THE PREVALENCE OF SELF-REPORTED SLEEP DISTURBANCES IN YOUNG ADULTS

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The prevalence of seven common patterns of sleep disturbance (delayed sleep onset, frequent wakenings, early wakening, waking tired, disrupted sleep, day napping and nightmares) was assessed in 2,782 young adults (age 17 to 30 years). Only 36% of the sample reported that they were completely free of any sleep disturbance. The data suggest that the various sleep complaints are relatively independent, with low intercorrelations. There were significant sex differences for some problems. Women were more likely to have nightmares, delayed sleep onset and frequent night wakenings, while males were more likely to engage in day napping. These data provide a measure of the prevalence of common sleep disorders and are presented in a format which should facilitate their use for comparative or normative purposes.

Keywords: sleep, insomnia, sex differences, hyperarousal.

Self-report measures of sleep disturbances have been used for many years and in many research contexts (e.g., Buysse & Reynolds, 1989; Hicks & Pellegrini, 1978; Lack, 1986). Such self-reports of sleep quality have proven to be capable of discriminating various clinical from normal populations. Thus differences in self-reported sleep patterns have been associated with depression (Reynolds & Kupfer, 1988), post-traumatic stress disorder (Inman & Silver, 1990; Ross & Ball, 1989), history of birth stress or pregnancy complications (Coren & Searleman, 1985), myocardial infarction (Falger & Schouten, 1988), anxiety (Blankstein & Flett, 1990; Ware, 1988), aging (Moran & Thompson, 1988; Vitiello & Prinz, 1988) and many other conditions.

Although attempts have been made to standardize self-report procedures for the determination of sleep disturbances and to determine their validity and reliability (e.g., Buysse & Reynolds, 1989; Espie & Lindsay, 1989), there have been remarkably few studies which have attempted to describe the prevalence of a range of self-reported difficulties in large samples. The few epidemiological studies of sleep disorders thus far conducted have usually focused on the prevalence of a single sleep disorder (e.g. Hicks & Mistry, 1990; Hicks, Pellegrini, Hawkins & Moore, 1978) or on one specific patient population (e.g., Zarcone, 1988; Pilowsky & Crettenden, 1985). One exception was a broadly based study by Bixler, Kales, Soldatos, Kales and Healey (1979) which looked at six sleep problems in a general population. Unfortunately, since the 1,006 subjects were spread out over the entire life span, the number of cases in each of the age categories was not very large.

In order to better understand the prevalence of self-reported sleep difficulties in specific psychological or clinical groups, it would be useful to have data from a large sample of a
typical segment of the population to serve as a comparison. A young adult sample would provide the most useful base of comparison, serving as a reference point to monitor aging related changes in the sleep patterns of the elderly. It would also serve as a reference standard against which early childhood patterns could be compared. To provide data on the prevalence of sleep problems for a number of sleep and arousal difficulties manifest in a young adult sample (age 17 to 30), the following study was conducted.

METHOD

The subject sample consisted of 2,782 individuals, between the ages of 17 and 30 years. There were 1,594 females and 1,188 males. Subjects were recruited from the general Vancouver Metropolitan Area (Canada) and from the campus of the University of British Columbia. Subjects responded to a solicitation for volunteers for a study pertaining to "individual health and life-style differences". All subjects were non-hospitalized volunteers, participated for no remuneration.

Self-reports were solicited for seven of the most typically reported sleep problems. Most of the items were taken from Coren (1990). All questions in this Sleep Disruption Inventory (SDI) dealt with specific sleep and arousal related behaviors which are easily observed by the individual. The subject simply has to report the relative frequency of such behaviors. Such item formats have previously proven to be much more reliable than more global questions when investigating a variety of behavioral problems not involving sleep (e.g., Coren & Hakstian, 1988, 1989, 1992).

In a printed questionnaire, subjects were asked about delayed sleep onset latency (Do you have difficulty falling asleep?), early wakening (Do you tend to awaken early and then lay in bed until the alarm goes off?), dream anxiety attacks (Do you have nightmares?), intermittent sleep (Do you tend to waken during the night?), disrupted sleep (Do you tend to be a restless sleeper?), morning fatigue or somnolence (Do you tend to wake up in the morning still tired?), and sleep-wake schedule disruption (Do you take daytime naps?). Subjects responded "Never (or almost never)," "Seldom," "Occasionally," "Frequently," or "Always (or almost always)". Sleep items presented in this format have been shown to be sensitive enough to detect differences in sleep patterns associated with birth stress (Coren & Searleman, 1985) and differences in sleep associated with laterality patterns (Coren & Searleman, 1987). The sleep items were embedded in a larger health related questionnaire.

RESULTS AND DISCUSSION

Prevalence of Sleep Problems

Data on the prevalence of each of the seven common sleep disturbances measured is presented in Table 1 with separate tabulations by sex.

