Beliefs about the 'shape' and continuity of healthy sleep as a function of age

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ABSTRACT

Objective: Treating insomnia includes challenging unrealistic beliefs that may contribute to anxieties and wakefulness. This study explored beliefs about the shape and continuity of healthy adult sleep at different adult ages.
Methods: Younger ($n = 113, M = 21.4 (2.4)$) and older adults ($n = 110, M = 72.3 (7.7)$) depicted their concept of the normal sleep of both a healthy 18 and 65 year olds. Plots were drawn to show sleep depth and awakenings across the night.
Results: Seventy percent conceptualized healthy sleep as an unbroken U shape and 18 year olds were depicted with deeper sleep than 65 year olds. About 95% of younger adults and three quarters of older adults showed both healthy 18 and 65 year olds sleep without awakenings.
Conclusion: Unrealistic sleep beliefs are widespread, with healthy sleep usually being mistakenly conceptualized as unbroken, even in older adults. Education that awakenings are part of normal sleep may have preventative health implications and reduce sleep anxieties.

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One common misconception is that sleep is one continuous 'down time' where a person falls asleep and stays solidly asleep until the morning. Historical analyses suggest that sleep was not always seen in this way, with Ekirch [1] finding references to 'first sleep' and 'second' sleep' (or similar terms) in 58 different sources from the 14th to the 19th centuries. Waking periods were spontaneous and routine and a 1–3 hour waking episode often occurred around midnight. First and second sleep periods were also described by the Tiv people of Africa [1]. Yet in modern times in non-traditional societies nocturnal sleep is seen as a monophasic phenomenon. This is likely to be an artefact of modern lighting [2] and the fact that we typically no longer feel the need to check our sleeping areas for evil spirits or predators. Monophasic sleep is perceived as the normal and 'natural' way to sleep, where breaks in the continuity of nocturnal sleep may be interpreted as signifying difficulty with sleep.

Unrealistic beliefs about sleep continuity may actually contribute to the perpetuation of difficulty sleeping [3]. One unrealistic view is that the 'shape' of a night of sleep is a U shape, where the bottom of the U is the deepest period of sleep and occurs between two wake points at bedtime and the morning. Lack [4] was the first to explore the extent to which this idea is held across the population and devised a simple blank graph on which participants were asked to draw the possible variation of wake, light, deep and very deep sleep across the night.

Using a sample of 250 young to middle age participants Lack found that 70% believed that sleep proceeded in an unbroken U shape. Lack theorized that such a belief may be particularly dysfunctional in older populations where sleep becomes lighter and more fragmented [5]. Older sleepers may become more concerned if they believe that their sleep is abnormal and they may become anxious about the consequences of their fragmented sleep on their overall health [6]. As the normalizing of non-pathological symptoms in the mind of poor sleepers is a key aspect of many psychological treatments [7], it is important to understand the extent to which potentially dysfunctional beliefs about the normal shape of sleep may be present in the community. Given that sleep changes with age it is also of interest to investigate how such beliefs may differ between younger and older adults. Further, do people of different ages have an understanding that sleep becomes lighter and more fragmented with advancing age, even in healthy individuals?

In this study a tool, the Sleep Plot, designed by Lack [4], was used by participants to plot the sleep patterns of healthy adults of two different ages (an 18 year old Sleep Plot and a 65 year old Sleep Plot) across a typical night of sleep. Lack's participants covered a wide age range (38.5 ± 14.4 years). Although he found no difference in the healthy Sleep Plots judged by the younger and older median split of his sample, we wanted a stronger test of the possible age effect of participants. Therefore, participants were derived from two more extreme age groups, aged 18 to 25 years in the younger and aged 60 years or more in the older group.

The rationale for the research included (i) Lack's [4] finding that the predominant characterization of healthy sleep is a U shape, (ii) the lack

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of previous research concerning perspectives on plotting the sleep of one's own age cohort and other age groups, and (iii) the concern that the prevalence of sleep problems in both age groups (older and young adults) may be perpetuated, in part, by incorrect beliefs. The issues to be explored were framed as exploratory research questions, rather than as directional hypotheses:

1. Can the previous finding that the main characterization of the shape of sleep is a U shape be replicated?
2. Do the Sleep Plots differ significantly as a function of the depiction of 18 versus 65 year old's sleep (i.e. plot age) or the age of the respondents (younger versus older adult groups, i.e. age group)? (Here the dependent variables are the depth ratings across 15 time intervals from sleep onset to awakening.)
3. Does the frequency of depicting an uninterrupted U shape versus Sleep Plots with awakenings differ as a function of age group, plot age or sex of the participant? (Here the dependent variables are categorical data relating to plot shape.)

