

Professional Correlates of Insomnia

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Study Objectives: Insomnia is a highly prevalent disorder that affects daytime functioning, behavior, and quality of life. Several reports have shown that insomnia impacts on the workforce and is associated with an increased risk of absenteeism. However, few workplace studies have been performed. Our study attempted to evaluate the professional correlates of insomnia by comparing a group of workers with insomnia to a matched group of good sleepers. The main objective measure was absenteeism. Accidents, self-esteem at work, job satisfaction, and efficiency at work were also investigated.

Design: Pairs of workers with insomnia (according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition definition) and good sleepers, matched by age, sex, and occupational status, were interviewed by their occupational physician and also answered a self-administered questionnaire on work-related criteria. Objective data on absenteeism (number of days absent from work) were provided by the employers' health resource databases.

Setting: Paris and the Ile de France region (France).

Measurements and Results: Seven hundred eighty-five subjects completed the questionnaire. We retained 369 pair (ie, 738 subjects) for analysis. Insomniacs missed work twice as often as good sleepers. The difference between insomniacs and good sleepers in terms of absenteeism was particularly high for blue-collar workers (odds ratio = 3.0) and men (odds ratio = 2.31). Insomniacs had also a higher accident rate while driving and, strikingly, a 3-fold greater risk of having 2 or 3 serious road accidents. They also reported poor self-esteem at work, less job satisfaction, and less efficiency at work, compared with good sleepers.

Conclusions: Our study found an objective increase in absenteeism in insomniacs compared with good sleepers.

Keywords: Insomnia, occupation, absenteeism, professional advancement.

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INTRODUCTION

INSOMNIACS ARE FREQUENTLY CONSIDERED AS MERELY POOR SLEEPERS, INDEPENDENT OF THE DAYTIME CONSEQUENCES OF THEIR CONDITION.¹ Nevertheless, insomniacs themselves commonly complain of impaired daytime functioning and cite feelings of fatigue and sleepiness and an increased risk of making mistakes.²⁻⁵ Even though international sleep disorder classifications^{6,7} do indeed include daytime consequences in the definition of insomnia, there is controversy over the true impact of insomnia on the daily lives of sufferers. Objective studies in insomniacs (using cognitive test batteries and Multiple Sleep Latency Tests) have not demonstrated a short-term increase in sleepiness or decreased daytime performance after a night of poor sleep.^{2,8,9} However, it has been clearly demonstrated that subjective sleepiness is not always associated with objective measures but is significantly associated with worse mood and performance.^{10,11}

As a long-term issue, insomnia may affect daytime behavior. It seems probable that insomnia impacts on sick days and other indicators of workplace productivity. Several preliminary studies

have suggested that insomniacs report more absenteeism at work than do persons who sleep well.¹²⁻¹⁴ Kupperman et al¹⁵ have reported that workers with sleep problems have poorer self-ratings for job satisfaction and job performance. The Johnson and Spinweber study¹⁶ in naval recruits also suggests a negative impact of insomnia on the likelihood of promotion recommendations and the pay grade attained. In general, however, there are few studies on this subject, and those that have been published tend to have involved insomniacs in the general population rather than a professionally active group.

At a collective level, the impact of insomnia is far from negligible. Insomnia is highly prevalent in many countries.^{1,17} The quality of life of insomniacs is impaired,¹⁸⁻²² and the direct costs of insomnia in the United States and France have been evaluated^{23,24} and classified as major burdens on society. Direct costs reflect charges for medical care or self-treatment that are borne by patients, the government, healthcare providers, or insurance companies. Indirect costs correspond to patient- and employer-borne costs that result from insomnia-related morbidity and mortality. These latter costs are, however, difficult to assess in the absence of prospective studies comparing insomniacs and good sleepers. In retrospective studies, it is difficult to know whether insomnia is a cause or a consequence of poor health condition. The World Health Organization international conference on insomnia emphasized that direct costs probably reflect only a relatively minor portion of the total economic costs of insomnia.³ An important proportion of these costs appears to concern the workplace costs of insomnia from the employer's perspective. The impact of insomnia on workplace productivity is a crucial point that needs to be clarified to better understand the indirect costs of this condition.

We therefore decided to conduct a study specifically designed to explore the professional consequences of insomnia in a wide group of workers with insomnia and matched good sleepers. The main goal of our study was to compare the 2 groups in terms of

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absenteeism. Secondary goals were to compare accidents, job satisfaction, self-esteem, and efficiency at work in the 2 groups.

