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Links between medical interns' perceived stress, workaholism and personality: a cross-sectional study

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Abstract

Background Medical interns' work conditions and individual features make them vulnerable to stress and deterioration in their physical and mental health. Moreover, these factors are associated with a pathological relationship with work, workaholism. Few studies have focused on this population, and its exposure to psychosocial risks and related consequences. We evaluated the perceived stress of medical interns with regard to their personality and the risk of workaholism.

Methods This cross-sectional observational study was carried out using a self-administered questionnaire, anonymously, assessing perceived stress (PSS-10), personality (BFI-10) and the risk of workaholism (DUWAS-10).

Results 358 medical interns were included in the study. We found that perceived stress was positively associated with neuroticism and the risk of workaholism and, on the other hand, negatively associated with a conscientious personality. The risk of workaholism increased with perceived stress, number of weekly work hours and conscientiousness trait. Having time for leisure was associated with a reduction in both perceived stress and the risk of workaholism.

Conclusions Among medical interns, our results further supported that perceived stress, risk of workaholism and personality are intertwined. A better understanding of these mechanisms will contribute to the identification of the most vulnerable interns, to the improvement of targeted screening and prevention tools of psychosocial risks, usable during occupational medicine consultations.

Clinical trial number Not applicable.

Keywords Workaholism, Mental health, Stress, psychological, Surveys and questionnaires, Leisure activities

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Background

The world of work is characterized by numerous occupational risks that can affect people's health. Among these, psychosocial risks (PSR), formalized in six categories in the Gollac report [1], play a predominant role, particularly in the healthcare sector [2]. Exposure to these PSR leads to the emergence of many cases of psychological suffering and can lead to burnout or, in extreme cases, suicide [3].

Medical interns represent a professional category in their own right, with the distinctive feature of being healthcare workers in training. As a result, they are highly exposed to PSR, with overwork and intense emotional demands at the forefront. Simultaneously, their work environment is marked by a lack of material and human resources. These working conditions lead to a state of stress with significant consequences for the individual's physical and mental health. A number of surveys conducted in recent years have established the psychological vulnerability of this population [4, 5]. In 2015, a systematic review of the literature found a 28.8% prevalence of depression and depressive symptoms among interns [6].

Stress levels and professional experience are inherent to the work environment. However, it is also clear that they are linked to the individual, and in particular their personality [7]. Furthermore, interns' excessive dedication to work by interns can also be associated with pathological behavior known as workaholism [8]. This term is a neologism composed of the terms work and alcoholism, coined by Wayne Oates in 1968 [9, 10]. In 1992, Spence and Robbins were the first to describe workaholism as a pathological relationship with work [11]. Despite the lack of consensus on the definition, existing literature described this concept as a "persistent compulsion to devote increasing importance, time and energy to one's work" [12].

Only a few studies have identified an increased risk of workaholism in the medical population [13, 14]. These studies have highlighted its harmful consequences on health and socio-professional life, which could fall within the field of non-substance addictions [15]. While the risk of workaholism in medical interns has been assessed, the links with stress and personality traits and the relationship between these dimensions remains for the most part unknown. This is a relevant issue particularly for medical interns, who are still in training, acquiring work skills and habits while exposed to PSR. In light of the aforementioned considerations, we have conducted a cross-sectional epidemiological study with the objective of evaluating the relationship between perceived stress, risk of workaholism and personality traits in a population of medical interns.

Methods

Study design and population

A cross-sectional observational epidemiological study was conducted. The target population was medical interns, from any French University Hospital, medical specialty and any semester. Participants who did not fully complete the questionnaire were excluded. This study was approved by the Montpellier University Hospital Institutional Review Board (ID 202201262). The project was also registered in the Health Data Hub public directory in accordance to French data protection authority (CNIL) legislation (#N° F20230507183259).

