

## Psychological correlates of sleep habits reported by healthy young adults

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Variations in the pattern of sleep and wakefulness and the presence of clinically significant insomnia are widely known to be associated with psychiatric illnesses of various kinds (McGhie, 1966; Hawkins & Mendels, 1966; Ward, 1968; Kupfer *et al.*, 1970). However, even in groups of people who do not have overt physical or psychiatric illness, there are wide variations in sleep habits (McGhie & Russell, 1962; Thomas & Pederson, 1963), some of which can be attributed to differences of personality (Raybin & Detre, 1969; Tune, 1969; Hartmann *et al.*, 1971). This report is concerned with relationships between long-term psychological characteristics and several aspects of the sleep habits recorded by a group of medical students.

Monroe (1967) selected from among healthy young adults good and poor sleepers on the basis of their subjectively reported delays before falling asleep at night and the frequency with which they woke up during the night. He found that these two groups also differed in other respects: the good sleepers had evidence of better psychological health than the poor sleepers, i.e. greater 'adaptiveness and availability of ego resources'. Furthermore, there were physiological differences which suggested that in poor sleepers the central nervous system was more highly activated than in the good sleepers, both when awake and asleep.

Johns *et al.* (1971*a*) also studied groups of good and poor sleepers selected on *a priori*

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grounds from a large group of medical students who had given subjective descriptions of their usual sleep in a detailed questionnaire. Although none of these subjects had severe insomnia, the poor sleepers were found to excrete more urinary free 11-hydroxycorticosteroids than the good sleepers during the day and night. As in Monroe's study, there were significant psychological differences between these two groups. Thus, even among apparently healthy young adults, differences of sleep habits measured along a dimension of good-poor sleep are related not only to some aspects of personality and lifestyle, but also to physiological differences between people.

However, apart from being good or poor, sleep habits may differ in several respects. Some people habitually go to bed earlier at night and wake up earlier next morning than others, despite having a similar schedule of activities during the day (Johns *et al.*, 1971*b*). Little is known about any psychological characteristics which may be related to this aspect of sleep habits. In addition, some people sleep for an average of eight or nine hours each night (long sleepers); others for six hours or less (short sleepers). These differences are not necessarily related to the quality of sleep. For example, Jones & Oswald (1968) reported on two healthy men who coped well with only three or four hours of sleep each night. Attempts have been made to define differences of personality between short sleepers and long sleepers (Hartmann *et al.*, 1971). However, when neither group had evidence of being poor sleepers, as manifest by difficulty in falling asleep or frequent awakenings during the night, psychological differences between them could not be found

in a wide range of tests (Webb & Agnew, 1970; Webb & Friel, 1971).

Johns *et al.* (1971*b*) have previously described many aspects of the usual times, duration and quality of sleep reported in a Sleep Questionnaire by two large groups of medical students, who included those in the present study. We report here the relationships that exist between the psychological characteristics, measured by scores on various scales of the Minnesota Multiphasic Personality Inventory (MMPI), and many different aspects of the sleep habits reported by a group of 104 medical students. Sleep habits are known to be influenced by many other factors including age, some types of physical illness (Johns *et al.*, 1970), as well as social and occupational factors (Masterton, 1965*a, b*). In this investigation many of these influences were controlled because all the subjects were ostensibly healthy, all were of similar age and all had a similar daily routine of clinical instruction.

#### METHOD

A detailed Sleep Questionnaire was completed by a group of fourth-year medical students assembled at a teaching session one afternoon at Monash University Medical School, Melbourne. Three months later, the same students filled out the MMPI under supervision. Of the students assembled on these two occasions, there were 104 (86 per cent of all students enrolled in that year) for whom both the Sleep Questionnaire and the MMPI were completed and returned. The mean age of these students was 21.5 years (s.d. = 1.5 years). There were 92 men and 12 women, all of whom were in the first year of their clinical studies. All had similar daily routines at the hospital, with no imminent professional examinations.

The self-administered Sleep Questionnaire asked such questions as: 'At what time do you usually go to bed at night on weekdays?', 'How long does it usually take you to fall asleep on week nights?', and 'How would you describe the quality of your usual sleep?'. Parameters such as the usual delay before sleep onset, the duration of sleep at night and the total duration of night awakenings were calculated in hours per week from the answers provided. Thus consistent differ-

ences between weekdays and weekends were overcome, at least in part (Johns *et al.*, 1970, 1971*b*). Variables such as the subjective quality of sleep were rated from 1 to 4; the frequency of disturbing dreams or nightmares from 1 to 3, corresponding to frequencies reported as 'never or very seldom', 'occasionally' or 'frequently'. The MMPI's were scored for L, F and K and the ten basic clinical scales (Dahlstrom *et al.*, 1972). Product-moment correlation coefficients were calculated between the raw scores on these scales and twelve characteristics of the usual times, duration and quality of each student's sleep. The statistical significance of correlation coefficients was accepted at the 0.05 level of probability.

