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# Assessment of mental health and psychosocial factors in French merchant officer cadets

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## ABSTRACT

***Background:*** *Several studies have demonstrated the existence of psychological pathologies and psychosocial risks among seafarers, particularly merchant navy officers. To date, there is no study of merchant navy officer cadets. First aims are to assess anxiety and depression disorders, framework, work strain and social support in this population.*

***Materials and methods:*** *A questionnaire including demographic and sailing data to which we added the Hospital Anxiety and Depression Scale (HAD) and Karasek questionnaire was developed. All students were approached and completed the questionnaire anonymously by electronic means.*

***Results:*** *One hundred and seventy questionnaires could be included. The population was predominantly male (76.4%), and the average age of the students was 21.7 years. The means of the HAD anxiety and HAD depression were 6.9 and 5.37, respectively. According to Karasek classification, we noted that the "active" class was the most represented with 29.4% of students, followed by the "high strain" and "low strain" classes with 27.6%. The "passive" class was the least represented with 15.3%.*

***Conclusions:*** *We found a predominance of anxiety disorders but few signs of depression. Signs of "high strain" according to Karasek were found in 27.6% of the population of these young officers. Job demand was linked to mean of anxiety and depression disorders declared in HAD questionnaire. Being a woman was associated with anxiety but not depression symptoms. Prevention programme to decrease the level of job demand and increase decision latitude and social support seems relevant for mental health disorders in merchant officers.*

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**Key words: psychosocial, high-risk population, job stress, workplace safety, seafarers, cadets**

## INTRODUCTION

In recent decades, studies increased knowledge on occupational physical and psychological stressors exposure in seafarers [1]. Some, like fatigue, boredom and social isolation are linked to social and technology modifications. Global economic growth is coupled with shipping trade and maritime technology has to respond to globalisation signals. Globalisation encouraged transactions of goods and service "just in time" in smaller packets. Maritime transport, shipping but also fishing is now directly impacted by worldwide globalisation.

Oldenburg and Jensen [2] recently published an article on stress and strain among seafarers considering their jobs on board. With a sample of 323 seafarers employed on 22 container ships, they conducted an interview-based study with a questionnaire addressing stressors among seafarers validated in a previous study [2]. Specific job-related factors such as sailing route, trip duration at sea, physical stressors (e.g. noise and seasickness) and psychosocial stressors (e.g. shift to new ship and social problems due to migration) were assessed. Nautical officers

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more frequently felt mentally stressed than the ratings, which the authors attributed to their higher maximum working hours and higher work-related demands. They also found that watchkeepers had significantly shorter sleeping periods than daytime workers (i.e. 5.5 h vs. 5.8 h) and significantly lower scores for effectiveness of sleep, the overall average of which was 69.6% (odds ratio 0.48; 95% confidence interval 0.26 to 0.88). In view of those findings, the authors proposed a possible relationship between chronic fatigue and human error during maritime disasters. By job type, officers complained more often than non-officers about high stress levels due to time constraints and administrative tasks [2].

Fatigue is considered as an important maritime safety and mental health problem [3]. The youngest are more burdened by stress, especially because of the lack of good social relationships, physical fatigue and lack of control [4]. A French survey with 74 seafarers on oceanographic vessels studied stress using the Karasek demand-control-model. Of all respondents, 17% were at the low end of the decision level in the model of Karasek and regarded as an expression of high stress risk, which is believed to be associated with a high risk of stress. There were 33% with mental stress in the overall health tests [5].

As coronavirus disease 2019 (COVID-19) continues to adversely impact seafarers, an estimated 400,000 of whom are stranded on vessels around the world; many working within the maritime industry have become increasingly concerned about the damaging effects of extended time on board, as well as complications with repatriation and the financial problems resulting from unexpected unemployment. The well-being of seafarers during on-board COVID-19 outbreaks was evaluated with the General Health Questionnaire-12, where 60% of the sample had mean Likert-scores below 15 (i.e. "No problems"), whereas 40% had scores from 15 to 23 (i.e. initial problems). In response to other items, half of the seafarers did not feel safe performing their jobs and 60% did not think that every precaution had been taken to ensure their health at work due to the pandemic. Another 30% suffered from insomnia to the extent of becoming concerned, while 26% reported being unhappy and depressed during their latest tour of duty [6].