Outcomes and intervention

The main study outcomes are perceived stress levels measured by the Perceived Stress Scale (PSS-10) questionnaire [16, 17], personality traits assessed with the Big Five inventory (BFI-10) questionnaire [18], and the risk of workaholism assessed with the French version of the Dutch Work Addiction Scale (DUWAS-10) [19]. These questionnaires were selected as they are validated in the French language, have good psychometric properties, and are short, and therefore easy to implement to ensure completeness. To collect these data, we created a self-administered questionnaire consisting of four parts. The first part of the questionnaire collected socio-demographic data (age, sex, subdivision, couple or single) and professional data (specialty, current semester, number of weekly work hours, performance of on-call duty, compliance with on-call safety rest time, time for hobbies). The on-call safety rest time corresponds to a complete interruption of hospital medical work, lasts for 11 h and should be taken immediately after on-call duties.

The second part included a scale for assessing perceived stress, the PSS-10. This is a validated scale in its original version [17], and we integrated the French validated version [20], consisting of 10 items. This questionnaire has strong internal consistency as supported by Cronbach's alpha over 0.7. Each item was evaluated on a five-point Likert scale, ranging from 0 (never) to 4 (very often). Individual scores ranged from 0 to 40, with higher scores indicating greater perceived stress. Three levels of stress were established: a low level for scores from 0 to 13, a moderate level for scores from 14 to 26, and a high level for scores from 27 to 40 [17].

The third part of the study employed a shortened validated version of the BFI-10 questionnaire in French [21], adapted from its original English version [18]. Its Cronbach's alpha ranges from 0.37 to 0.83, likely underestimated given the small number of items in this questionnaire. Each item was rated on a 5-point Likert scale, ranging from 1 (Strongly Approves) to 5 (Strongly Disapproves). Items 1, 3, 4, 5 and 7 were reverse-scored (at the time of calculation, the rating 5 became 1, and so on).

The scale assessed five personality traits: extraversion, openness, agreeableness, conscientiousness, and neuroticism. Each personality trait was assigned a score ranging from 2 to 10. The higher the score, the more pronounced the trait. Each personality trait was compared with the average score in the population used for the validation of the BFI-10 questionnaire in French. Scores above or below average distinguish, respectively, Extraversion vs. introversion, Agreeableness vs. antagonism, Conscientiousness vs. lack of direction, Neuroticism vs. emotional stability, and Openness vs. closedness to experience.

The fourth part of the assessment tool measured the risk of workaholism using the 10-item DUWAS-10 scale in French (Cronbach alpha for EW ranging 0.65–0.72, and CW ranging 0.69–0.71) [22], adapted from the original version [19]. The scale is evaluated on a 4-point Likert scale, ranging from 1 (Almost never) to 4 (Almost always). The scale comprised two subscales, each comprising five items. The first subscale assessed excessive work (EW), while the second assessed compulsive work (CW). For each subscale, the score corresponded to the average of the responses to the five items, with a range of 1 to 4. A higher score indicated a greater tendency towards excessive or compulsive work behavior. The scores for each subscale were averaged to obtain an estimate of the risk of workaholism, with a high final score corresponding to a high risk. The positive cutoffs (mean + 1 SD) applied for the definitions of three cluster populations based on the EW and CW subscales were, specifically, ≥ 3.067 for the EW subscores, and ≥ 2.903 for the CW subscores [23].

Data collection

The link to the self-questionnaire accompanied by an explanation of the study, was distributed online, between May 22nd 2023 and June 30th 2023, to various groups of medical interns on a social media platform (Facebook), the website of the "Syndicat des Internes du Languedoc-Roussillon" (SILR), and in the magazine of the "Association Nationale des Internes en Médecine du Travail" (Mag'ANIMT). The interns consented to the use of the data collected by answering the questionnaire. The data were collected using LimeSurvey, which guarantees their protection and anonymity. On the home page of the questionnaire, participants had access to an information note detailing the aim of the study, anonymous and voluntary participation and its conditions, the legal framework for carrying out the study and data protection.

Sample size

We calculated that 102 participants with complete questionnaires would be sufficient to have an 80% power to explain 15% of the variability for a multivariate linear regression model comprising around ten variables (nQuery software).

Statistical analysis

The population was described in terms of both qualitative and quantitative variables. Qualitative variables were expressed as numbers and percentages, while quantitative variables were expressed as means and standard deviations.