#### RESULTS

Table 1 summarizes the sleep habits reported by the whole group of subjects and shows the statistically significant correlations with raw scores on scales of the MMPI. As reported elsewhere (Johns *et al.*, 1970, 1971*b*), later times of going to bed on Friday and Saturday compared with other nights seem to be characteristic of young adults in whom social activities at night are concentrated at weekends. However, they often sleep until later next morning at weekends, thereby obtaining more sleep than on week nights.

On the average, the students in this investigation spent a total of 55.3 hours each week in bed at night, of which 51.1 hours (92.3 per cent of the available time) were spent asleep. Sixty per cent of the subjects described their usual sleep as very good, 35 per cent as moderately good, and 5 per cent as moderately bad; none described it as very bad. Nevertheless, 13 per cent usually took more than 30 minutes to fall asleep at night and 38 per cent reported waking up at least once during the night each week. Occasional nightmares were reported by 34 per cent, frequent nightmares by 3 per cent.

Ten of the 12 parameters of sleep habits were significantly correlated with scores on at least one scale of the MMPI: in several cases different combinations of scales were involved (Table 1). The usual delay before falling asleep at night was longest in those subjects

Table 1. Aspects of the sleep habits reported by medical students and correlations with their raw scores on scales of the MMPI

(Non-significant correlations omitted.)

Aspect of sleep habits	Mean ( $\pm$ s.d.)	Correlations with scores on scales of the MMPI
Time of going to bed on week nights	11.25 p.m. $\pm$ 45 min.	3 (Hy) 0.27** 4 (Pd) 0.24** 9 (Ma) 0.26**
Time of going to bed on weekends	12.25 p.m. $\pm$ 35 min.	4 (Pd) 0.25**
Time of morning awakenings on weekdays	7.00 a.m. $\pm$ 30 min.	F 0.28** 4 (Pd) 0.29** 9 (Ma) 0.25**
Time of morning awakenings on weekends	8.45 a.m. $\pm$ 65 min.	6 (Pa) 0.22*
Delay before falling asleep (hr./wk)	2.0 $\pm$ 1.5	2 (D) 0.25** 7 (Pt) 0.20*
Total duration of night awakenings (hr./wk)	0.3 $\pm$ 0.7	3 (Hy) 0.29**
Delay before getting up in morning (hr./wk)	2.1 $\pm$ 1.5	None
Total duration of night-sleep (hr./wk)	51.1 $\pm$ 5.6	3 (Hy) -0.24*
Total duration of day-sleep (hr./wk)	0.7 $\pm$ 1.4	4 (Hy) 0.30**
Total time spent in bed at night (hr./wk)	55.3 $\pm$ 5.6	None
More frequent disturbing dreams or nightmares		L -0.27** K -0.21* 1 (Hs) 0.31** 2 (D) 0.21* 4 (Pd) 0.25** 6 (Pa) 0.21* 7 (Pt) 0.34*** 8 (Sc) 0.34***
Subjectively poor quality sleep		K -0.24* 1 (Hs) 0.39*** 2 (D) 0.34*** 6 (Pa) 0.21* 7 (Pt) 0.27** 8 (Sc) 0.30** 0 (Si) 0.20*

\*  $P < 0.05$ . \*\*  $P < 0.01$ . \*\*\*  $P < 0.001$ .

who had the highest scores on Scale 2 (depression) and Scale 7 (psychasthenia), indicating that they worried more, were more anxious and had lower levels of self-esteem than their peers.

Students who obtained the least sleep at

night tended also to have the most frequent awakenings during the night and to sleep for longest during the day. Daytime naps may have compensated to some extent for reduced amounts of sleep being obtained at night (Johns *et al.*, 1971*b*). All three aspects of

sleep habits – obtaining less sleep at night, having more frequent night awakenings and sleeping for longer during the day – were related to high scores on Scale 3 (hysteria) of the MMPI. This scale is concerned both with the presence of somatic symptoms and with the denial of emotional distress or difficulties with interpersonal relationships. High scores on Scale 3 may have few manifestations of personality disturbances except under conditions of stress (Dahlstrom *et al.*, 1972).