METHODS

Subjects and Controls

To tackle the relationship between insomnia and professional activity, we selected insomniacs in real working life, with the help of occupational physicians. In France, occupational medicine is established by law and is obliged to monitor all salaried employees. Each worker has to visit an occupational physician at least once a year. In companies with more than 800 employees, the physician is directly assigned to the employer, and visits take place at the work site or sites. Smaller companies are affiliated with occupational medicine visiting centers, in which several doctors monitor the employees of many different employers. In such centers, each occupational physician surveys an average of 2000 to 2500 employees per year. We decided to concentrate our study on a highly economically developed part of France: the Paris Ile de France region (PIDFR). PIDFR includes 11 million inhabitants and 6.5 million workers, with most of them (81.5%) working in the tertiary sector (service sector).²⁵ In 2001, PIDFR had the highest regional gross domestic product in the whole of Europe (362,117 million euros).²⁵

We first sent an announcement explaining the aims of the study to a group of 1615 occupational physicians in the PIDFR. In the letter, we explained the impact of insomnia on public health and the need to better understand the occupational consequences of insomnia. We also specified that participation in the study was linked to a possible direct access to the statistics of absenteeism of workers. We received 742 answers (response rate, 46%), and 200 of these physicians agreed to participate in the study (12%). Thirty-two physicians were then randomly selected from this group and invited to a meeting where they received information about insomnia, sleep disorders, and the study's inclusion and exclusion criteria, ethical rules, and methodology. Finally, 26 physicians were in a position to select subjects and controls (the remaining 6 had no access to objective absenteeism data).

This group of 26 occupational physicians was responsible for monitoring (on a yearly basis) a total of about 60,000 workers in companies that were representative of the economic fabric of the PIDFR (80% from the service sector and 80% from small-[fewer than 50 workers] and medium-size [fewer than 1000 workers] companies). Each physician was requested to select a similar number of insomniacs and good sleepers (an average of 26 subjects per physician). The physicians then approached all employees sequentially until 13 insomniacs and 13 matched good sleepers had been selected for a total of 26 subjects per physician. Employees were recruited among those who were coming for their annual medical check-up. Subjects were matched for age, sex, occupational category (manager, white collar, and blue collar), and type of employer (public or private sector). The insomniacs were selected according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition definition, with a 1-month reference period.⁶ Subjects were only included if they had had a history of insomnia over at least the previous 2 years. Employees were only included in the study if they had worked for the same employer for at least the last 2 years. Physicians and subjects then each had to complete a questionnaire. The goal of the physician questionnaire was mainly to check inclusion and ex-

clusion criteria and to describe comorbidities and the length and causes of absenteeism. The goal of the subject questionnaire was essentially to describe the work content and to assess the impact of insomnia on professional life.

The study was presented by the occupational physician to the host company's management team and union representatives and was also approved by the local ethics and technical committee. Questionnaires were processed anonymously, and personal information concerning employees was never passed back to the employer. The participants were informed about the aims and characteristics of the survey and gave their written informed consent to participate. The study was carried out in accordance with the current version of the Declaration of Helsinki.

METHODS

The Physician Questionnaire

The physicians had first to note the subject's age, sex, and marital and parental status and to check the inclusion criteria.

Inclusion Criteria

Insomniacs and controls were included in the study if they were between 18 and 65 years of age, were working at least 28 hours per week (80% of the official, full-time working week in France), had been at the same company for at least 2 years, and belonged to 1 of the following 3 professional categories: blue-collar workers, white-collar workers, or managers. Next, the physicians had to check whether the subjects were insomniacs or good sleepers. Insomnia was assessed according to a questionnaire previously used in epidemiologic surveys^{26,27} and that follows the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* definition of insomnia.⁶ Insomniacs were categorized as having at least 1 sleep complaint (from a list notably including nonrefreshing sleep, early awakening, and difficulties initiating or maintaining sleep) at least 3 times a week for at least 1 month and that had consequences on daytime functioning. The individuals were only included in the study if they had complained of insomnia for at least the previous 2 years. Good sleepers were defined as persons not having experienced any sleep difficulties for at least the previous 2 years.

Exclusion Criteria

The exclusion criteria were also checked by the occupational physicians. Subjects working less than 28 hours a week, aged younger than 18 years or older than 65 years, or working at their present company for less than 2 years were excluded. To accurately gauge the effect of insomnia on professional activity, we sought to eliminate pregnant subjects or those with chronic physical or mental disease—conditions that might have affected these workers' daily lives too dramatically. Hence, we excluded subjects with an absence of more than 3 consecutive months in the previous 3 years. It is indeed usually admitted in this country that 3 consecutive months of absence is a reasonable limit to define chronic diseases. We therefore considered that subjects with more than 3 months of absence were more likely to have an impact of the disease itself than an absence due to insomnia. Women who had been pregnant at any point in the previous 2 years were also excluded. Finally, subjects with anxiety and depression (identified on the basis of their medical history and current treatments) were

excluded from the study. Occupational physicians interviewed the subjects about current symptoms and treatments, including psychiatric treatments; subjects with a history of (or treated for) nonresolved depression or anxiety were excluded from the study. The main study criteria were the number and duration of absences in the 2 years preceding the visit. Absenteeism data were provided by the employer's human resource department. Occupational physicians usually have access to this database: as noted above, they were not allowed to participate in the study if this was not the case. The cause of each absence was also noted (using the International Classification of Disease) with the subject's help. On-going drug treatments were also reported.