Once it had been established that the explanatory variables were not collinear, multivariate linear regression was employed to analyze perceived stress in the context of the variables of interest (risk of workaholism, personality) and the socio-demographic and occupational variables. As existing literature to inform covariate inclusion is scarce, variables were selected using a backward elimination procedure based on the best Akaike Information Criterion (AIC). Variables used in the model were continuous (PSS-10 scores, DUWAS-10 scores and raw scores of personality obtained with the BFI-10). Score values were normalized in these analyses, therefore, beta coefficients relate to one SD increase of either the perceived stress score or risk of workaholism score. Specifically, beta estimates were adjusted on the variables presented in the model: (i) for stress: risk of workaholism, neuroticism, conscientiousness, agreeableness, time for hobbies; (ii) for risk of workaholism: stress, conscientiousness, extraversion, time for hobbies, work per week.

The significance level was set at $p < 0.05$. Data were analyzed using EasyMedStat 3.30.2 and SAS Enterprise Guide 9.4.

Results

After online dissemination, 477 interns responded to the questionnaire. Among these, 358 questionnaires were complete and analyzed in this study (Fig. 1). Participating interns were well distributed nationwide (Supplementary Fig. 1).

Among responders, most interns were female and pursuing medical specialties (Table 1). Two thirds were in a couple. Regarding their professional activity, interns worked around 52 h per week on average, and over 75% had on-call duties (Table 1). In addition, virtually all interns were able to benefit from the on-call safety rest time, and almost half declared having time for hobbies (Table 1).

Perceived stress levels

The medical interns' perceived stress levels, assessed with the PSS-10 questionnaire, was on average 19.86 (± 6.85) out of a total score of 40 (Fig. 2A). Considering these data in three stress categories, the vast majority of interns presented moderate (67.6%) to high (14.8%) stress levels.

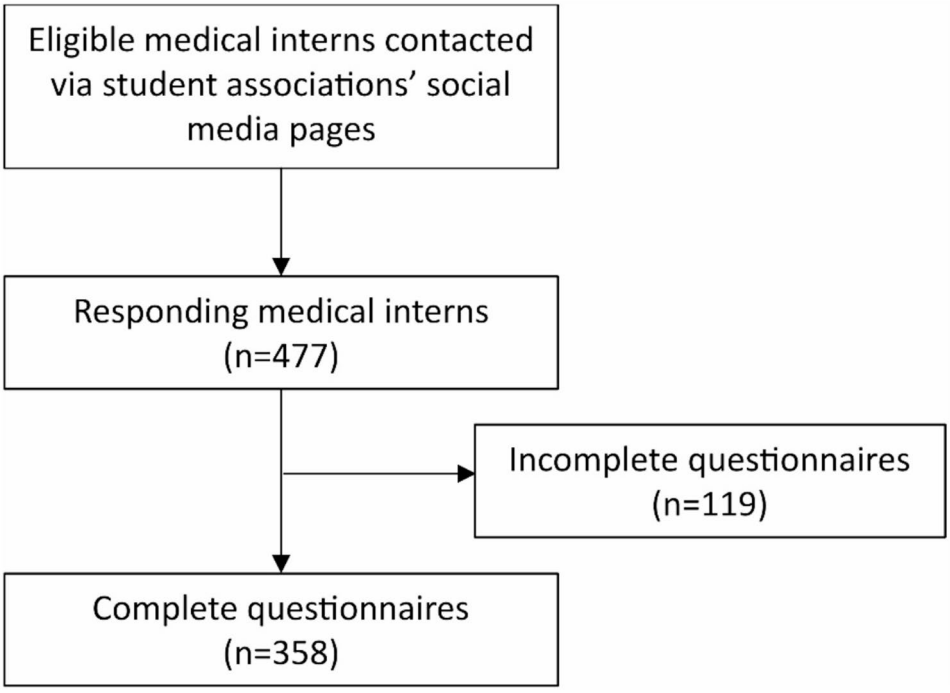

Fig. 1 Study flowchart

Table 1 Population baseline characteristics

	N **= 358**
Age (years) (mean ± SD)	27.22 (± 2.46)
Sex (n, %)	
Female	281 (78.49)
Male	77 (21.51)
Specialty (n, %)	
Surgical	33 (9.22)
Medical	325 (90.78)
Number of completed semesters (mean ± SD)	5.12 (± 2.38)
Marital status (n, %)	
Single	121 (33.80)
In a couple	237 (66.20)
Numbers of weekly work hours (mean ± SD)	51.61 (± 11.71)
On-call duty (n, %)	277 (77.37)
Respected on-call safety rest time (n, %) *	267 (96.39)
Time for hobbies (n, %)	174 (48.60)