In 2010, Beaucher et al. [7] analysed qualitatively first embarkment reports of French merchant officer trainees. Major stress sources described were vessels operations, piracy, damages and meteorological conditions. At the end, most of them concluded that this first onboard experience confirms their professional choice [7].

In another French study involving younger students from marine college and using the GHQ12 questionnaire, we found 43.2% of students with psychological distress (unpublished).

Linked to these, we think that it could be interesting and relevant to perform a study on French Merchant Officer trainees.

First aims are to assess anxiety and depression disorders, framework, work strain and social support in this population.

## MATERIALS AND METHODS

We conducted an observational study of self-evaluation using an anonymised questionnaire. The first part of the questionnaire focused on demographic and professional data (gender, age, year of training, type and duration of internships) and then participants were asked to answer two internationally validated questionnaires: the Hospital Anxiety and Depression Scale (HAD) and Karasek questionnaires [8, 9].

A hyperlink, created via the Sphinx Online software, to the questionnaire was sent to the students in their student mailboxes.

An e-mail was sent on 02/02/2022; a reminder was sent on 03/03/2022. The link was deactivated on 15/03/2022.

The entire population was composed of 637 students distributed as follows: 162 in the first year of a Bachelor's degree, 155 in the second year of a Bachelor's degree, 122 in the third year of a Bachelor's degree, 109 in the first year of a Master's degree and 89 in the second year of a Master's degree.

### INFORMED CONSENT

All information on the survey was included in the first page of the questionnaire and detailed in the email send with the link.

### TESTS

The Karasek questionnaire or Job Content Questionnaire (JCQ) was developed for a self-assessment of the psychosocial environment constraints at work. In this test, a work situation is characterised by the combination of psychological demand (workload or job demand) and decision latitude. By crossing these characteristics, four work situations can be defined, including low strain, passive, active and high job strain [10].

It then introduces another dimension, which is social support at work (colleagues or superiors).

The HAD is a questionnaire for the detection of anxiety and depressive symptoms [8].

### STATISTICS

The questionnaire was carried out using the "Sphinx" software. The data were extracted and coded on the Sphinx software and then the statistical analysis was carried out with the XL Stat software (Addinsoft 2022). The data were

anonymised and stored on a secure server in the hospital department with a password.

For the HAD, we followed the recommendations of these authors for coding. If the sum was greater than or equal to 11, we considered that there was a proven symptomatology [8].

For the Karasek model questionnaire, we assigned a value of –2, –1, +1, +2 to each response. The sum was made in each of the three categories: job demand, decision latitude and social support. When the sum was less than 0, we considered the job demand to be low, and when it was greater than 0, we considered it to be high. When the sum was less than 0, we considered decision latitude to be low and when it was higher, we considered it to be high. Finally, when the sum was less than 0, we considered social support to be low and when it was greater than 0, we considered it to be high. When the sum was equal to 0, we excluded the students from the analysis.

The statistical analysis of the data was carried out using XL Stat software (Addinsoft 2021). It includes a descriptive phase of the data expressed in numbers and percentages, Then, a comparison by work situations according to Karasek model was carried out by Chi-square test when the statistical conditions allowed it or by Yates corrected Chi-square. The means of the anxiety and depression scores were compared between the different categories of the Karasek score using the Z test for comparison of means. For all statistical tests, the p significance level was set at 0.05.

We also performed a linear regression analysis between the anxiety and depression values of the HAD questionnaire with the explanatory variables: age, gender, decision latitude, social support and job demand as independent variables.

Next, a Pearson correlation test and linear regression were performed for the anxiety and depression values of the HAD test.

## RESULTS

The questionnaire was sent to 637 students and 178 responded. The response rate was therefore 27.9%.

We chose to remove from the analysis the 8 people who had obtained the sum of 0 on the Karasek score for work constraints or for decision latitude. This would not have allowed us to classify them in one of the four Karasek categories. The rest of the results would therefore be presented with a student population of 170, except for the student characteristics.

The population was predominantly male (76.4%). The average age of the students was 21.67 years. 23.6% had not carried out any training. Of the 76.4% who had completed at least one placement, a majority had completed more than 60 days at sea (84.6%).

We found that 19.1% of the students' report having experienced one or more traumatic events during their onboard training.

