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Fatigue, insomnia and nervousness: gender disparities and roles of individual characteristics and lifestyle factors among economically active people

■ **Abstract** *Background* Individuals with certain personal, family and job characteristics are at elevated risk of poor mental health. Yet, the respective role of obesity, smoking, alcohol abuse, low education, income, living and family conditions, and socio-occupational category in fatigue/insomnia (FI), nervousness (N) and frequent drug use for those disorders (DFI and DN) among men and women and in gender disparities are not well known. *Methods* We studied gender differences in FI, N, DFI, DN, and in their correlated, and whether the gender differences were mediated by individual and lifestyle factors among 3,450 active subjects aged 18–64, randomly selected from North-eastern France. Subjects completed a post-mailed questionnaire. Data were analyzed via adjusted odds ratio (ORa) computed with the logistic regression model. *Results* Women were more affected than men for FI (21.3 vs. 13.1%, OR adjusted for age ORa 1.80, 95% CI 1.50–2.16), DFI (11.6 vs. 7.1%, ORa 1.74, 1.38–2.21), N (14.7 vs. 9.9%, ORa 1.58, 1.28–1.94), and for DN (12.1 vs. 5.7%, ORa 2.29, 1.79–2.94). These differences were not mediated by the individual characteristics studied. Multivariate analysis showed that the risk patterns varied between the two sexes. Smoking was related to N in men as well as in women; alcohol abuse to DFI in men only; lack of family support to all outcome variables in men and women; low educational level to DFI in men only; low income to FI, N and DN in men and to FI and DN in women; being unmarried to DN in men; being divorced/separated to N and DN in women; being a manual worker to FI and being a farmer to DFI in men; and being a manual worker to DN and being an employee to FI in women (1.50 ≤ ORa ≤ 2.95). *Conclusions* Women suffered more from fatigue/insomnia and nervousness and used more drug for those disorders than men. Socio-demographic and lifestyle factors played significant roles among men and women but they did not explain the gender disparities.

■ **Key words** gender – fatigue – insomnia – nervousness – lifestyle – individual characteristics

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Introduction

Fatigue, insomnia, and nervousness are very common to many countries and cause immense suffering [1, 6, 9]. Such disorders are correlated to more serious

conditions (such as depression, injury, hypertension, cardiovascular disease, gastrointestinal diseases, sickness absence, healthcare utilization, and suicidal ideation) [17, 18, 29, 34, 41, 47–49, 52] as well as poor quality of life and increased mortality [22, 39, 50]. Nervousness, mood and sleep disorders, as well as the consumption of corresponding psychotropic medications, has been found to be higher in France than in other European countries, such as Germany, Belgium, Spain, the Netherlands and Italy [1, 2, 24, 42, 43]. These studies also pointed out that both undertreatment of these disorders and misuse of psychotropic medications were widespread. In other words, many people suffer from these conditions but do not receive any treatment, and conversely many people take psychotropic medications but do not exhibit symptoms corresponding to these disorders.

Among socio-demographic characteristics associated with both the prevalence of nervousness, mood and sleep disorders, and the consumption of psychotropic medications, gender is probably the more salient one, with higher prevalences and consumptions among women [1–3, 19, 51]. There is no reason to believe that women are more 'fragile' than men [37]. Three other distinct explanations have been put forward for this result. First, women may be more exposed to stressing events related to their lifestyle and to the burden of household tasks [11, 12]. Second, women may be more exposed to social isolation and lack of social support [14, 23, 45]. Third, due to common gender stereotypes widespread among both the general population and health professionals, women are alleged to be more prone to suffer from psychological disorders, and their somatic conditions are more likely to be interpreted as consequences of such disorders [4, 5, 51].

In order to further investigate this topic, the present study assessed: (1) the sex difference in fatigue/insomnia and nervousness and in frequent drug use for those disorders among economical active people in a French population; (2) whether the sex difference was mediated by various socio-demographic and lifestyle factors (age, obesity, current smoking, alcohol abuse, low educational level, low income, living alone, family condition, lack of family support, and socio-occupational category) which are well known as risk factors for mental disorders, smoking, alcohol abuse, or psychotropic drug use [1, 2, 6, 7, 15, 41, 45].