The Subject Questionnaire

The participants also had to fill in a self-administered questionnaire. In the first section, the diagnosis and the severity of insomnia were assessed using the Pittsburgh Sleep Quality Index Scale (PSQI)²⁸ and the Spiegel Sleep Inventory (SSI).²⁹ The PSQI contains 19 self-rated questions and 5 questions rated by the bedpartner or the roommate (if one is available). Only self-rated questions are included in the scoring. The 19 self-rated items are combined to form 7 components scores, each of which has a range of 0 to 3 points. In all cases, a score of 0 indicates no difficulty, whereas a score of 3 indicates severe difficulty. The 7 component scores are then added to yield 1 global score, with a range of 0 to 21 points, with 0 indicating no difficulty and 21 indicating severe difficulties. Psychometric studies support the reliability of internal consistency and construct validity. Cronbach α were 0.80 across groups, and correlation between global and component scores were moderate to high. PSQI scores were moderately to highly correlated with measures of sleep quality and sleep problems and poorly correlated with unrelated constructs. Individuals with sleep problems, poor sleep quality, and sleep restlessness had significantly higher PSQI scores in comparison with individuals without such problems. The SSI is a self-administered miniquestionnaire that inquires about the previous 2 nights via 6 questions on sleep initiation, quality, and length; nocturnal awakenings; dreams; and feeling refreshed in the morning. Each question has a 0 to 5 score. A total score higher than 18 indicates sleep problems, whereas 24 and higher corresponds with severe sleep problems. There are fewer data available on the psychometric validity of the SSI; however, it is a very simple and easy-to-use scale, which we used to assess the presence of insomnia in the nights preceding the survey.

The second section included 18 items and self-anchoring (visual analog) scales investigating the professional correlates of insomnia, in which 0 was defined as the worst possible work condition and 10 as the top work condition for the job in question. These items were principally inspired by the World Health Organization Health and Work Performance Questionnaire and the Work Productivity Short Inventory (WPSI) and focused on self-esteem at work, job satisfaction and work performance and efficiency.^{30,31} We used the Health and Work Performance items for reduced work performance and work-related accidents and the Work Productivity Short Inventory items on job satisfaction, incidents (errors at work), and efficiency. However, we have never used or validated these items in previous studies. The reference period adopted depended on the item in question. For example, efficiency at work was estimated at the moment of the study, whereas

job satisfaction was assessed over the previous few years. Visual analog scales are 10-centimeter scales that permitted the subject to calculate a score based on the self-evaluation. The reference (0) was usually given the negative feeling: (i.e., "I am very badly paid for my job"), and the end (100), the positive feeling (i.e., "I am particularly well paid for my job").

This section also included a description of the job's characteristics: e.g., work schedules, driving while working, social insurance coverage, transportation mode, and time spent commuting between home and work. One part of the questionnaire included queries about automobile accidents and sleep-related accidents. Subjects were asked about their driving habits (annual mileage for personal and professional reasons) and answered the following questions: "Did you have minor accidents while driving in the last 12 months?" (Yes or No; if Yes, how many [1, 2 or 3, more than 3]), "How many at work or driving to or from work? (0, 1, 2 or 3, more than 3)", "How many were your fault?" (0, 1, 2 or 3, more than 3) and, "Did you have serious accidents while driving in the last 12 months (with the same items + How many times did you stop working after the accident work [0, 1, 2 or 3, more than 3, and how many days in total]).³² Work-related accidents were asked using the same questions, and errors at work were assessed by the item: "Did you make severe errors at work in the last 12 months?" (Yes or No; if Yes, how many [1, 2 or 3, more than 3]).

Statistical Analysis

The approximate number of subjects needed to show a difference was calculated on the basis of an α risk of .05 and a power (1- β) of 0.80. This yielded the number of 393 employees for each group, with an estimated 2% dropout rate. We therefore calculated that we needed to select 2 groups of 400 subjects, i.e., 400 insomniacs and 400 good sleepers.

The goal was to assess a small size effect ($\Delta/\Sigma = 0.2$). For monovariate analyses, quantitative data were compared using the Student *t* test or, when the data compared did not have a normal distribution, the Wilcoxon test. Within-group odds ratios (OR) were also calculated for absenteeism and accidents. The Fisher exact test and χ^2 were applied to qualitative data. Factorial analyses were also used to test the relationship between absenteeism and other variables. SAS v8.2 software (SAS Institute, Inc., Cary, NC) was used for all statistical analyses.