Note. * assessed for *N* = 277 participants

Personality traits

Results from the BFI-10 questionnaire showed the highest scores were observed for the personality traits: conscientiousness and neuroticism (Fig. 2B). Comparison of the BFI-10 score results with the national average, for each personality trait, showed that 122 interns (34.1%) were more extrovert than average (score > 6.42); 210 interns (58.7%) were more agreeable (score > 6.42); 296 interns (82.7%) were more conscientious (score > 6.86); 236 interns (57.0%) were more neurotic (score > 6.4); and, 124 interns (34.6%) were more open to experiences (score > 7.36).

Risk of workaholism

On average, the overall risk of workaholism was 2.32 ± 0.6. It ranged from 1 to 3.9 and the median was 2.3 (Q1 1.9; Q3 2.7) (Fig. 2C). Considering the excessive work (EW) and compulsive work (CW) subscales independently, the average was 2.43 (± 0.6) and 2.21 (± 0.7), respectively. Cross-referencing these results enabled the definition of three cluster populations: workaholics, with high EW and CW scores, excessive workers with high EW scores, and compulsive workers with high CW scores. In this population of medical interns, 34 (9.5%) were workaholics, 24 (6.7%) were excessive, 29 (8.1%) were compulsive, whereas most interns (271, 75.7%) showed moderate or low EW and CW scores.

Factors associated with perceived stress and risk of workaholism

Multivariate analysis showed agreeableness, neuroticism and risk of workaholism were associated to higher perceived stress levels (Fig. 3A). On the contrary, having time for hobbies and conscientiousness were associated with lower perceived stress levels (Fig. 3A).

A second multivariate analysis on risk of workaholism found the number of weekly work hours, the perceived stress score, and conscientiousness were associated to higher risk of workaholism (Fig. 3B). In addition, time for