Although the students in this investigation went to bed later at night and also woke up later next morning on weekends than on weekdays, each tended to maintain his position as an early or late sleeper in relation to his peers (Johns *et al.*, 1971*b*). Later times, both of going to bed at night and of waking up next morning on weekdays, were related to high scores on Scale 4 (psychopathic deviate) and Scale 9 (hypomania); that is, to arousal-seeking behaviour and a need for excitement, sometimes with reckless disregard for the consequences of such behaviour. In addition, many students who went to bed late at night during the week also had high scores on Scale 3. Those who slept until latest in the morning on weekdays had high scores on the F Scale, indicating that some aspects of their behaviour and their attitudes were unconventional. As on week nights, later times of going to bed on weekends were related to high scores on Scale 4. However, sleeping until very late in the morning at weekends was related to high scores on Scale 6.

Neither the total amounts of time spent in bed at night (awake or sleep) nor the delays before getting out of bed after waking in the morning were related to any of the personality characteristics measured. Nor was there any evidence that early-morning awakening was associated either with other aspects of sleep disturbance or with depression, as occurs in major psychiatric illness (Ward, 1968).

The frequency with which students reported nightmares was related to high scores on six of the ten clinical scales and to low

scores on L and K of the MMPI. Thus reports of nightmares were associated with a tendency to admit to many different symptoms (low defensiveness) and with a general awareness of psychological distress in daily life. Subjects who reported that their sleep was of poor quality had similar characteristics. Neither nightmares nor subjectively poor quality sleep were reported commonly by students who had high scores on Scale 3 – those who tended to inhibit or deny any awareness of psychological distress even though they had somatic symptoms of functional disturbance, including awakenings during the night.

#### DISCUSSION

We have shown that there are several different ways in which psychological characteristics are related to sleep habits in a group of healthy young adults or, at least, to their reports of those habits in a Sleep Questionnaire. It could be argued that these relationships are manifestations of a factor which determines to some extent how each person will answer any questionnaire, having little to do with his actual sleep habits. Although some degree of bias is always present in subjective responses, most people describe parameters of their sleep in a way which is related significantly to objective measurements of the same parameters in the laboratory (Lewis, 1969; Baekeland & Hoy, 1971; Johns, 1971). In addition, differences in the subjective descriptions of sleep habits can predict the presence of physiological differences between healthy young adults (Monroe, 1967; Johns *et al.*, 1971*a*). In this investigation there was an interval of three months between the times when the Sleep Questionnaire and MMPI's were answered. Thus the relationships described probably reflect a constancy in the interaction between biological, psychological, social and environmental factors in each person.

An important new finding was the difference between the psychological correlates of difficulty in falling asleep and of waking



during the night. In the psychiatric literature, delays before falling asleep have long been associated with anxiety, although Gering & Mahrer (1972) found that this aspect of sleep disturbance was related also to ratings of depressive affect in a group of psychiatric patients. Even among healthy young adults we have found that longer-than-average delays before falling asleep were associated with a tendency to worry excessively and to be pessimistic and self-doubting (Scales 2 and 7). It may be that difficulty in falling asleep is a non-specific concomitant of the degree of emotional involvement and the physiological arousal which follows rather than the type of emotion, whether it be anxiety, hostility, depression or euphoria which predominates in any particular person. By contrast, awakenings during the night were associated in students with the denial of emotional distress in daily life and with the presence of such bodily symptoms as frequently feeling weak and having dizzy spells (Scale 3) – symptoms which may well be produced by neurotic psychological mechanisms as a defence against emotional distress.

The tendencies to wake up during the night and to have difficulty in falling asleep are often present in the same subject, but not invariably (Johns *et al.*, 1971*b*). The ability to fall asleep quickly after going to bed seems to depend, to some extent, on the inhibition of conscious mental activity. There are differences in the efficiency with which psychological mechanisms inhibit uncontrolled mental activity in different people: for example, the ease and frequency with which normal dreams are recalled seem to depend on such mechanisms (Williamson *et al.*, 1970). Having fallen asleep, mental processes which are controlled differently from those of wakefulness, continue through most of the night – not only during REM sleep, although the mental activity associated with this state (dreaming) is different from that during non-REM sleep (Rechtschaffen *et al.*, 1963).