In order to specify the prevalence of a sleep or arousal related problem, we must first decide how frequently the disturbance must occur before it is classified as a real difficulty. For some purposes it might be useful to only classify individuals as having difficulty if the sleep disturbance is frequent, for other questions occasional difficulties are important, and certain research questions might also focus on individuals who never report particular difficulties. Since it was felt that various researchers might wish to use different criteria, the prevalence data is shown in the form of cumulative percentages in Table 1. Thus for the
TABLE I
Cumulative Percentage of 2,782 Individuals (1,594 Women, 1,188 Men) Reporting Various Relative Frequencies of Sleep Difficulties. Parenthesized Percentage in the “Never” Category is the Single Cell Value for this Response Category. Asterisks Indicate a Significant Sex Difference

<table>
<thead>
<tr>
<th>Problem Frequency</th>
<th>Delayed Sleep Onset*</th>
<th>Wake Frequently***</th>
<th>Early Final Wakening</th>
<th>Day Napping**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Always</td>
<td>3.0</td>
<td>2.5</td>
<td>2.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Frequently</td>
<td>17.3</td>
<td>13.1</td>
<td>13.4</td>
<td>9.0</td>
</tr>
<tr>
<td>Occasionally</td>
<td>50.7</td>
<td>48.7</td>
<td>37.4</td>
<td>30.4</td>
</tr>
<tr>
<td>Seldom</td>
<td>86.8</td>
<td>87.1</td>
<td>78.8</td>
<td>76.2</td>
</tr>
<tr>
<td>Never</td>
<td>(13.2)</td>
<td>(12.9)</td>
<td>(21.2)</td>
<td>(23.8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problem Frequency</th>
<th>Nightmares***</th>
<th>Disrupted Sleep</th>
<th>Wake Tired</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Always</td>
<td>0.4</td>
<td>0.2</td>
<td>3.1</td>
</tr>
<tr>
<td>Frequently</td>
<td>4.5</td>
<td>1.7</td>
<td>13.4</td>
</tr>
<tr>
<td>Occasionally</td>
<td>22.8</td>
<td>13.4</td>
<td>37.2</td>
</tr>
<tr>
<td>Seldom</td>
<td>71.3</td>
<td>62.6</td>
<td>75.2</td>
</tr>
<tr>
<td>Never</td>
<td>(28.7)</td>
<td>(37.4)</td>
<td>(24.7)</td>
</tr>
</tbody>
</table>

Sex differences: *p < .05   **p < .01   ***p < .001.

problem of “delayed sleep onset” the percentage of females in the sample reporting that they “always” suffer from the problem is 3.0%, the percentage indicating that they “frequently” or “always” had delayed sleep onset (cumulating the two categories) is 17.3% and so on down the column. The percentage of individuals reporting that they “never” have the problem is presented in parentheses to indicate that it is a raw percentage, rather than the final cumulation (100%), thus 13.2% of the females report never having delayed sleep onset.

Looking at Table 1, it is clear that if we define a sleep problem as any item which subjects indicate occurs “frequently” or “almost always”, the most common problem in this population is morning fatigue, with 46.5% of the total population reporting that they awaken in the morning still tired. The problem with the lowest prevalence in this sample is dream anxiety, with only 3.2% of the total sample reporting frequent nightmares. The five other problems all have incidence rates of between 11 and 20 percent.

An alternate way of looking at the prevalence of sleep difficulties is to count the number of specific problems that any individual is apt to have. Using “frequently” or “almost always” as our cut-off again, we get the cumulative distribution of problems shown in Table 2. Notice that approximately 34% of the sample reports no sleep disturbances according to our criteria. Similarly, less than 2% of the sample show more than 4 problems.

Sex Differences in Sleep Disruption

A glance at Table 1 shows that there appear to be differences between males and females in the distribution of common sleep disturbances. Based upon overall Chi Squared measures, females are significantly more likely to complain of delayed sleep onset, frequent night wakenings and nightmares, while males are more likely to engage in day napping.

From the simple tabulations, however, it is somewhat difficult to get a feel as to the magnitude of these differences. One way in which we can assess these differences is to use the epidemiological measure of Relative Risk (RR). In this instance this would actually be a ratio of the prevalence of any particular problem in males compared to females. Using the same definition of the existence of a problem that we used above (namely if an individual
TABLE 2
Cumulative Percentage of Individuals Reporting Various
Numbers of Sleep Problems with an Incidence of “Always”
or “Frequently”

<table>
<thead>
<tr>
<th>Number of Sleep Problems Reported</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>34.6%</td>
<td>34.4%</td>
</tr>
<tr>
<td>1</td>
<td>66.7</td>
<td>69.1</td>
</tr>
<tr>
<td>2</td>
<td>85.9</td>
<td>87.6</td>
</tr>
<tr>
<td>3</td>
<td>93.2</td>
<td>96.1</td>
</tr>
<tr>
<td>4</td>
<td>98.1</td>
<td>98.4</td>
</tr>
<tr>
<td>5</td>
<td>99.6</td>
<td>99.6</td>
</tr>
<tr>
<td>6</td>
<td>99.9</td>
<td>99.9</td>
</tr>
</tbody>
</table>

Sex difference significant with p < .05.

responds that they “always” or “frequently” suffer from the complaint) we can compute the relative risk for those problems in which we find significant sex differences. For delayed sleep onset RR = 1.38. To understand the size of this difference, it means that females are 38% more likely to suffer from this problem. The sex difference is larger for frequent wakenings with RR = 1.56 and the disturbance which produces the largest relative effect in women is the appearance of nightmares with RR = 2.68.