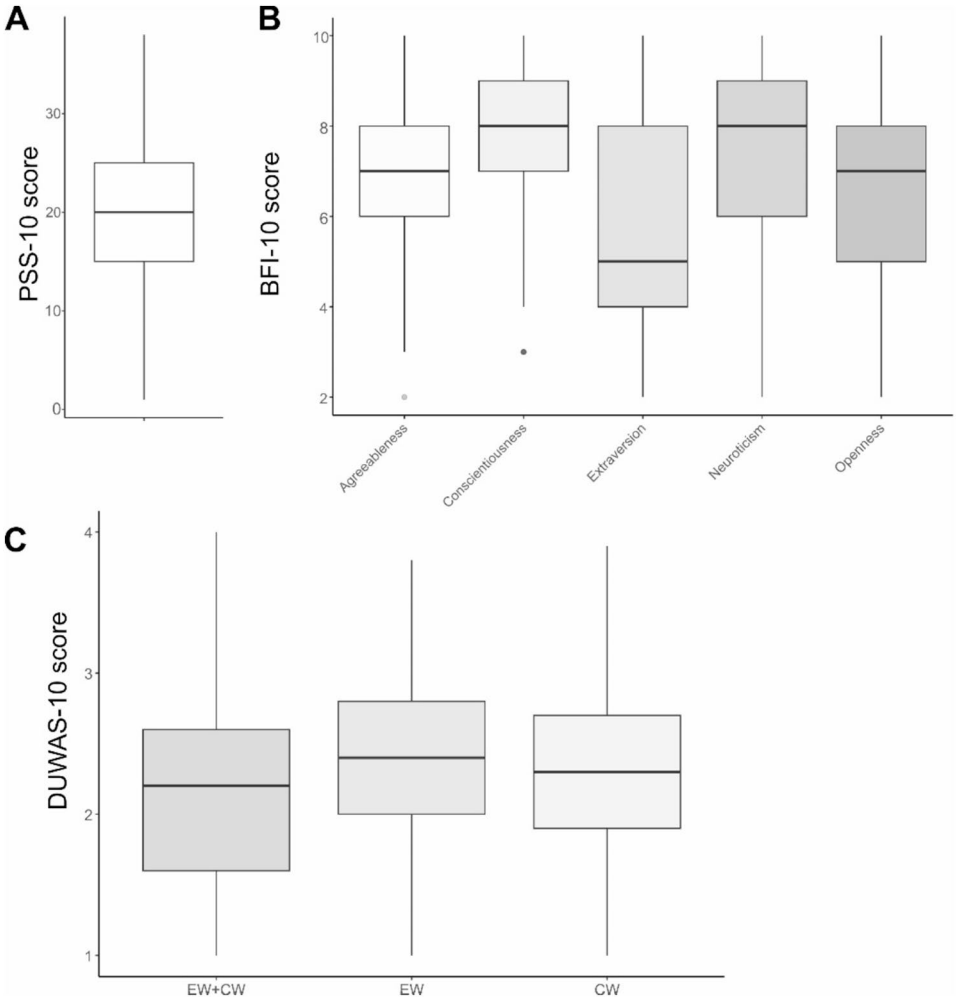

Fig. 2 **A**) Score results of Perceived stress levels according to the Perceived Stress Scale (PSS-10) questionnaire. **B**) BFI score distribution per personality trait (C, conscientiousness; N, neuroticism; O, openness; A, agreeableness; E, extraversion). **C**) Risk of workaholism according to DUWAS-10 score results (EW, excessive work; CW, compulsive work)

hobbies was also associated to lower risk of workaholism (Fig. 3B).

Overall, considering all measured parameters, we were able to detect several factors associated with perceived stress and risk of workaholism in medical interns (Fig. 4). These two factors were intertwined, with medical interns at higher risk of workaholism being associated with higher levels of perceived stress. Time for hobbies was a significant protective factor influencing perceived stress. While we observed the presence of protective factors, these were fewer and generally less impactful than the identified risk factors, such as personality traits (neuroticism and conscientiousness).

Discussion

Overall, our study showed that perceived stress is influenced by certain personality traits and risk of workaholism in medical interns. We also found additional determinants that affect perceived stress and risk of workaholism, namely, time for hobbies and the number of weekly work hours.

Personality traits

Regarding the measured personality traits, conscientiousness was associated with a reduction in perceived stress, which corroborates data already found in the literature [24, 25]. Conscientiousness was previously associated with active, problem-focused coping strategies [26]. These strategies help conscientious individuals avoid predictable stress and manage it better, perceiving life events as challenges rather than threats [7, 27]. We found that conscientiousness was also associated with an increased risk of workaholism. While this result may seem contradictory, it could be explained by the fact that a structured environment enables a conscientious person to better manage stress. On the other hand, a disorganized work environment or excessive pressure could lead

