatoxymelatonin (aMT6s), was measured before and at the end of each 3-week light exposure period (via sequential urine collection over a 39 hour period) to assess the timing of the circadian body clock.

Key findings and implications for daily light exposure:

Artificial light exposure produced some beneficial effects on sleep, mood, alertness, activity and the melatonin rhythm in older people suffering from self-reported sleep problems. The results were shown to depend on the light intensity (lower light intensity being more effective).

Apart from the fact that blue-enriched light significantly delayed the time of sleep onset compared to control white light, the two light conditions did not differ in their effectiveness.

The light treatments for 4 hours each day in older people's homes, only resulted in small changes in the self-reported mood and alertness of the study participants.

In summary, administration of low and medium intensity lights at the beginning and end of each day produced few effects, possibly due to insufficient strength of the light signal (intensity, duration) as well as the confounding effects of a real world-life environment (older people's natural exposure to daylight and social commitments).

Although light has been shown to be effective on the rest-activity patterns of older people living in a care home environment, optimising light treatment for older community-dwelling individuals with sleep problems requires further study to determine the ideal light conditions (e.g. intensity, duration, spectral composition and timing of light exposure).

Supplementing light in care homes (WP6)

Key message: ***Residential care homes have low levels of artificial lighting. Light supplementation increased the time that care home residents spent under brighter light conditions and produced no adverse effects.***

Researchers: Dr Samantha Hopkins, Lloyd Morgan, Daniel Barrett, Dr Benita Middleton and Professor Debra J. Skene

Background and rationale:

Some studies have reported low levels of illumination in care homes for older people. Light is known to be the major factor influencing the body's biological clock and sleep/wake patterns and changes in the eye with increasing age reduce the amount of light reaching the body clock. These ocular changes as well as other consequences of ageing (e.g. nerve degeneration) indicate that older people require 3-5 times more light than younger people. Lack of light can also lead to poor differentiation between day and night which may result in poor sleep and poor daytime functioning.

The primary focus of the study was to examine the effects of increasing the lighting levels in selected living rooms in residential and nursing care homes. Routine aspects of care home life may adversely affect residents' sleep, including reduced exposure to sufficient natural light during the day, lack of physical activity, daytime naps, night-time disturbances and light at night in residents' rooms. Previous research has indicated that increasing the level of room lighting in care homes during the day may slow down loss of mental ability and improve some aspects of resident's sleep.

The aims were:

a) To install two novel lighting conditions in selected communal areas of care homes to provide additional uniform lighting.

b) To determine the effects of these two lighting conditions on residents' sleep quality, daytime mood and mental ability.

What was done:

- Seven care homes owned by the private sector and local authorities in South-east England took part. Additional room lighting was installed in 2-3 communal areas (e.g. lounges, dining rooms) in each care home.
- Each care home was studied for 12 weeks between September and April when the natural daylength was short.
- Two different fluorescent lighting conditions (provided by Philips Lighting) were tested: blue-enriched white light (high colour temperature, medium light intensity ~ 1000 lux) and control white light (low colour temperature, low light intensity ~ 200 lux).

- Baseline measurements were collected during the first week of the study, then the novel lighting was installed for 4 weeks, followed by 3 weeks of 'washout' when the care homes' own lights were used, and finally there was a further 4 weeks of the second light condition.

- Residents taking part in the study were questioned on one occasion each week about their sleep, mood and alertness. At the end of each light treatment period more detailed assessments of mental ability, sleep quality and mood were made. Residents and staff were also asked their opinion of the lights and if they thought they were better or worse than the normal lighting.

- Some residents also wore an activity and light monitor (Actiwatch) on their wrist throughout the 12-week study to measure their own light exposure and their activity and sleep rhythms.

- Light levels in the communal rooms in the 7 care homes were measured throughout the 12 week study using light sensors which recorded light levels every 5 minutes. Artificial lighting levels were also measured by a researcher once a week after sundown.

Key findings and implications for policy and practice:

In the absence of natural light, lighting levels in the twenty communal care home rooms we studied were low (56 lux, ± SD 64 lux, in the direction of gaze) and not uniform, leaving areas of poor visibility. By contrast, the experimental light conditions produced uniform, significantly higher light levels - control white lights 191 lux (± SD 52 lux); and blue-enriched white lights 907 lux (± SD 199 lux). Lighting levels during the daytime (artificial lighting plus natural lighting) were substantially higher but extremely variable (736 lux ± SD 1250 lux) and depended on the time of year, weather conditions and the direction the room faced. The blue-enriched lights, however, produced more consistent, less variable lighting throughout the day (1091 lux ± SD 821 lux).