The one condition which males displayed to a greater extent than females is day napping. Here the sex difference was somewhat smaller in magnitude than any of the others, with RR = 1.26 meaning that males were 26% more likely to take naps during the day.

Returning to Table 2, then, it is not surprising to find that there is a global sex difference in terms of prevalence of sleep problems with females showing somewhat greater problem frequency. For example, 6.8% of the females in the sample show more than 3 sleep disturbance problems, while only 3.9% of males do. The overall difference between males and females is statistically significant with \( X^2(7) = 15.98, p < .05 \).

**Inter-relationship Among Sleep Disturbances**

There is a natural tendency to view various sleep disturbance symptoms as inter-related along some underlying dimension. This dimension might reflect a broad physical or psychological problem, perhaps something like hyperarousability (see Coren, 1990). If this is true, then subjects who report one particular problem should also be more likely manifest the other aspects of sleep disturbance. Looking at Table 2, however, there is a hint that the degree of inter-relationship among sleep problems might be low. This is because only about 5% of the sample complain of more than three of the seven sleep problems assessed. We must recognize, however, this pattern might be different if a more lax criterion had been used to dichotomize subjects into those with and without problems.

To better assess the relationship among aspects of self-reported sleep disturbance, the subjects’ responses were recoded to reflect the degree (relative frequency) of sleep disruption. For each item in the SDI, “Never” was encoded as 1 up through “Always” encoded as 5, so that higher numbers mean more frequent sleep difficulty. Table 3 presents the Pearson Product moment correlations among the various self-reported sleep problems coded in this manner. Looking at the table we first note that virtually all of the correlations are statistically significant (with \( p < .001 \)). This is not particularly surprising given the current sample size of 2,782. The only non-significant correlations are between daytime napping versus both delayed sleep onset and early final wakening, and between early final wakening and morning fatigue.
The surprise in Table 3 is not the number of significant correlations, but the low level of association shown by the correlations that are present. Of the 21 correlations, only three account for more than 10 percent of the predictive variance (i.e., \( r > .33 \)). These three are between delayed sleep onset versus both intermittent sleep (frequent night wakenings) and disrupted sleep (restless), and between disrupted sleep and intermittent sleep. Even among these three largest relationships, none of the correlations is larger than 0.45 (which would account for 20% of the variance), suggesting that the degree of association among the various sleep problems assessed here is quite low.

### GENERAL DISCUSSION

Analysis of the data in this sample allows us to make some interesting generalizations about the prevalence of self-reported sleep disturbances in a young adult population. To begin with, the number of individuals with none of the seven sleep problems assessed here is relatively low, amounting to only about one third (35.5%) of the sample. On the other hand, only about one third of the sample (32.1%) reports that more than one aspect of sleep disturbance is present “frequently” or “always”. The most common problem is morning fatigue (46.5%), the least common is nightmares (3.2%) with the other five sleep difficulties manifesting a prevalence of around 15%.

Generally speaking, women manifest a higher frequency of self-reported sleep difficulty. In terms of relative risk, women are 168% more likely to have nightmares, 56% more likely to have frequent night wakenings and 38% more likely to have delayed sleep onset. Only in the realm of the sleep-wake schedule, specifically daytime napping, are men 26% more likely to show deviations from the norm.

Finally, the evidence presented here suggests that the various sleep and arousal difficulties measured here are relatively independent of one another, with low correlations between items. This would be consistent with the hypothesis that various sleep problem symptoms assessed here are the consequence of different underlying mechanisms.

At the methodological level, the relative independence of the various sleep problems suggest that the Sleep Disruption Inventory should not be considered as a unidimensional scale which might be used to generate a number indicating the graded level of “sleep disturbance”. Rather it should be viewed as a listing of common self-reported symptoms of sleep and arousal problems, with a known prevalence rate.

It is hoped that the data provided here may prove to be a useful indication of the distribution of sleep difficulties in North American, young adults. The size of the sample is sufficiently large to provide a degree of stability and should allow various generalizations and comparisons to be made given data from responses on these items obtained from other
groups. The data presented here could potentially be used to assess the degree of elevation of specific sleep and arousal problems in specific clinical groups, or in other age groups, using the present sample as a reference or control group. Of course, for such comparisons to be valid, the item wordings and response alternatives ought to be the same as those described in the method section of the present study. The seven items which make up the SDI are sufficiently brief and self-explanatory so that they can easily be incorporated into existing inventories or with other measures, to allow a quick assessment of the prevalence of sleep difficulty in any targeted group.

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REFERENCES