In the first step, we made a simple description of the study population: the observed characteristics of the subjects included in the total group and in each of the 2 subgroups (insomniacs and good sleepers). The descriptive statistics included continuous data, the total number of subjects considered, the number of missing data, and the mean and SD for each variable. In the second step, we tested the differences between the 2 groups for several select variables. The main criteria were absenteeism and the average number of days absent from work. Within-group OR were shown in the results to better enhance and clarify the relative risk due to insomnia on absenteeism and accidents.

RESULTS

Seven hundred eighty-five subjects completed the questionnaire. Fifteen did not meet the inclusion and exclusion criteria, and matched controls were not available for 32 subjects with in-

somnia. Finally, data from 369 pairs (738 subjects) were retained for analysis.

Sociodemographic Data

Of the 738 subjects, 470 (63.7%) were women, and the average age was 43.8 ± 8.9 years; 228 were managers (30.9%), 478 white-collar workers (64.8%), and 32 blue-collar workers (4.3%). One hundred ninety subjects (26.0%) were not married and lived alone, 107 (14.7%) were not married but cohabited, and 413 (56.6%) were married. Twenty individuals (2.7%) were widowed. Due to the matched nature of this study, there were no differences between the 2 groups in terms of sex, age, caretaker responsibilities, and socioprofessional category (i.e., there were 63.69% women in the insomnia group and 63.69% in the good-sleeper group [χ^2 , $p = 1$], the average age was 44.01 years for insomniacs and 43.53 for good sleepers [analysis of variance $p = .459$], the marital status of insomniacs and good sleepers was not significantly different [χ^2 , $p = .206$], and the number of children at home was also not different [χ^2 , $p = .481$]). We also checked that there were no significant differences between the 2 groups regarding transportation time, the size of the companies, the existence of risk at work, the schedule variability, and the seniority of the subjects in the same job and in the same company.

Insomnia

The 369 insomniacs were selected according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* definition. The diagnosis of insomnia was, however, cross-checked with the results of 2 questionnaires.

The total SSI score in the insomniacs was 17.4 ± 3.6 versus 25.2 ± 5.7 in good sleepers for the night before the questionnaire ($p < .001$) and 16.2 ± 3.8 versus 25.2 ± 4.5 for the second to the last night before the questionnaire (Wilcoxon, $p < .001$).

The PSQI score differed significantly between insomniacs (11.7 ± 3.0) and good sleepers (4.1 ± 1.8) ($p < .001$), which allows us to affirm that we correctly selected 2 different groups in terms of insomnia status (Wilcoxon, $p < .001$).

Professional Activity

The vast majority of the study population (359 subjects, 49.0%) worked in companies with more than 500 employees, with 167 (22.9%) in companies with 101 to 500 employees, 89 (12.2%) in companies with 21 to 100 employees, 79 (10.8%) in companies with 5 to 20 employees, and 38 subjects (5.2%) in companies with fewer than 5 employees. Subjects and controls had held the same occupation for an average of 86.9 ± 89.1 months and had been working in the same company for an average of 16.4 ± 10.1 years. We did not have a means of determining whether this job distribution is representative of the industrial fabric of the PIDFR. Nevertheless, the 2 groups did not differ in this respect.

Comorbidities

The difference of the absenteeism rate between insomniacs and good sleepers could be explained by a difference of comorbidity within the 2 groups. This is why we compared the comorbidities in the 2 groups, based on the main categories of treatments used by the subjects. The results are shown in Table 1. We found no dif-

Table 1—Main Categories of Current Drug Treatments in Insomniacs and Good Sleepers

Medical Condition Currently Treated With Medication	Subjects, no. (%)		p value ^a
	Good sleepers n = 369	Insomniacs n = 369	
Digestive tract and metabolism	19 (5.1)	26 (7.0)	.282
Cardiovascular system	41 (11.1)	49 (13.3)	.368
Genitourinary system and sex hormones	43 (11.6)	45 (12.2)	.820
Musculoskeletal system	5 (1.4)	7 (1.9)	.560
Nervous system	3 (0.8)	44 (11.9)	< .001
Respiratory system	9 (2.4)	14 (3.8)	.290
Systemic hormone preparations excluding sex hormones	7 (1.9)	17 (4.6)	.038

^aThe χ^2 test was used to test the difference between the groups. Treatments with fewer than 5 subjects per each group are not shown.

ference between the 2 groups regarding rates of subjects currently taking medication for the treatment of digestive and metabolic, cardiovascular, genitourinary, musculoskeletal and respiratory disorders or the use of sex hormones. Insomniacs were more likely to be taking medications that act on the central nervous system (11.9% vs 0.8%; χ^2 , $p < .001$) and systemic hormone preparations (4.6% vs 1.9%; χ^2 , $p = .038$).