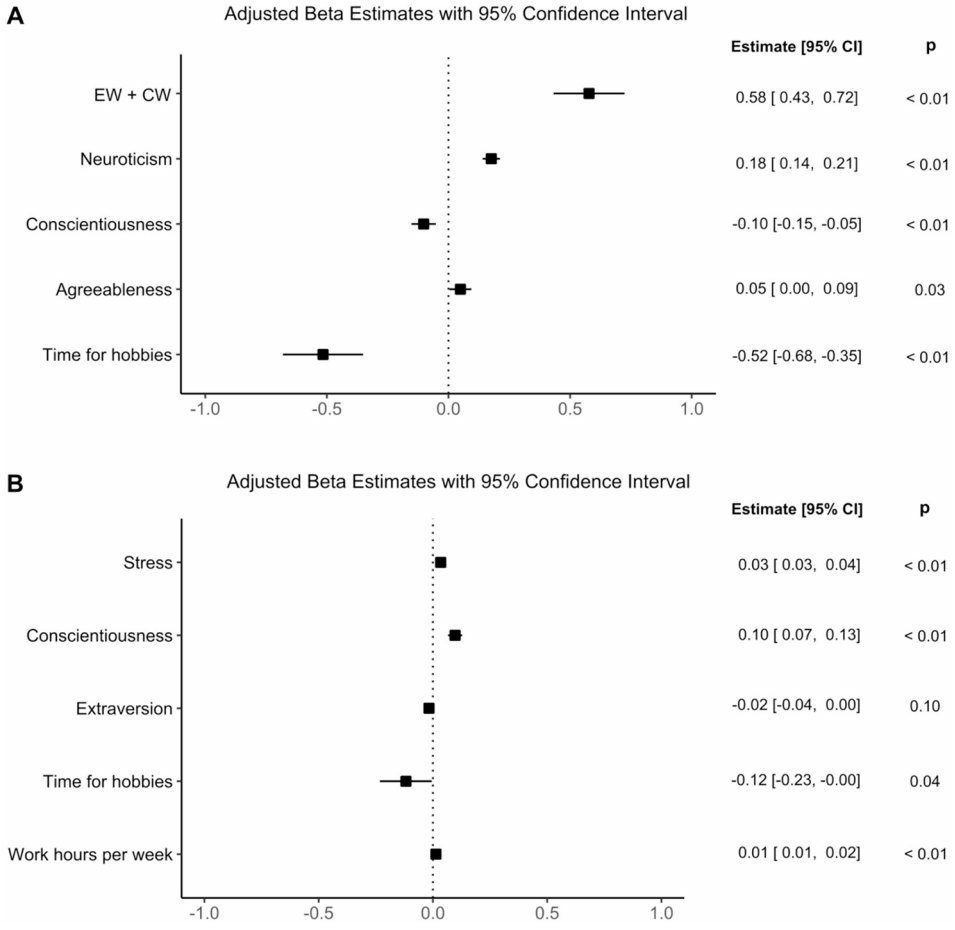

Fig. 3 Predictive factors associated with perceived stress and risk of workaholism. **A**) Multivariate analysis on stress (adjusted beta estimates + 95%CI + p). **B**) Multivariate analysis on risk of workaholism (adjusted beta estimates + 95% Confidence Interval + p-value). EW, excessive work; CW, compulsive work

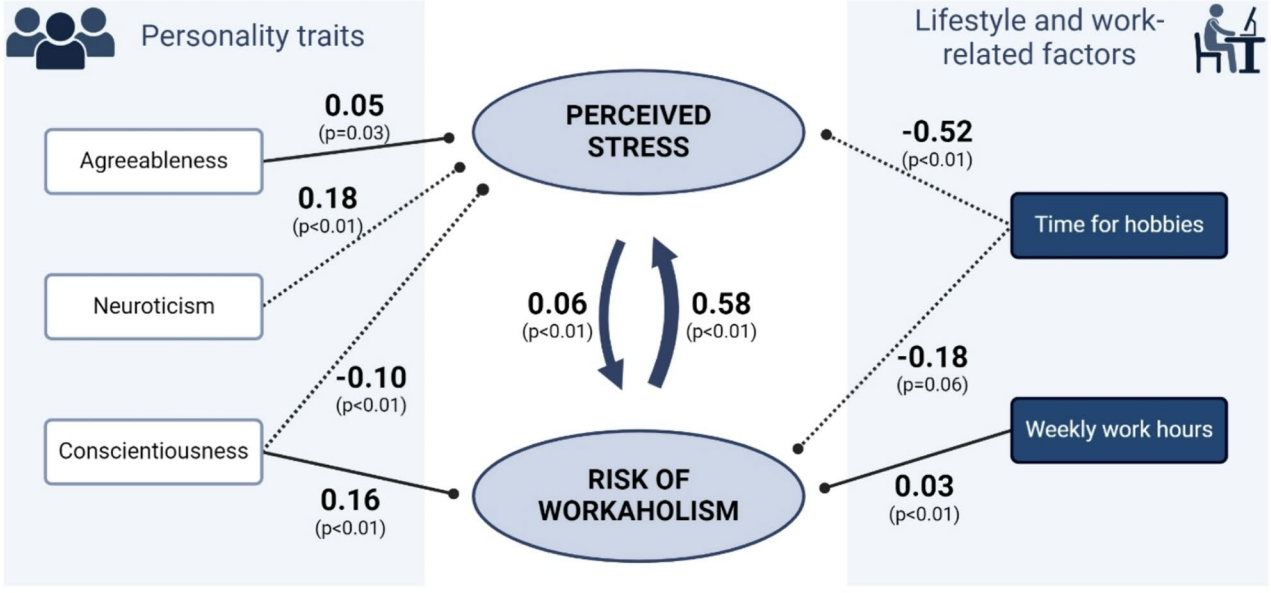

Fig. 4 Summary of found associations on perceived stress and risk of workaholism. Dashed arrows correspond to protective factors. Filled arrows correspond to risk factors

to maladaptive perfectionism and an increased risk of workaholism [28].