Materials and methods

Study design

The initial sample consisted of everyone aged 15 years or more living in 8,000 randomly selected households in the Lorraine region of north-eastern France (2.3 million inhabitants). Only households with a telephone were eligible.

Table 1 Distribution according to sex and age of the sample studied and of the general population of Lorraine (Institut national de la statistique et des études économiques [32]) (%)

Age (year)	Sample studied	Lorraine general population
15–19	5.4	9.6
20–24	8.0	9.8
25–29	9.7	9.7
30–34	10.4	9.6
35–39	10.5	9.6
40–44	7.9	9.3
45–49	8.5	5.9
50–54	6.0	6.6
55–59	6.3	6.8
60–64	7.2	6.6
65–69	7.5	5.7
70 or over	12.6	10.8
No. of subjects	6,216	1,848,579
Women	52.4	51.5

Before the initial survey, a 3-month media campaign (television, print, and radio) was conducted in order to raise awareness. The investigation was approved by the *Commission Nationale d'Informatique et Libertés,* and written informed consent was obtained from respondents.

The study protocol included: (a) an application to participate that ascertained the number of people in the household, and (b) three standardized self-administered questionnaires with a covering letter and a pre-paid envelope for the reply. Mailings were made at 1-month intervals. When the number of individuals was unknown, two questionnaires were sent first, and another later.

Of the 8,000 households included in the sample, mailings to 193 (2%) were lost (due to address error or death). Of 7,807 households contacted, 3,460 (44.3%) participated (all eligible members of the family took part in 86% of those). In total, 6,234 subjects filled in a questionnaire; 18 were of unknown sex or age, leaving 6,216 subjects who were similar in age and sex distribution to the Lorraine population (Table 1). The present study focused on the subpopulation of 3,450 economically active (either employed or looking for work) subjects aged 18–64 years by excluding the housewives and students.

Measures

Questionnaires were completed by the subjects themselves. Questions covered: sex, date of birth, height, weight, educational level, occupation coded according to the INSEE classification (Paris, 1983), smoking habit, alcohol abuse, family condition (married or living in couple/divorced or separated/unmarried/widowed), living alone, family support, perceived income, fatigue, insomnia, nervousness, and drug use for fatigue, insomnia, or nervousness.

Nine occupational categories were considered: upper occupations (intellectual professionals, upper managerial staff and administrators, medical doctors, independent professionals, engineers), intermediate occupations (managerial staff, school teachers, skilled technicians, foremen, medical and social workers), manual workers (skilled manual workers, farm workers, semi-skilled manual workers and unskilled manual workers), farmers (farm managers), craftsmen/tradesmen (independent shop or business owners), and other employed people and unknown [3, 16, 25, 34]. Unemployed were categorized according to their last job, considered as the best reflection of their current situation. Educational level was categorized into "primary school only" versus "secondary or above".

Obesity was defined as body mass index ≥ 30 kg/m^2 [53]. Alcohol abuse was defined using the DETA questionnaire [at least two positive responses to four items: (i) consumption considered excessive by the subject; (ii) consumption considered excessive by people around the subject, (iii) subject wishes to reduce consumption, and (iv) consumption on waking] [9, 31, 34, 44] which is

the French version of the CAGE questionnaire [8]. With regard to perceived income, subjects were asked whether they considered themselves: comfortable or well off, earning just enough, coping but with difficulties, or getting into debt; low income was defined by coping, but with difficulties, or getting into debt. Family support was addressed in the question: "Are you satisfied or dissatisfied with support from your family over the last two months?" (very satisfied/rather satisfied/no opinion/rather dissatisfied/very dissatisfied). Lack of family support was defined as "very dissatisfied' or 'rather dissatisfied".

For fatigue subjects were asked how much trouble have had with getting tired easily over the last eight days (a lot/none or some). For insomnia subjects were asked how much trouble have had with sleeping over the last 8 days (a lot/none or some). For nervousness subjects were asked how much trouble have had with nervousness over the last eight days (a lot/none or some). These items are parts of the French version of the Duke questionnaire [27]. Drug use was determined by asking whether respondents had frequently taken medication (prescribed and/or non-prescribed) for fatigue, insomnia or nervousness (Yes/No) [6, 9, 13].