The amount of light residents were exposed to throughout the study period was also assessed. The findings indicate that by increasing the illumination in selected communal areas the time that care home residents spend under brighter light conditions can be greatly increased with the blue-enriched white lights increasing the time residents spent above 500 lux by 6-8 fold.

Data analysis of the effect of the light conditions on residents' sleep quality, daytime mood and mental ability is still at an early stage. Preliminary analysis, however, suggests that the novel lighting did not produce any deterioration in the residents' mood or self-reported sleep. No significant adverse effects such as headache, eye strain or discomfort, irritability or fatigue with the different lighting were reported by residents, indicating that the lights appear to be well tolerated by older care home residents.

In summary, lighting levels in the communal areas of the care homes studied were low and variable. Even if the room lighting meets the current recommendations, whether this fulfils the needs of older people and is sufficient for good sleep and daytime functioning requires further study.

Development and evaluation of assistive technologies to improve sleep in the community and care homes (WP7)

Key message: ***There is much potential for designing technological interventions that can improve sleep among older people.***

Researchers: Dr Bruce Carey-Smith, Mrs Nina Evans and Professor Roger Orpwood

Rationale:
As part of the aim of improving the quality of sleep of older people without using hypnotic drugs it is suggested that there is a role for the use of technological interventions, and research is needed to explore the potential of this approach.

Background:
There has been much development in recent years of assistive technology in the home that uses sensors to monitor people's behaviour and then to provide support based on the insight gained. This support can assist users during the night and has been shown to help improve sleep. However there is a need to look broadly at a range of new technologies, and to base their design on an understanding of the issues that can impact on people's sleep. Previous work on these kinds of technologies which have a complex interface with people using them has shown that a sensitive user-led approach is crucial to their successful development.

What was done:
This work has followed a systematic user-led process of design creation and development:

- The key first stage was to get an understanding of issues affecting sleep which might be approached using technology. Consequently this work-package was started 18 months into the *SomnIA* programme so that it could use the results obtained by both WP2 and WP3. Contacts in several care homes in the Bath area were also used to explore these issues in detail with staff and residents.

- Based on the insights gained a number of possible technological interventions were generated as concepts, and discussed with contacts in care homes to see how they felt about them. Simple non-working representations of some of these ideas were also constructed, and used in these discussions to help users visualise the concepts more easily. The ideas aimed to either reduce disturbance of residents at night, or improve night -time comfort, or reduce anxiety at night.

- A short-list of promising concepts was compiled, and then ideas were prioritised through workshops with the other *SomnIA* partners and through further discussions with care home staff and residents. From this prioritised list a number of concepts were selected for development.

- Initial prototypes were constructed for four of the key ideas. A further one explored a compilation of a number of products already commercially available. The prototype ideas were tested, initially under close supervision, to see how users received them, and in particular to check the effectiveness of any user-interfaces such as controls etc. These ideas were refined according to the feedback received from both residents and staff.

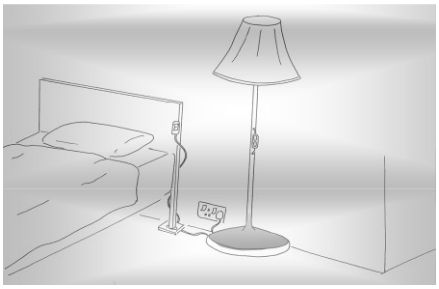
- The above process was also followed to explore ideas that might be helpful for older people in the community with sleep problems. Interviews were carried out in people's homes and ideas developed to the promising concept stage.

Technology developed and evaluated:

Four ideas for use within care homes were developed to a point where unsupervised evaluations could be carried out.

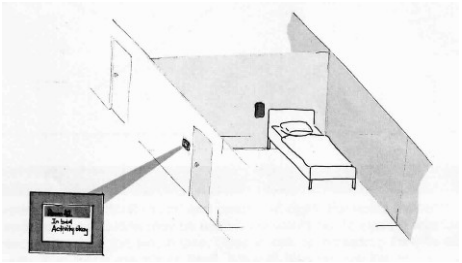
Night-time tray. This tray was developed to enable residents to satisfy their needs during the night by storing and then accessing a drink, glasses, care alarm, etc. It automatically illuminated on contact and thereby enabled lower night-time light levels to be used in the room.

Musical pillow. This plays sounds through the pillow such as gentle music, radio or TV, or a recorded voice. The sound fades away after a set time but can be simply turned on and off by the resident.



Automatic lighting. This provides lighting both for the resident when they need it and for care staff when coming into a room at night. Its design provides good background lighting without disturbing sleeping residents.