Our results showed an increase in perceived stress was influenced by increased neuroticism. Several existing studies support this association [29]. Neuroticism is associated with poor emotional management and weak coping resources [30]. Thus, a neurotic individual will tend to perceive life events as threats, predicting higher exposure to stress.

We also found increased perceived stress were associated with higher agreeableness scores, contrary to previous unclear findings in the literature results [31]. Agreeableness is defined as altruism and caring for others. This result could be explained by the fact that being pleasant generates positive reactions from those around us, reducing stress. Altruistic and generous individuals often invest more effort, which can cause stress [31]. This association may vary by context: agreeable individuals may experience less stress in a collaborative environment, but struggle setting boundaries in a conflictual environment under recurring demands, increasing their stress levels.

Globally, previous literature supports most of the links between personality and stress and workaholism observed in our study, while underlining that they are not linear [24]. Our study focuses on personal factors related to perceived stress. It is important to emphasize that environmental and professional factors are known to influence this effect [32–34].

Interplay of perceived stress and risk of workaholism

Our results also showed that having time for leisure activities reduces perceived stress. Previous research showed that work overload and less rest time increased stress and disrupt work-life balance [35]. Another study confirmed that time for extra-professional life reduces stress [36], supporting our results.

Our results suggested that perceived stress is associated with an increased risk of workaholism. Considering these results, we hypothesize that highly stressed individuals identify work as unpredictable and uncontrollable, levering their resources to cope. These coping mechanisms could lead to pathological over-investment in work [37].

Inversely, our results showed that higher perceived stress was associated with greater risk of workaholism. Numerous studies included in the meta-analysis by Clark et al. support this finding [15]. Workaholism is associated with a negative affective state [38]. We posit that individuals develop a pathological relationship with work, characterized by unfeasible professional objectives, work-life imbalance, interpersonal conflicts and a lack of sleep, all increasing stress levels.

Our results identified conscientiousness as a risk factor for workaholism. Conscientious individuals are characterized by perseverance and an orientation towards achievement, frequently observed in workaholics. Nevertheless, research has not established a link between these two variables. Only Andreassen et al. [39] found a link between conscientiousness and the three components of the workaholic triad described by Spence and Robbins [11]. We speculate that highly conscientious people may struggle with uncontrollable stress, making their coping strategies and capacity for perseverance ineffective, and leading to a pathological relationship with work [40, 41].

The number of weekly work hours was associated with greater risk of workaholism, consistent with previous studies. Clark et al. showed a positive connection between time spent at work and workaholism [15]. Organizational characteristics, including work overload and working extra hours, are risk factors. Our results showed that risk of workaholism was negatively linked to leisure time, suggesting workaholics prioritize work over other life aspects (such as leisure), while having leisure time may reduce the risk of workaholism. No other studies have examined this link even though leisure time is part of a balanced life, which protects against workaholism [36]. We suggest that leisure time can be used both to identify and prevent workaholism.

Perspectives

Medical interns are particularly vulnerable and exposed to stress and PSR [42]. Stress and over-investment in work can harm their physical and mental health. These can lead to high levels of psychological distress (anxiety, depression, suicidal thoughts), physical health problems (cardiovascular problems, sleep disorders). They can also impact on their personal life and, in extreme cases, lead to burnout syndrome and suicide [43]. Moreover, the high demands and social representation of the medical profession can cause performance anxiety and maladaptive perfectionism, increasing the risk of stress and pathological relationship with work.