■ Statistical analyses

The outcome variables were fatigue/insomnia, nervousness, and frequent drug use for those disorders. Independent variables were: sex, age, obesity, current smoking, alcohol abuse, low educational level, low income, living alone, family condition, lack of satisfaction with family support, and job category. The χ^2 independence test was used to compare the two sexes for various variables. First, logistic regression analyses were carried out to assess the relationships between each outcome variable and all independent variables for men and women separately. Then, two rounds of logistic regression analyses were performed with two sets of independent variables and covariates: the first round included sex and age only in order to compute the odds ratios adjusted for age for women versus men; the second set added all other individual and lifestyle factors among the covariates. The extent of the difference between the estimates arising from the two sets was interpreted as reflecting the role of those factors in explaining the gender disparity in fatigue/insomnia, nervousness or drug use for those disorders.

Results

The study sample included 1,825 men and 1,625 women. Table 2 shows that fatigue/insomnia, nervousness, and frequent drug use for those disorders were common, and affected more women than the men. Regarding fatigue/insomnia, among women, 15.5% suffered from those disorders and did not consume drugs, 5.7% consumed drugs and were free of those disorders, 5.8% consumed drugs and were affected by the disorders (9.8, 3.7, and 3.3% among the men, respectively). Regarding nervousness, among women, 9.3% suffered from this disorder and did not consume drugs, 6.7% consumed drugs and were free of this disorder, 5.4% consumed drugs and were affected by the disorder (7.9, 3.8, and 2.0% among the men, respectively). Men exhibited a significantly higher prevalence than women of smoking, alcohol abuse, but women reported more to live alone (it should be noted that housewives were here excluded). The family condition and job category also differed between men and women.

Table 2 Characteristics of the subjects by sex (%)

	Men (n = 1,825)	Women (n = 1,625)	P value
Fatigue	9.3	16.7	<0.001
Insomnia	6.1	10.1	<0.001
Nervousness	9.9	14.7	<0.001
Frequent use of drugs for			
Tiredness	3.2	5.7	<0.001
Insomnia	4.5	7.4	<0.001
Nervousness	5.8	12.1	<0.001
Age (year)			
<30	18.8	24.7	<0.0001
30–39	35.0	32.6	
40–49	28.6	23.6	
≥50	17.6	19.0	
Obesity	15.4	16.5	0.405
Current smoking	37.6	29.3	<0.001
Alcohol abuse	13.7	3.4	<0.001
Low educational level (primary school)	18.2	20.0	0.177
Low perceived income (with difficulties)	11.1	10.3	0.489
Living alone	7.5	11.5	<0.001
Family condition			
Married or living in couple	79.6	71.0	<0.001
Divorced or separated	4.7	7.6	
Unmarried	15.2	16.9	
Widowed	0.5	4.4	
Lack of family support	14.0	13.0	0.397
Job category			
Upper occupations	16.6	9.2	<0.001
Intermediate occupations	11.2	6.8	
Manual workers	39.2	11.7	
Employees	18.6	45.7	
Farmers	2.7	0.9	
Craftsmen and tradesmen	2.5	2.0	
Other occupations or unknown	9.2	23.8	

Housewives and students were excluded

The risk patterns varied between the two sexes, and with the type of disorders and the type of drugs used (Tables 3, 4). Smoking was related to N in men as well as in women, while alcohol abuse was related to DFI in men only. Lack of family support appeared to be a strong risk factor for all outcome variables in men as well as in women. Low educational level was related to DFI in men only. Low income was related to FI, N and DN in men and to FI and DN in women. Being unmarried was related to DN in men while being divorced/separated was related to N and DN in women. Being a manual worker was related to FI and being a farmer to DFI among the men. Being a manual worker was related to DN and being an employee to FI among the women.

Table 5 shows that FI, N, DFI, and DN remained markedly more common among the women than the men when adjusting for age (ORa between 1.80 and 2.29), and this higher risk was not mediated by obesity, current smoking, alcohol abuse, low educational level, low income, living alone, family condition, lack of satisfaction with family support, and job category.