The main characteristics of the included population and those of the embarkations are described in Table 1.

The average scores of HAD anxiety and HAD depression were 6.871 ± 3.8 and 5.371 ± 3.3, respectively.

Of the 170 students, 31 showed symptoms of anxiety, representing 18%. Fewer of them showed depressive symptoms, 13 or 7.6% (Table 2).

**Table 1.** Demographic characteristics of included students

| Features | Per cent | Workforce |
|---|---|---|
| Response rate | 100% | |
| Gender: | | |
| Male | 76.4% | 136 |
| Woman | 23.6% | 42 |
| Age [years]: | | |
| < 20 | 24.2% | 43 |
| 20–24 | 63.5% | 113 |
| 25–29 | 9.6% | 17 |
| 30–34 | 1.7% | 3 |
| 35–39 | 0.6% | 1 |
| > 40 | 0.6% | 1 |
| Average | | 21.67 |
| Year of training: | | |
| L1 | 21.3% | 38 |
| L2 | 28.1% | 50 |
| L3 | 24.2% | 43 |
| M1 | 14% | 25 |
| M2 | 12.4% | 22 |
| Number of on-board courses: | | |
| 0 | 23.6% | 42 |
| 1 | 10.7% | 19 |
| 2 | 19.1% | 34 |
| 3 | 23.6% | 42 |
| 4 | 7.3% | 13 |
| 5 | 4.5% | 8 |
| > 5 | 11.2% | 20 |
| Average duration of internships [weeks], Average | | 8.98 |

→

**Table 1 (cont.).** Demographic characteristics of included students

| Features | Per cent | Workforce |
|---|---|---|
| Maximum duration of traineeships [weeks], Average | | 11.79 |
| Total number of course days [J]: | | |
| < 10 | 0.7% | 1 |
| 10–20 | 0.7% | 1 |
| 21–30 | 2.2% | 3 |
| 31–40 | 0.7% | 1 |
| 41–50 | 7.4% | 10 |
| 51–60 | 3.7% | 5 |
| > 60 | 84.6% | 115 |
| Type of vessel: | | |
| Passenger ship | 67.6% | 92 |
| Freight ship | 50% | 68 |
| Raw material transport vessel | 30.9% | 42 |
| Special ships | 28.7% | 39 |
| Port vessels | 7.4% | 10 |
| Other | 11.8% | 16 |
| Nationality of the shipping company: | | |
| French | 99.3% | 135 |
| Foreign | 13.2% | 18 |
| Language spoken on board: | | |
| French | 19.9% | 27 |
| English | 8.8% | 12 |
| French + English | 71.3% | 97 |
| Traumatic events: | | |
| Yes | 19.1% | 26 |
| No | 80.9% | 110 |

**Table 2.** Results of the HAD questionnaire in classes

| | No. of students | Questionnaire results | Number | Frequency (%) |
|---|---|---|---|---|
| HAD anxiety | 170 | > or equal 11 | 31 | 18.2 |
| | | < 11 | 139 | 81.7 |
| HAD depression | 170 | > or equal 11 | 13 | 7.6 |
| | | < 11 | 157 | 92.3 |

HAD — Hospital Anxiety and Depression Scale

The profile of the students was very diversified; we found mainly three classes which were almost equal in terms of numbers. The "active" class was the most represented with 29.4% of the students, followed equally by the "tense" and "relaxed" classes with 27.6%. The "passive" class was the least represented with 15.3%.

Description of different variables for each Karasek class are presented in Table 3 with same frequencies of gender in different classes.

The comparison of the means of the HAD questionnaire according to the category of the Karasek questionnaire showed a significant increase in the level of anxiety in the high strain (also named "tense") group compared to the active, passive and, especially, low strain group. The depression score was also significantly worse in the tense group compared to the low strain and passive group, as shown in Table 4.

When performing analysis of correlation using Pearson test, we found that for anxiety and depression rated by the HAD questionnaire, there was a significant and positive relationship with job demand and a negative one for decision latitude and social support (Table 5).

Interestingly, Table 6 shows the results of the linear regression. It shows that age had no influence on the different HAD scores. But gender, especially female, was significantly related to depression scores but not to anxiety. The data from the Karasek model had a strong impact on the variance of overall health, anxiety and depression. When it was added to the equation, the variance increased by almost 30% for both entities (anxiety and depression). More specifically, work constraints and social support had an impact on anxiety and depression. Decision latitude, on the other hand, had no significant effect.