Night-time communicator. A hand-held external hearing aid that care staff can use to communicate with residents at night without shouting and disturbing other residents. This is primarily for residents who wear a hearing aid during the day.



A fifth concept has explored how commercially available sensors for vital signs, urine detection, movement, etc could be combined to provide sufficient remote indication of the resident's status that staff would not feel they needed to disturb the resident at night. The key information required concerned breathing and eneuresis.

For older people in the community the most promising solutions were the use of the musical pillow, but also indicated the potential of technology to support Cognitive Behaviour Therapies.

Key findings for policy and practice:

All these technologies were well received by both care home residents and care staff. They are not expensive but have real potential to support quality sleep. It would be important to run longer term evaluations to provide care providers with evidence of their effectiveness, and to explore other similar technological interventions. It would also be important to ensure their commercial availability.

Web module: 'Sleep Problems in Later Life' on healthtalkonline (WP8)

Key message: ***The creation of a module entitled 'Sleep Problems in Later Life' on the Healthtalkonline website provides information for older people, their carers, and health professionals about what it means to experience sleep problems in later life***

Researchers: Susan Venn and Professor Sara Arber

Rationale:
There is a lack of easily accessible information for the general public about sleep and a need for publicly available information on the activities and strategies older people can adopt to improve their sleep.

Background:
The award-winning *Healthtalkonline* website (www.healthtalkonline.org, formerly DIPEx) contains the results of qualitative research on patient experiences of diverse health conditions. It is well-known, accessed by a million people a month, and widely used in healthcare teaching. The aim was to produce a module on sleep problems among older people for the website, utilizing some of the interview data collected in the *SomnIA* Workpackage 2 (p 5-6), which would provide information for older people and their carers, as well as educating health care professionals, about the experiences of older people with sleep problems, and their self management strategies.

What was done:

- In-depth interviews were undertaken with 39 people who agreed to take part in the *Healthtalkonline* website. Participants were aged 65-95 and all had sleep problems as measured by the Pittsburgh Sleep Quality Index (PSQI > 5).
- 33 of the interviews were videoed and six were audio recorded. All the interviews took place in the participants' own homes.
- Participants were given the opportunity to read the interview transcript and make changes, if they wished, before extracts from the interview were selected for inclusion on the *Healthtalkonline* website.
- Each older person also provided biographical information about themselves for the website.
- A selection of topics relating to different aspects of experiencing and managing poor sleep was identified from all the interviews. A summary of what participants said in relation to each topic was created, and illustrated on the website by extracts from the interviews in the form of video, audio and/or written clips.
- A website module called 'Sleep Problems in Later Life' was created: (http://www.healthtalkonline.org/Later_life/Sleep_problems_in_later_life).

Key findings and implications for policy and practice:
The provision of a resource containing older people talking about their personal experiences of poor sleep, through the 'Sleep Problems in Later Life' module from the *Healthtalkonline* website, helps other older people to make informed decisions about their own experiences of poor sleep.

Users of the website will find accounts which resonate with their own perspectives and experiences of issues relating to problematic sleep. Questions such as consultations with their doctor, effect on day-time activities, decisions on treatment options and strategies for coping with poor sleep can be answered. Examples of topics available on the website are:

- Going to the doctor or chemist
- Impact of bereavement and care-giving on sleep
- Sleep medication, other medication and over-the-counter remedies
- Strategies for achieving good sleep
- Age, ageing and changes in sleep patterns
- Daytime sleep
- Worries at night
- Going to the toilet in the night
- The bedroom and sleeping environment

Who will benefit from accessing the web module?
The 'Sleep Problems in Later Life' module is not only aimed at presenting the perspectives of the older person with poor sleep, but also the impact of poor sleep on those around them, such as their carers. The module also acts as an educational resource for health professionals, such as nurses, GPs and hospital doctors, therefore helping to promote better communication between patients and health professionals.

For example, under the topic 'Sleep medication, other medication and over the counter remedies', older people explain how they would rather not visit their doctor for help with their poor sleep in case they are prescribed sleeping tablets, which they would rather not take.

Advice given to others on the website to promote a good night's sleep includes maintaining a regular routine, being aware that each person's need for sleep is individual, and getting enough physical exercise during the day to make you tired.

Other resources and information:
The 'Sleep Problems in Later Life' module also contains a Resources and Information section with recommended books, website resources and articles for those who experience poor sleep, their carers and for health professionals to seek further guidance.

Publications and Resources:
'Sleep Problems in Later Life': Module in Healthtalkonline website (www.healthtalkonline.org).

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