Absenteeism at Work

The results for absenteeism in the 2 groups are given in Table 2. Considering the percentage of subjects with at least 1 work absence in the last 2 years, insomniacs had an almost 2-fold higher rate of absenteeism than did good sleepers: 50% of insomniacs and 34% of good sleepers had an absence during this period (OR = 1.93). The difference between insomniacs and good sleepers was particularly marked for blue-collar workers (64% of insomniacs versus 38% of good sleepers [OR = 3.0]). In managers, 40% of insomniacs versus 23% of good sleepers had at least 1 absence (OR = 2.29), and, in white-collar workers, 54% versus 40% (OR = 1.77).

There was also a significantly different absenteeism rate between insomniacs and good sleepers in both sexes: insomniac men, 44%, versus 25% of good sleepers (OR = 2.31); insomniac women, 55%, versus 40% of good sleepers (OR = 1.89). The difference between the 2 groups in regard to average duration of absenteeism in the past 2 years was confirmed, with an average 11.65 ± 22.26 days of absence in the insomnia group versus 4.84 ± 10.38 days in the good-sleeper group (Wilcoxon, $p < .001$). The duration of absence was significantly longer in women and managers with insomnia but was not significantly different in the other subgroups (white-collar and blue-collar workers and men).

Transportation

For the study population as a whole, 169 subjects (22.9%) had to drive as part of their work activities, but only 3% of the total sample drove a truck. Eighty-three subjects (51.2%) had to drive at work every day, with 28 (17.3%) driving 2 to 3 times a week, 19 (11.7%) once a week, and 32 (19.8%) less than once a week.

In terms of travel to work, 114 (15.4%) subjects took the train,

Table 2—Absenteeism at Work

Subjects	Insomniacs, n = 369	Good sleepers, n = 369	p value	Odds ratio (95% CI)
Total	50	34	< .001	1.93 (1.44-2.61)
Managers (n = 114 pair)	40	23	< .001	2.29 (1.29-4.07)
White-collar workers (n = 251 pair)	54	40	< .001	1.77 (1.24-2.56)
Blue-collar workers (n = 14 pair)	64	38	< .001	3.0 (0.68-13.31)
Women (n = 235 pair)	55	40	< .001	1.89 (1.31-2.72)
Men (n = 134 pair)	44	25	< .001	2.31(1.38-3.88)
Duration of absenteeism in the last 2 years ^b				
Total	11.65 ± 22.26	4.84 ± 10.38	< .001	
Managers (n = 114 pair)	8.25 ± 19.24	3.19 ± 8.57	< .001	
White-collar workers (n = 251 pair)	13.18 ± 23.79	5.53 ± 13.18	< .001	
Blue-collar workers (n = 14 pair)	13.06 ± 16.01	6.31 ± 12.93	< .001	
Women (n = 235 pair)	12.21 ± 20.68	5.41 ± 10.40	< .001	
Men (n = 134 pair)	10.68 ± 24.83	3.84 ± 10.30	< .001	

^aThe χ^2 test was used to test the difference between these qualitative variables, and within-group odds ratios were also calculated to better enhance the relative risk of being insomniac.

^bThe mean ± SD duration of absenteeism (total number of days absent) by category was compared between the 2 groups using the Wilcoxon test. CI refers to confidence interval.

347 (47.0%) took a bus, 325 (44.0%) drove a car, 207 (28.0%) walked, and 32 (4.3%) had other means of transportation. The average total time spent commuting to and from work was 66.9 ± 46.1 minutes per day. There were no significant between-group differences concerning driving habits at work or driving to work. Insomniacs drove an average of 3244 ± 6437 km for professional purposes, versus 3728 ± 7413 km for good sleepers (Wilcoxon, $p = .989$) and 8948 ± 11509 km for personal purposes, versus 8955 ± 13735 km for good sleepers (Wilcoxon, $p = .725$). Thus, we did not observe any differences between the 2 groups in terms of overall driving habits (annual mileage).

Accidents

Table 3 indicates the proportion of subjects reporting a minor or a major accident in the last 12 months. For minor accidents, there was no difference between the groups, except that insomniacs were more likely to report several minor accidents (2 or 3) than good sleepers (17 [31.5%] vs 7 [14.9%], $\chi^2 = .051$, OR = 2.48). For major accidents, insomniacs had a higher accident rate and a 3-fold higher risk of having 2 or 3 serious major accidents (OR = 3.08) (but there was no significant difference between insomniacs and good sleepers, 22 [6.4%] vs 13 [3.6%], $\chi^2, p = .593$, due to the small sample size). Fifty percent of the good sleepers involved in a serious accident said they were responsible, versus 45.4% of the insomnia group ($\chi^2, p = .800$). Conversely, insomniacs reported a longer absence at work after these accidents than good sleepers: 34.4 ± 34.3 days for insomniacs versus 4.0 ± 1.0 for good sleepers (Wilcoxon, $p = .068$).