## DISCUSSION

In this study, we were able to assess the psychological health of French merchant navy cadets using internationally validated tests. Anxiety-type pathologies were detected thanks to the HAD test, but only few depressive syndromes were observed. Interestingly, the analysis of the Karasek questionnaire showed that more than a quarter of the students were included in the high strain "tense" class. The main factors influencing depressive symptoms were female gender and job strain with a protective effect of social support. For anxiety symptoms, the influence of gender was not found, but the influence of stress and social support was similar to that of depression.

A study published in 2014 among French seafarers evaluated, by means of the HAD questionnaire, a score of anxiety and depression respectively > 11 in 17.9% and 7.7% of officers and 20.5% and 7.7% for other crew members [11]. These figures are very close to ours for officers, de-

**Table 3.** Description of variables for each Karasek class in number and frequencies

| | | Karasek class | | | |
|---|---|---|---|---|---|
| | | **Active** | **Low strain** | **Passive** | **High strain** |
| Gender | Woman | 12 (24%) | 12 (25.5%) | 7 (26.9%) | 10 (21.3%) |
| | Male | 38 (76%) | 35 (74.4%) | 19 (73.1%) | 37 (78.7%) |
| Year of training | L1 | 13 (26 %) | 10 (21.2%) | 5 (19.2%) | 9 (19.1%) |
| | L2 | 9 (18%) | 13 (27.6%) | 11 (42.3%) | 15 (31.9%) |
| | L3 | 13 (26%) | 10 (21.2%) | 5 (19.2%) | 12 (25.5%) |
| | M1 | 8 (16%) | 9 (19.1%) | 2 (7.7%) | 6 (12.7%) |
| | M2 | 7 (14%) | 5 (10.6%) | 3 (11.5%) | 5 (10.6%) |
| HAD anxiety | 11 and over | 9 (18%) | 5 (10.6%) | 3 (11.5%) | 14 (29.8%) |
| | < 11 | 41 (82%) | 42 (89.3%) | 23 (88.5%) | 33 (70.2%) |
| HAD depression | 11 and over | 4 (8%) | 2 (4.2%) | 2 (7.692%) | 5 (10.6%) |
| | < 11 | 46 (92%) | 45 (95.7%) | 24 (92.3%) | 42 (89.4%) |

**Table 4.** Comparison of results (by Chi-square) of the HAD questionnaire according to the type of position according to the Karasek classification, p-values

| **HAD anxiety** | | | | |
|---|---|---|---|---|
| Active | 1 | | | |
| Low strain | **0.005** | 1 | | |
| Passive | 0.366 | 0.101 | 1 | |
| High strain | **0.043** | **< 0.0001** | **0.010** | 1 |
| **HAD depression** | | | | |
| Active | 1 | | | |
| Low strain | **0.045** | 1 | | |
| Passive | 0.152 | 0.860 | 1 | |
| High strain | 0.353 | **0.005** | **0.036** | 1 |

HAD — Hospital Anxiety and Depression Scale

spite differences in the population in terms of average age and the exclusive presence of men in the study by Jégaden et al. [11]. Interestingly, the authors did not find any significant difference in the average anxiety and depression scores between seafarers and sedentary controls, nor between seafarers and operational staff. Concerning the use of medication, 2.5% of the officers were taking anxiolytic or antidepressant treatments compared to 10.3% and 5% for the other seafarers [11]. In this study, the authors evaluated the disposition to boredom by questionnaire. They highlighted the existence of this state of boredom predominantly among the operational staff and that it would be linked to less external stimulation (monotony, loss of meaning at work, different relationship to time).