Table 3 Relationships between fatigue/insomnia or nervousness and drug use with various risk factors among men (*n* = 1,825): adjusted odds ratios and 95% CIs

	Fatigue/insomnia		Nervousness		Frequent drug use for fatigue/insomnia		Frequent drug use for nervousness	
Age (year): vs. <30								
30–39	1.00	0.62–1.63	1.70*	1.01–2.86	1.14	0.58–2.24	1.25	0.59–2.63
40–49	1.58§	0.97–2.56	1.28	0.73–2.24	1.49	0.75–2.95	2.83†	1.38–5.84
≥50	2.55‡	1.50–4.31	1.52	0.82–2.82	3.93‡	1.97–7.82	2.59*	1.16–5.79
Obesity	1.08	0.74–1.57	1.07	0.70–1.65	0.93	0.56–1.55	0.99	0.57–1.71
Smoking	1.27	0.94–1.71	1.54†	1.11–2.13	0.85	0.56–1.28	0.85	0.55–1.31
Alcohol abuse	1.43§	0.99–2.07	1.28	0.84–1.93	1.78*	1.12–2.84	1.52	0.91–2.53
Low educational level (primary school)	1.32	0.93–1.88	1.18	0.78–1.78	1.73*	1.10–2.70	1.32	0.80–2.18
Low perceived income (with difficulties)	1.64*	1.11–2.43	2.47‡	1.63–3.74	1.23	0.71–2.14	2.29†	1.36–3.85
Living alone	1.56	0.85–2.84	1.37	0.67–2.80	1.47	0.66–3.27	0.76	0.34–1.70
Family condition: vs. married or living in couple								
Divorced or separated	1.04	0.53–2.03	0.78	0.36–1.71	0.63	0.23–1.69	1.84	0.82–4.12
Unmarried	1.03	0.61–1.73	0.73	0.40–1.35	1.31	0.66–2.60	2.32*	1.18–4.54
Widowed	2.13	0.51–8.91	2.08	0.40–10.8	1.48	0.26–8.37	1.84	0.21–16.3
Lack of family support	2.05‡	1.45–2.90	2.36‡	1.62–3.43	1.99†	1.27–3.11	1.67*	1.01–2.74
Job category: vs. upper occupations								
Intermediate occupations	1.38	0.74–2.54	0.38†	0.18–0.79	0.64	0.27–1.51	0.49	0.19–1.28
Manual workers	1.92†	1.19–3.11	0.65§	0.41–1.03	1.06	0.58–1.92	0.88	0.48–1.64
Employees	1.63§	0.96–2.80	0.72	0.43–1.21	1.28	0.67–2.46	0.86	0.43–1.74
Farmers	0.21	0.03–1.56	0.61	0.20–1.85	2.95*	1.17–7.44	0.30	0.04–2.33
Craftsmen and tradesmen	0.57	0.16–2.02	0.56	0.18–1.73	0.78	0.21–2.89	a	
Other occupations or unknown	1.72§	0.92–3.25	0.91	0.48–1.72	0.97	0.43–2.17	1.40	0.65–3.02

*P < 0.05, †P < 0.01, ‡P < 0.001, §P < 0.10
aNot computable

Table 4 Relationships between fatigue/insomnia or nervousness and drug use with various risk factors among women (*n* = 1,625): adjusted odds ratios and 95% CIs