We can suggest that work attitudes and job stress are influenced by stereotypes, which should be overcome to prevent them from becoming harmful [44–46]. Some institutions may favor individuals with a compulsive work tendency, believing they are better suited to meet productivity goals [47]. However, it has been shown that workaholism tends to reduce performance and productivity [48], lead to a high level of stress, with harmful consequences for the individual's health and extra-professional life [15].

Research shows the role of mental constructs in stress perception [49] and dysfunctional work relationships [8]. These individual behaviors are amenable to both primary and secondary prevention measures.

Among preventive measures, the importance of work-life balance should be emphasized [50]. Our results also suggested that interns should dedicate time to rest and personal life, including leisure activities. Raising awareness about this essential aspect can help prevent stress and destigmatize devoting time for hobbies.

Finally, it is essential to educate and screen for workaholism, which is still poorly understood. Medical interns often start over-investing in their work during their undergraduate studies [13], potentially leading to workaholism as doctors [51]. This suggests a continuity of this risk from early education. Occupational physicians and preventive medicine departments can help identify and prevent stress, workaholism, and at-risk personality traits in medical interns. Collaboration between preventive medicine, university health services, GPs, psychiatrists and psychologists could improve managing these risks and their consequences.

Training programs could integrate interventions to prevent stress and workaholism, such as stress management, relaxation strategies, goal setting, communication, relationship management. Medical interns could access tools for time management, task prioritization, mentorship among interns, and leisure activities (sports, cultural, or artistic). Additionally, occupational health monitoring could include self-assessment of personality traits, workaholism awareness and psychological support. Supervisors (teachers, internship supervisors) could receive training on mental health, preventing PSR, sexual and gender-based violence (SGBV), pedagogy, and identifying risk situations.

Limitations and strengths

The main limitations of the present study were the sample size and representativeness of medical interns. The participation rate is unknown, estimated at 1.4%, based on 33,000 contacted members, likely an underestimate. Nevertheless, we exceeded our target number of participants, with a well-distributed sample across medical specialties nationwide. The use of an online self-questionnaire led to a selection bias. This bias could have led to an overrepresentation of stressed individuals in our analyzed population. To mitigate this, we carried out a nationwide multicentric study with wide distribution via social networks. Another limitation is the cross-sectional design, limiting assessment of long-term changes. Additionally, responses are subjective. The low proportion of interns from surgical specialties in this study, although comparable to the overall population, may limit the generalizability to this subpopulation. Finally, while multivariable models based on backward selection are useful to establish associations, causality cannot be inferred and results should be interpreted cautiously.

One key strength of our study is its originality as no other study has assessed the link between perceived stress, personality and the risk of workaholism in French medical interns. In addition, the study design enabled easy implementation and wide distribution of the self-questionnaire. We used a validated, concise scale in French, thereby maintaining engagement and ensuring questionnaire completeness.

Conclusion

Our study suggests a link between perceived stress, personality and the risk of workaholism among French medical interns. Implementing occupational health monitoring and addressing their relationship with work, stress management and the personality could help prevent PSR and their consequences. Research into these issues will enhance understanding, prevention and management of such mechanisms.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-025-06914-4.

Supplementary Material 1

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Author contributions

CJ, LM, MC conceptualized the study. CJ and LM designed and supervised the study. CJ, LM, MC conducted the formal analysis. MC led the investigation. MC and JP interpreted and validated the findings. JP and MC created the visualizations and drafted the manuscript. All authors read and approved the final manuscript.

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There is no funding or funding agency involved in the design of the study, the collection, analysis, and interpretation of data, and in the writing of the manuscript.

Data availability

Due to the nature of the research and to ethical restrictions, supporting data is not available.

Declarations

Ethics approval and consent to participate

This study was approved by the Montpellier University Hospital Institutional Review Board (ID 202201262). The project was also registered in the Health Data Hub public directory in accordance to French data protection authority (CNIL) legislation (#N° F20230507183259). Informed consent was obtained from all participants. To this end, participants were given access to an information note on the home page of the questionnaire detailing the aim of the study, anonymous and voluntary participation and its conditions, the legal framework for carrying out the study and data protection. Participants agreed to take part in the study by completing the questionnaire and consented to the use of the data collected.

Consent for publication

Not applicable.

Competing interests
The authors declare no competing interests.

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