It is suggested, therefore, that some people who have certain psychological disturbances

usually control, albeit unconsciously, the level of their emotional involvement in daily life so that they are able to fall asleep quickly at night. Once asleep, this inhibition is reduced and the emotional concomitants of mental conflicts are able to increase periodically the level of behavioural arousal sufficiently to produce wakefulness. Difficulty both in falling asleep and in staying asleep would be experienced by people who have psychological conflicts in which emotional involvement is not strongly inhibited. Such people, who are the poor sleepers of earlier studies, have increased levels of adrenocortical activity throughout the day and night – evidence for their persistent condition of physiological hyper-activation which seems to be associated with their emotional involvement (Johns *et al.*, 1971*a*).

Among those people who usually obtain the least sleep at night, some may actually be short sleepers, i.e. people who have reduced needs for sleep – whatever these may be; some may stay up so late at night that they leave insufficient time for the sleep which they need; a few may allow sufficient time but have their sleep fragmented by frequent and prolonged awakenings. As in this investigation, reports of fitful and disturbed sleep have been noted by others to be closely related to total scores on Scale 3 of the MMPI (Dahlstrom *et al.*, 1972). The related tendencies, to obtain less sleep by staying up late at night and to sleep for longer during the day, have not been described for other groups of subjects. Nevertheless, the results of this study suggest that students who have enthusiastic social relations and strong needs for excitement but with little insight into their own behaviour (high scores on Scales 3, 4 and 9) commonly obtain less sleep than they need because they stay up until late at night on week nights and then attempt to compensate by dozing during the day.

The usual times of waking or being woken in the morning on weekdays must be influenced not only by how much sleep is needed but also by the necessity to adhere to a

schedule of daily activities determined largely by other people and by environmental factors. For the subjects of this investigation there were early morning lectures to be attended. The more unconventional and, perhaps, rebellious students (those with high F scores) reported that on weekdays they slept until later than their peers. The former might have been less willing than others to adhere to a schedule imposed upon them. Perhaps they were prepared to sleep-in and thereby miss some of the earliest teaching sessions. However, details of such behaviour were not sought in the Sleep Questionnaire.

By contrast, the usual times of waking up on Saturday and Sunday mornings were probably influenced less by external factors; indeed, there were no regular teaching sessions for the students at weekends. Late sleepers at the weekend had higher scores than early sleepers on Scale 6 of the MMPI but the interpretation of this relationship is uncertain. The actual times during which sleep is usually obtained at night have seldom been studied before (Tune, 1969), yet they form an important part of a person's sleep habits in the description of which subjective reports have an important role to play (Johns, 1971). The psychological characteristics of healthy people who have nightmares – occasionally at least – likewise have received little attention in the past. However, the results of the present investigation are consistent with reports that have associated nightmares with neurotic emotional disorders (Hersen, 1971).

It is difficult to compare directly the results of this investigation with those of Hartmann and his colleagues (1971) who found that short sleepers (those who usually slept for less than six hours per night) were 'efficient, hard-working and somewhat hypomanic'. In the present investigation the short sleepers tended also to be poor sleepers, whereas among Hartmann's subjects it was the long sleepers who had the longest delays before falling asleep and the most frequent awakenings during the night – a difference which

serves to emphasize that the sleep habits of individual people often differ in several respects simultaneously.

An unusual feature of this investigation was that it involved the whole range of sleep habits in a relatively homogeneous population of young adults, rather than a comparison of groups chosen from the extremes, whether they be of long versus short or of good versus poor sleepers. The results suggest that detailed subjective reports of sleep habits, readily obtained by means of a Sleep Questionnaire, can provide information about several different aspects of a person's psychosocial characteristics.

#### SUMMARY

The psychological correlates of several different aspects of the sleep habits reported in a Sleep Questionnaire by 104 ostensibly healthy fourth-year medical students were studied by means of the Minnesota Multiphasic Personality Inventory. The students who went to bed latest at night and woke up latest next morning, especially on weekdays, were characterized by arousal-seeking behaviour with little regard for the consequences of that behaviour. The longest delays before falling asleep were reported by students who tended to worry excessively and to have low self-esteem. By contrast, awakenings during the night, decreased amounts of sleep at night and increased sleep during the day were all associated with reports of physical symptoms which may have been produced by neurotic psychological mechanisms and with the denial of any emotional distress in daily life. Nightmares and subjectively poor quality sleep were reported by students who had psychological problems involving emotional distress. It is suggested that detailed descriptions of sleep habits, readily obtained by means of a questionnaire, provide information about a person's psychosocial characteristics, although age and the presence of certain physical illnesses must also be taken into account.

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