Method

Participants

There were two groups of participants differing in age. In the younger adult group there were 113 (67 female and 46 male) participants between the ages of 18 and 25 years ($M = 21.41$ years, $SD = 2.43$ years). The participants were from the general community and were recruited via word of mouth, workplaces (retail stores), and university lectures. While less than half of the participants were university students no data was collected on this variable. In the older adult group there were 110 (62 females and 48 males) participants aged 60 years and older ($M = 72.13$ years, $SD = 7.71$ years). The participants were from the general community and were recruited via workplaces, community organizations, church, and sporting groups. The response rate across the two groups was 41.3% and this was calculated from the total number of questionnaire packages that were distributed to willing volunteers compared to the number that were completed and returned. No demographic details were collected apart from age and gender and all participants had a sufficiently high level of English language skills to complete the package.

Materials—the Sleep Plot

In the Perceived Normal Sleep Plot [4] participants were asked to plot what they believed the normal sleep period looked like for two different age groups (referred to here as the Sleep Plot). In the Sleep Plot participants were able to draw waking periods, sleep periods and what they believe happens in terms of depth of sleep across the night. All participants were given two blank graphs with dimensions of 8.5 cm by 17 cm (see Fig. 1) and the following instructions on the first page, with the box shown in Fig. 1 placed below the instructions on the first page.

*This task has two parts: On this page your sleep plot will show us your understanding of the nature of a **normal night of sleep for a healthy 18 year old**. On the next page your sleep plot will relate to the **normal night of sleep for a healthy 65 year old**. Please do this by drawing a continuous line in the box below across the normal night time period. Start the line at the γ mark in the upper left corner, representing the start of the night's sleep, and stop the line at the γ mark in the upper right hand corner of the box, representing awakening in the morning. The dashed horizontal line between awake above and sleep below marks the transition between awake and asleep. The darker bands indicate deeper sleep. With this continuous line indicate your understanding of the progress through the night of a normal sleep of a healthy 18 year old."*

On the following page the instructions, above a blank box as on the previous page, were:

*Now create a sleep plot, using the same starting and ending points (γ) as before, for the **normal sleep of a healthy 65 year old.***

The scoring of the Sleep Plot for the first three research questions was as described in Lack (2007). The continuous curve for each respondent was assigned one of four different values (0 = wake, 1 = light sleep, 2 = deep sleep, 3 = very deep sleep) for each of 15 half-hourly time points across the night. Thus the horizontal axis of the Sleep Plot shown in Fig. 1 was taken to represent a total of 7.5 h as measured between the two λ symbols. Two different sets of dependent variable scores were yielded for each participant, one for the sleep of a healthy 18 year old and for a healthy 65 year old.

In a more global analysis each plot was categorized into one of three categories. (i) The plot was a U shape whereby the Sleep Plot followed a pattern of light sleep at the beginning of the night going into deeper sleep across the night and then finally coming into lighter sleep until awakening in the morning. The lines had no variations from the U shape that crossed into one of the three colored bands shown in Fig. 1 inconsistent with a continuous U shape. (ii) The plot showed a non-U shape (e.g. at least one transition into a lighter band of sleep followed by a deeper band before ascending into wakefulness) but where there was no awakening depicted. (iii) The plot showed a non-U shape with at least one awakening across the night. Where a plot touched the
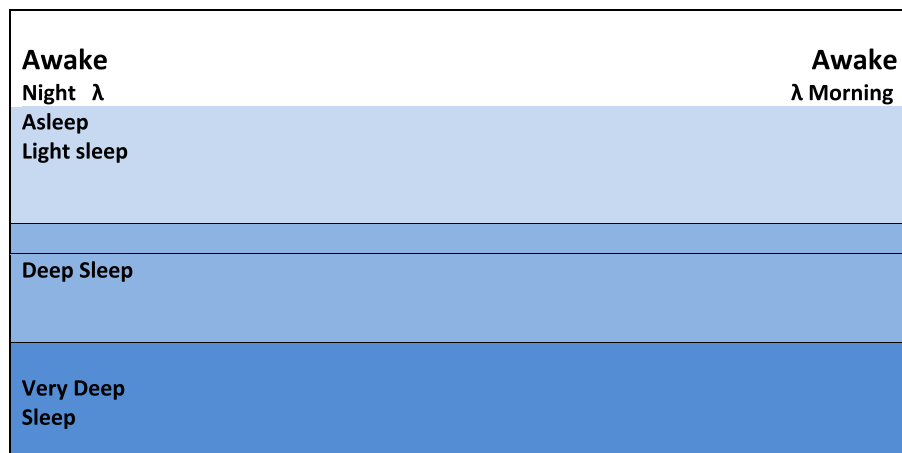

Fig. 1. A blank Sleep Plot, as given to participants.