Errors at Work

Forty-four percent of insomniacs (vs.31.3% of good sleepers; $\chi^2, p < .001$) remembered having made errors at work (and that might have resulted in serious consequences) over the last 2 years (OR = 1.72). For 29.3% of insomniacs versus 23.8% of good sleepers, these errors occurred more than 3 times during the previous 2 years. This difference was not significant ($\chi^2, p = .35$).

Table 3—Minor and Serious Driving Accidents in the Previous 12 Months Among Insomniacs and Good Sleepers

Accident in previous 12 months	Insomniacs n = 369	Good sleepers n = 369	p value ^a	Odds ratio (95% CI)
Minor				
Total	54	47	.328	1.17 (0.77-1.78)
Number of accidents	37	40	.752	1.11 (0.69-1.78)
1	17	7	.051	2.48 (1.01-6.06)
2 or 3	26	19	.842	1.40 (0.76-2.58)
At work	26	20	.839	1.32 (0.72-2.41)
Serious				
Total	22	13	.096	1.74 (0.86-3.51)
Number of accidents				
1	19	12	.075	1.62 (0.77-3.39)
2 or 3	3	1	.593	3.08 (0.32-29.75)
At work	13	8	.850	1.65 (0.68-4.03)
Due to own fault	12	6	.800	2.03 (0.75-5.47)
Leading to absence at work	6	3	.721	2.02 (0.50-8.14)

CI refers to confidence interval.

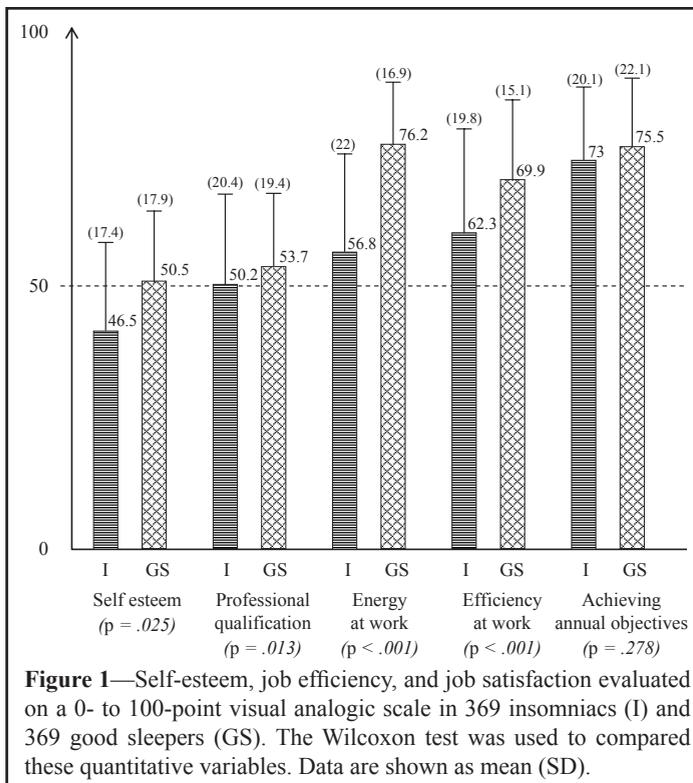
Self-esteem, Job Satisfaction and Efficiency at Work

Self-Esteem

Of the insomnia group, 20.4%, versus 15.3% of good sleepers ($\chi^2, p = .046$), considered that their professional qualifications were undervalued by their employer. When subjects evaluated their potential ability to work in a more responsible post than their current position, the insomnia group scored an average of 46.5 ± 17.4, versus 50.5 ± 17.9 for good sleepers ($\chi^2, p = .025$) (Figure 1, item 1).

Professional Training

Of insomniacs, 50.9%, versus 63.7% of good sleepers, ($\chi^2, p < .001$) stated that they had received sufficient training at work over the previous 5 years. The insomniacs estimated their knowledge



DISCUSSION

Even though there is broad consensus on the fact that daytime impact is a major criterion in the definition of insomnia,^{6,7} the precise nature of this impact remains subject to debate. In a review of insomnia and daytime functioning, Riedel and Lichstein suggested that the lack of objective findings in the literature might be explained by (1) a focus on variables that are not impaired (rather than areas of actual impairment) and (2) methodologic problems (such as nonhomogenous groups of subjects), which may have hidden actual differences between insomniacs and good sleepers.³³ Daytime sleepiness has received the most attention, but it is becoming clear that a large number of insomniacs are not sleepy during the day.^{2,5} Bonnet and colleagues⁵ have even used Multiple Sleep Latency Tests to demonstrate that insomniacs are more alert in the daytime than are good sleepers. However, the absence of an objective somnolence deficit does not mean that insomniacs are not impaired during the daytime.