	Fatigue/insomnia		Nervousness		Frequent drug use for fatigue/insomnia		Frequent drug use for nervousness	
Age (year): vs. <30								
30–39	0.65*	0.46–0.92	1.10	0.74–1.63	1.76*	1.05–2.93	1.08	0.67–1.72
40–49	0.80	0.55–1.17	0.97	0.62–1.53	1.93*	1.11–3.37	1.27	0.76–2.13
≥50	1.34	0.88–2.04	1.12	0.67–1.88	3.71‡	2.08–6.61	2.45‡	1.43–4.19
Obesity	0.93	0.67–1.29	0.80	0.54–1.19	0.58*	0.37–0.92	0.84	0.56–1.28
Smoking	1.20	0.91–1.58	1.46*	1.07–1.99	1.18	0.82–1.70	1.22	0.86–1.73
Alcohol abuse	1.17	0.61–2.22	1.14	0.55–2.34	0.35§	0.10–1.15	1.22	0.57–2.62
Low educational level (primary school)	1.31§	0.96–1.80	1.43§	0.99–2.06	1.18	0.80–1.75	1.09	0.74–1.61
Low perceived income (with difficulties)	1.50*	1.03–2.17	1.33	0.88–2.02	1.41	0.88–2.27	2.01‡	1.31–3.07
Living alone	0.92	0.57–1.48	0.83	0.50–1.38	1.60§	0.93–2.74	1.16	0.67–1.99
Family condition: vs. married or living in couple								
Divorced or separated	1.54§	0.99–2.40	2.22‡	1.38–3.57	1.36	0.79–2.34	1.77*	1.07–2.94
Unmarried	0.77	0.51–1.17	1.48§	0.95–2.30	1.13	0.65–1.94	1.09	0.65–1.83
Widowed	1.17	0.62–2.22	1.54	0.73–3.28	1.37	0.68–2.77	0.99	0.46–2.14
Lack of family support	2.14‡	1.54–2.96	2.08‡	1.40–2.88	1.77†	1.17–2.66	2.28‡	1.55–3.34
Job category: vs. upper occupations								
Intermediate occupations	1.10	0.53–2.26	1.31	0.57–2.99	0.69	0.28–1.71	0.86	0.32–2.33
Manual workers	1.56	0.85–2.88	1.69	0.83–3.42	1.43	0.70–2.94	2.26*	1.05–4.86
Employees	1.71*	1.03–2.85	1.73§	0.95–3.13	1.00	0.55–1.82	1.60	0.82–3.11
Farmers	0.78	0.16–3.85	2.33	0.56–9.77	1.03	0.20–5.32	a	
Craftsmen and tradesmen	1.59	0.61–4.14	1.26	0.40–3.97	1.62	0.58–4.54	2.58§	0.88–7.52
Other occupations or unknown	1.53	0.87–2.70	1.45	0.75–2.82	1.27	0.65–2.47	1.73	0.84–3.59

*P < 0.05, †P < 0.01, ‡P < 0.001, §P < 0.10
aNot computable

Discussion

Among a regional sample of French aged 18–64 years, fatigue/insomnia and nervousness were more prevalent among women, who were also more prone to consume drugs for those disorders. Distinct analyses performed separately for women and men demonstrated that several risk factors were gender-specific: low perceived income was correlate of nervousness, being unmarried was correlate of drug use for nervousness, and alcohol abuse and low perceived income were correlates of drug use for fatigue/insomnia among men only, while being divorced

Table 5 Gender disparity for fatigue/insomnia, nervousness and drug use: adjusted odds ratios for women versus men and 95% confidence interval

	Fatigue/insomnia		Nervousness		Frequent drug use for fatigue/insomnia		Frequent drug use for nervousness	
OR adjusted for age only	1.80[‡]	1.50–2.16	1.58[‡]	1.28–1.94	1.74[‡]	1.38–2.21	2.29[‡]	1.79–2.94
OR adjusted for all factors studied[a]	1.83[‡]	1.48–2.28	1.57[‡]	1.24–2.00	1.79[‡]	1.35–2.37	2.36[‡]	1.76–3.17

[‡]$P < 0.001$

[a]Which were age, obesity, current smoking, alcohol abuse, low educational level, low income, living alone, family condition, lack of satisfaction with family support, and socio-occupational category

or separated was correlate of nervousness and corresponding drug use among women only. Being aged 50 or over was correlate of fatigue/insomnia among men only. Being a manual worker was correlate of fatigue/insomnia and being a farmer of frequent drug use for these disorders among men. Being a manual worker was correlate of frequent drug use for nervousness and being an employee of fatigue/insomnia among women. The gender differences for fatigue/insomnia, nervousness and corresponding drug use did not change when controlling for various socio-demographic and lifestyle factors, and odds ratios measuring the gender effect did not change when these factors were introduced into the logistic modeling.