As for anxiety and depression, it seems that French cadets have the same health assessment as their elders. The GHQ12 questionnaire was recently used in a study

**Table 5.** Correlation test (Pearson) between HAD questionnaire anxiety, depression scores and job type according to Karasek classification

| | **Anxiety HAD** | **Job demand** | **Decision latitude** | **Social support** |
|---|---|---|---|---|
| **HAD anxiety** | 1 | | | |
| Job demand | 0.394*** | 1 | | |
| Decision latitude | –0.305*** | –0.212** | 1 | |
| Social support | –0.457*** | –0.340*** | 0.388*** | 1 |
| | **Depression HAD** | **Job demand** | **Decision latitude** | **Social support** |
| **HAD depression** | 1 | | | |
| Job demand | 0.379*** | 1 | | |
| Decision latitude | –0.174** | –0.212** | 1 | |
| Social support | –0.428*** | –0.340*** | 0.388*** | 1 |

*p < 0.05;**p < 0.005;***p < 0.0001; HAD — Hospital Anxiety and Depression Scale

**Table 6.** Linear regression between the anxiety and depression values of the HAD questionnaire with explanatory variables

| | HAD anxiety | | HAD depression | |
|---|---|---|---|---|
| | t | $R^2$ | t | $R^2$ |
| Demographic: | | 0.01 | | 0.05 |
| Age | –0.02 | | 0,01 | |
| Gender | 0.39 | | 1.7** | |
| Karasek models: | 9*** | 0.29 | 6.55*** | 0.27 |
| Job demand | 1.27*** | | 1.1*** | |
| Decision latitude | –0.9 | | 0.08 | |
| Social support | –1.66*** | | –1.4*** | |

*p < 0.05;**p < 0.005;***p < 0.0001; HAD — Hospital Anxiety and Depression Scale

including 72 seafarers sailing in the Adriatic Sea, the average score was 13.9, very similar to our study. A high proportion, 30%, suffered from insomnia and 26% said they were depressed or sad when they last sailed [6].

In our study, we find a high percentage of students classified as tense (24.6%) according to the Karasek model and therefore more at risk of developing psychological and cardiovascular pathologies linked to stress. This percentage is higher than those of French studies from 2008 (10%) and 2010 (13.5%). The two population samples are different, with an exclusively male population over 40 years old and including the entire crew (officers and operational staff) for Loddé et al. [5].

The difference in results can be explained by the young age of the students, who are entering working life. Being students, on placement they have less decision latitude than an officer but strong demands because they are apprentices.

In recent publications on the mental health of seafarers, several factors causing occupational stress have been highlighted, such as remoteness, long working hours, loneliness on board, multi-ethnicity, limited recreational activities and sleep deprivation. Interestingly, almost 20% of the students reported having experienced a traumatic situation during boarding. We do not have more precise data on these events. However, in their study on the psychological impact of the first embarkation, Beaucher et al. [7] described the main stress factors reported by the students as including 32% related to the operation of the ship, 14% related to damage, 14% related to piracy and then weather conditions. Stress prior to embarkation was reported by 23%.

Similarly, seafarers are commonly exposed to situations at risk of post-traumatic stress disorder as noted for 35.9% of the 323 German seafarers interviewed: maritime disasters, threats or major maritime accidents, including piracy on board (17.0%) and stowaways (39%) [12].

Another possible source of discomfort was the atmosphere on board with possible difficulty in integrating and language barriers. In Beaucher et al. [7] study 23% described a more difficult integration, but the overall feeling was positive.

Some difficulties were described with the language barrier with some crew members speaking little English. In our study, in 71% of cases French and English were spoken on board, rarely one language. We did not ask if there were other languages spoken.

The period of the COVID-19 pandemic may have influenced these results, as students are faced with uncertainty about their future and worries about what to expect from internships or their future work. A meta-analysis of 176 studies published in December 2021 found a prevalence rate of 30.6% for depression and a prevalence rate of 28.2% for anxiety among post-secondary students during the COVID-19 pandemic, worldwide [13]. It should be noted that these studies were conducted in different countries and among students from different fields. However, it is clear that anxiety and depressive symptoms can be very high among students.

COVID-19 also influenced the maritime field, as shown in a recent article which, comparing papers before and during the COVID-19 period, found that the pandemic contributed to significantly higher levels of depression and anxiety among seafarers. They found a significant difference for both depression and anxiety, indicating a significantly higher average for depression and anxiety symptoms during the pandemic than before [14]. Another study from 2021 conducted during the COVID-19 period found a prevalence of depression, anxiety, stress, self-reported anxiety general psychiatric disorders and poor perceived health of 12.3%, 11.6%, 5.9%, 2.1%, 42.6%, and 4.3%, respectively [15]. In addition, non-officer seafarers experienced significantly less psychosocial distress, such as anxiety and stress, than officers [14].