Riedel and Lichstein³³ have also recommended using objective measures of work performance (e.g., absenteeism, promotion) to clarify the impact of insomnia on daytime functioning. Insomnia is not a visible handicap in the workplace, and it is difficult for insomniacs to explain to their colleagues and managers that they have had a poor night and that they need to rest. Insomniacs have to face a regular work load, and they often complain of difficulties in their professional life.^{8,9,20} However, there are few data assessing the true impact of insomnia on daily work. The goal of this study was to try to evaluate the impact of insomnia on absenteeism and other work measures in a real setting.

Absenteeism

The main goal of our study was to observe absenteeism. In economic and epidemiologic studies, overall measures of the respondent's health have appeared to be the most important covariate of absenteeism.^{14,34} Paringer³⁴ was one of the first to demonstrate that health variables are more strongly associated with absenteeism than are economic ones. In a large, cross-sectional, national probability sample of 1308 workers in the United States, Leigh¹⁴ demonstrated that complaining of insomnia was the most predictable factor of absenteeism from among 36 variables. In a study comparing 80 insomniacs at work with 135 good sleepers, it was found that insomniacs had double the control rate of absenteeism.¹⁹ However, these preliminary studies^{20,37,4,18,14,19,35} were based on general population samples; insomnia was not always clearly defined and the groups of insomniacs were heterogeneous. Moreover, the absenteeism data were mainly based on the patients' declaration and not on objective data.

In our study, insomniacs showed almost twice as much absenteeism as good sleepers. The difference between insomniacs and good sleepers was particularly high for blue-collar workers (OR = 3.0) and women (OR = 2.31). For managers, the OR was also high: 2.29. We believe that this study is of particular interest because (1) we processed objective (rather than subjective) data on absenteeism, (2) insomnia was defined according to international classifications, (3) subjects with depression and anxiety were excluded, (4) subjects were all full-time workers and representative of the active population in the area, and (5) subjects with chronic disease (which may interfere with sleep) and pregnant women

level at 53.70 ± 18.8 versus 57.9 ± 15.9 for good sleepers (Wilcoxon, $p = .002$) and, therefore, considered that they had received less knowledge at work than their colleagues.

Job Satisfaction

The insomnia group did not differ from the good-sleeper group in terms of opinion on the suitability of pay levels. When individuals rated their actual wage against what they thought they should receive, the insomnia group scored 41.6 ± 18.5 , versus 39.7 ± 18.2 for good sleepers (χ^2 , $p = .198$). However, 43.5% of insomniacs (vs 31.4% of good sleepers) considered that their career advancement had been blocked or was insufficient over the previous 5 years (χ^2 , $p = .004$). When they compared their actual professional qualifications to those they estimated to have, the insomniacs rated 50.2 ± 20.4 versus 53.7 ± 19.4 for good sleepers (Wilcoxon, $p = .013$) (Figure 1, item 2). Insomniacs also estimated that they had less energy at work than did good sleepers (56.8 ± 22.0 vs 76.2 ± 16.9 , Wilcoxon $p < .001$) (Figure 1, item 3).

Efficiency at Work

Of the insomnia group, 26.1% (vs 10.3% of good sleepers) estimated they were not efficient enough at work (χ^2 , $p < .001$). When rating their work efficiency, the insomniacs scored 62.3 ± 19.8 , versus 69.9 ± 15.1 for good sleepers (Wilcoxon, $p < .001$) (Figure 1, item 4). When rating their achievement of annual professional objectives, the insomniacs and good sleepers scores did not differ significantly (73.0 ± 20.1 versus 75.5 ± 22.1 , respectively, Wilcoxon, $p = .278$) (Figure 1, item 5).

Experience of unemployment did not differ significantly between the groups: 3% of the insomniacs versus 2.4% of good sleepers had been dismissed in the previous 5 years (χ^2 , $p = .421$), with an average duration of unemployment of 11 ± 4.9 months for the insomnia group versus 9 ± 5.3 months for the good-sleeper group (Wilcoxon, $p = .96$)

were excluded from the study. Hence, in the group studied here, it seems more probable that significant differences between insomniacs and good sleepers reflect the impact of insomnia itself, rather than the effects of comorbidities.