Before discussing our results, we have to acknowledge some limitations of the present study. A first limitation was its cross-sectional design, which precludes any formal conclusion about the causality of the associations between fatigue/insomnia, nervousness, corresponding drug use and their correlates. Nevertheless, in the case of sociodemographic correlates, and especially gender, such limitation is a minor one. A second limitation is due to data collection, as both disorders and drug use were self-reported and not objectively measured. However, the self-administered occupational health history questionnaire is considered reliable and valid [28], and all the factors introduced into the analysis had been previously validated and used in other studies [6, 8, 9, 13, 26, 27, 44]. Any selection bias here would be small: 96% of households had telephones at the time of the study, and only 16% had confidential addresses. Discussions before the survey, for example with associations of people with disabilities, suggested that this list would not be biased with regard to health status or living conditions. The participation rate was rather modest but similar to that achieved in similar surveys in France [2, 35]. A previous study analyzing non-response bias in a mailed health survey showed that respondents and non-respondents were of similar sex and age distributions, and close in terms of health care expenditure [21]. Similar observations were reported by the Maastricht Cohort Study [33]. Moreover, the age and sex distributions of the sample, as well as the prevalences of various variables, reflect those of the general population of Lorraine [32]. It should be noted that our study would have a bias, as the most economically deprived (i.e. those with no

home and therefore no telephone) were not included in the sample. Finally, our results should not be generalized to France as a whole.

For both men and women, and for fatigue/insomnia as well as for nervousness, we found important discrepancies between perceived disorders and psychotropic drug uses: the most frequent case was disorders without drug use, but drug use without disorders was as frequent as reporting disorders and drug use. Such discrepancies may reflect both patients 'non compliant' strategies (early treatment cessation, subsequent self-medication, etc.) and erratic prescriptions [4, 5, 10, 43, 46]. These discrepancies were also illustrated by the fact that reported disorders and psychotropic drug use were not correlated to the same risk factors. For example, the relationship with older age was far more stronger for psychotropic drug use, which is consistent with previous studies [28, 30].

Our results also pointed out the social differentiation of fatigue/insomnia and nervousness, which was more prevalent among people reporting low income and lack of family support [6, 7, 15]. Fatigue/insomnia was also more prevalent among manual workers and employees, and in this case such disorders may be directly linked to working conditions [6, 15, 20, 36, 41, 45]. Moreover, gender-specific risk factors (low perceived income for nervousness, being unmarried for nervousness, alcohol abuse and low perceived income for drug use for fatigue/insomnia, being a manual worker for fatigue/insomnia, being a farmer for drug use for fatigue/insomnia, and being aged 50 or over for fatigue/insomnia among men—being divorced or separated for nervousness and related drug use, being a manual worker for frequent drug use for nervousness, being an employee for fatigue/insomnia among women) probably reflect gender roles in our society. On the one hand, a man is usually considered as the head of the household, and as such he is responsible for its material well-being, thus a low perceived income may be interpreted as a man's failure. Men are more likely to be manual workers or farmers with higher physical job demands which result in fatigue/insomnia, especially for older workers. On the other hand, as most domestic tasks lie with women, living in couple may be more beneficial to men. Nervousness seemed exacerbated among divorced or separated women. Additionally, women are more likely employees with generally lower physical job demands than male manual workers.

Finally, with regard to the different explanations that have been put forward to interpret the higher prevalences observed among women for fatigue/insomnia, nervousness and related psychotropic drug use, we found a strong role of occupation or lack of family support. These results suggest that the 'lifestyle/household burden' and the 'social isolation' hypotheses are not sufficient to explain the significant differences observed between men and women, and as a consequence they support the third hypothesis (the 'gender stereotypes' hypothesis). The present study did not investigate specifically this topic, but previous studies already pointed out the importance of gender stereotypes regarding pain and somatization [38, 40]. Our results call for further research on gender stereotypes and the way they may shape women's perceptions of their own condition, men's perceptions of women's condition, as well as health professionals' attitudes and behaviors toward consulting women.

Conclusions

Women suffered more from fatigue/insomnia and nervousness and used more drug for those disorders than men. Living conditions and lifestyle played significant roles among men and women but they did not explain the gender disparities. Preventive measures should aim at improving working conditions and to help people to be aware of the benefits of improving their living conditions and lifestyle.

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