We can ask ourselves whether the period of the COVID-19 pandemic still influences the psychological health of seafarers or not.

In a Swedish case-control study including more than 700 engine officers and 300 British engineers working ashore, the authors showed no significant differences between the two populations for perceived job strain, impact of family-work and work-family conflict and global health assessment via the GHQ12. However, they noted a higher level of perceived stress and role conflict among seafarers. This perceived stress and impact on mental health was more significantly related to the conflict dimension than to role ambiguity [16]. As in our study, the factor in the job-demand model influencing stress was job strain. Contrary to our results, social support had no impact on the analysis models.

Further analysis in the population of 731 Swedish engineer officers revealed that age had no impact on the occurrence of mental illnesses or on the deterioration of work stress. On the other hand, age had a significant impact on perceived stress and the interaction between age and work stress had an impact on the stress level and mental health of seafarers. Thus, the authors concluded that the impact of job strain on stress and mental health was greater in older officers [17].

This is in line with the data from the study of French seafarers, which found the same proportion of 'tense' among officers as among operational staff, but a majority of officers classified as active (30%) and passive (53.8%) among other crew members. With age, the officers went from passive to active and the operational staff increased their passive character [18].

The high proportion of officer cadets classified in our study as tense raises questions about their future psychological stability and the risk of developing psychological pathologies.

Sickness reports of 22,763 American seafarers were analysed in the 1980s to determine the relationship between work-related stressors and the occurrence of eight stress-related diseases (cardiovascular disease, hypertension, myocardial infarction, psychoneurosis, suicide, peptic ulcer disease, gastritis, arthritis and asthma). Hierarchical position was found to be the main determinant of the rate of disease occurrence. Deck and engine officers had a significantly higher percentage of stress-related illnesses. By job category, licensed deck personnel showed higher rates of cardiovascular disease, suicide and asthma, and engine engineers of myocardial infarction and asthma. The explanatory factors expressed by the authors were the high level of responsibility, adaptation to technological and situational changes and the general ageing of the merchant marine workforce [19].

It emerges that, within the corporation of merchant navy officers, the psychosocial factors with the greatest impact on the overall and mental health of seafarers are work constraints and, more particularly, conflicts, contradictory demands and their resolution. This is in line with the latest work on German ships which found a higher level of stress among officers, which the authors linked to a regularly increasing administrative workload and sleep deprivation [2]. The intensification of rotations between the various ports, the administrative constraints of customs but also of health and the increase in profitability within maritime transport are very likely sources of this. Within our population of cadets, social support has an important protective role which can be explained by the apprenticeship period and the status of being an overcrowded cadet within the crew with special attention from the tutor. It would compensate for the high levels of stress.

Despite the good participation in our study, a selection bias with an over-representation of students aware of health and its prevention is likely. Similarly, we can assume that some students were not able to respond to the study because they were on a work placement. The length of the study's inclusion period and the reminders helped to limit this bias.

The maritime sector is essentially male. However, 23% of the respondents were women, which is not a negligible figure. We can assume that the officer community is becoming more feminine. According to the website of officers cadets school (https://www.supmartine.fr), the class of engineers who entered Marseille in 2020 was 23% female. According to national insurance figures for 2018, out of 38,956 active seafarers there were 3,072 active women, i.e. 7.9% for all sectors. In the trade sector there were 11.3% women.

## LIMITATIONS OF THE STUDY

We did not ask in our questionnaire whether the respondents were taking medication such as anxiolytics or antidepressants, nor whether they were being followed up by a doctor or psychologist for these anxiety or depressive symptoms. These data would have been interesting to estimate the intensity and the impact on daily and professional life of these symptoms.

Officer cadets have short embarkations with potentially less impact on mental health and less representative of the overall merchant navy officer population.

## CONCLUSIONS

The assessment of anxiety, depressive disorders and psychosocial factors in this population of French officer cadets shows the preponderance of anxiety disorders. It also highlights factors influencing their occurrence, such as female gender, high work demands and protective factors such as better decision latitude and social support. These data open up the prospects of prevention programme that take into account the reduction of the impact of these psychosocial factors or the development of protective factors in this specific population of workers.

**Conflict of interest:** None declared

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