The small sample of blue-collar workers in our study has to be underlined. It was a surprise for us to see how rare blue-collar workers were in the population surveyed by occupational physicians. In the tertiary sector, mainly represented in the PIDFR, there was an overrepresentation on white-collar workers and managers, compared with the economic fabric of the country. However, even in a small group, we found significant differences between insomniacs and good sleepers. This is why we did not exclude blue-collar workers from our study.

In fact, there were few intergroup differences regarding comorbidities when we consider the medications taken on regular basis by our subjects during the study period (Table 1). Even though insomniacs took more nervous system medications than did good sleepers (which is perhaps not surprising), other medication patterns did not differ between the insomniac and good-sleeper groups. Several large-scale studies^{11-13,20,36-39} have demonstrated clinical correlates of insomnia. Recently, Katz et al³⁶ calculated the OR between patients with chronic diseases and complaints of insomnia. Severe insomnia was strongly linked to current depression (OR = 8.2), as well as to congestive heart failure (OR = 2.5), obstructive airway disease (OR = 1.6), and prostate problems (OR = 1.6). They also found that men with systemic hypertension, bronchitis, diabetes, or rheumatic diseases complained of sleep difficulties more than healthy men did ($p < .05$). In our study, there were no differences observed in the other-treatment categories (especially for cardiovascular disease). One explanation may be the exclusion of subjects with severe diseases and absenteeism (i.e., more than 3 consecutive months of absence in the last 2 years) from our group. Another possibility is that insomniacs with severe comorbidities may be sufficiently impaired to prevent them from working, which would thus have excluded them from our sample. However, understanding the impact of insomnia on other diseases is a very difficult field, and the present study did not generate enough data in this respect to allow us to draw conclusions.

Considering the extension of our results to other groups of insomniacs, one may argue that, even though this sample is probably representative of the Paris area, it may not be representative of insomniacs in general—in France or indeed in other countries. The PIDFR region is a highly economically developed part of Europe, with a high percentage of people working in the service sector, and is thus unlikely to reflect the general population of insomniacs. Housing (which is expensive), noise, and security problems may also impact sleep quality. The average time spent traveling to and from work was high in our sample (66.9 ± 46.1 minutes per day) and, thus, may impact sleep quality due to early awakening and fatigue. However, we found no statistical differences between the groups in terms of travel duration and conditions. Of equal importance, the potential influence of environmental and socio-cultural factors on absenteeism was not taken into consideration, although we can hypothesize that this influence is the same in insomniacs and good sleepers. As stated above, it has been demonstrated that health variables are more strongly associated with absenteeism than are economic ones,³⁴ and so we may assume that

the difference found in the Paris area would probably be the same in other groups. However, this remains to be established statistically.

Other Occupational Characteristics

The impact of sleep disorders on automobile accidents is a crucial issue from a public health point of view. However, this mostly reflects the risk due to sleepiness rather than the risk due to insomnia. Occupational accidents are also often due to sleepiness: a recent case-control study conducted on 880 male workers who had experienced at least 1 occupational injury over a 2-year period and 880 controls found that the presence of a sleep disorder was one of the most powerful independent factors in accidents in the construction industry.³⁶ In our study, we observed that there was no significant difference between the insomnia and good-sleeper groups for single minor accidents or for major and repeated (2 or 3) accidents. However, our sample only allowed a limited analysis of these features; admitting to having had recent accidents and errors is probably sometimes difficult.

Our findings also suggest that insomniacs are less satisfied with their jobs, compared with good sleepers. Here, insomniacs complained of lack of consideration at work and lack of professional training. They considered that their career advancement was blocked or insufficient and that they were not efficient enough at work. These difficulties in the workplace have also been emphasized by other authors in the same field (but with smaller samples); Lavie³⁵ has also reported lower job satisfaction and job productivity in insomniacs. The most original study on this point was conducted by Johnson and Spinweber,¹⁶ who demonstrated that insomniacs in the navy are slower at work and have poorer career advancement than do good sleepers. The difficulty of comparing the respective work of insomniacs and good sleepers is a major concern in the discussion of our results. We cannot be sure that the matched pairs of subjects had exactly the same kind of job during the day. In the future, one solution might be to take insomniacs and good sleepers who are performing a very similar task and to try to compare how impaired the 2 groups are. However, it is very difficult to assess these parameters in a real-life setting.

CONCLUSION

Our comparison between a large group of working insomniacs and matched good sleepers suggests that insomnia is a significant factor in absenteeism at work. Insomniacs also have the feeling that they are significantly impaired at work, compared with good sleepers. Elsewhere, we present estimates of the indirect costs of insomnia for this same study population. An additional step would be to better understand how insomnia itself affects work efficiency. It would also be interesting to compare the influence of insomnia with that of other chronic diseases with the type of instruments used here and to clarify how insomnia affects the risk of automobile and work accidents.

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