RESEARCH ARTICLE

Occupational exposure factors for mental and behavioral disorders at work: The FOREC thesaurus

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Abstract

Background

Mental disorders in the workplace are a major public health problem. Knowledge of the impact of the psychosocial work environment on mental and behavioral disorders can assist occupational physicians in the identification and description of occupational risk situations, and help to define priority actions. However, no classification for occupational exposure factors is currently available. We aimed to build a thesaurus of “Organizational, Relational, Ethical and other Contributing Factors” (FOREC) linked with the onset of mental and behavioral disorders.

Methods

The French Agency for Food, Environmental and Occupational Health and Safety (ANSES) initiated and supervised a multidisciplinary working group consisting of the representatives of the main French occupational and public health actors. All decisions were accepted on a
consensus basis. This collaborative work led to the classification of occupational exposure factors for mental and behavioral disorders in the workplace. To test this thesaurus in clinical practice, a French multicenter study was implemented. Patients were workers referred to the Occupational Disease Centers for mental health issues at work. Factors contributing to mental and behavioral disorders among workers were identified and coded retrospectively from the worker’s point of view using the FOREC thesaurus.

**Results**

We recruited 323 workers, aged 44.9±9.2 years, of which 31.3% were men. The most commonly encountered disorders were generalized anxiety disorders (106 workers, 32.8%) and moderate depressive episodes (86 workers, 26.7%). We identified 1357 factors, i.e. an average of 4.2 factors per worker. Among them, 575 (42.4%) were relational and 515 (37.9%) were organizational. All factors identified during consultations were described in the thesaurus.

**Conclusions**

We built the first thesaurus of “Organizational, Relational, Ethical and other Contributing Factors” (FOREC) that may help to generate profiles of mental and behavioral disorders at work. Encoding and describing these exposure factors, as well as using a worldwide standardized and shared terminology, will help to identify specific workplace prevention programs.

**Introduction**

Mental disorders are major public health problems in the workplace [1]. Work stressors, such as psychological and organizational demands (e.g. work pace, time pressure, complexity of work and conflicting tasks [2]), have an impact on common mental disorders [3]. Mental disorders increase business and social costs due to losses in productivity [4,5,6,7], sick leave [8,9] and staff turnover (Ref. needed). Mental disorders are also associated with morbidity and mortality [10,11,12]. For these reasons, work-related mental disorders constitute an important public health challenge.

Since 2000, the French National Occupational Diseases Monitoring and Prevention Network (RNV3P) has been gradually expanded in metropolitan areas of France. This network collects data, in a sustainable and coordinated way, from Occupational Disease Centers in 32 university hospitals and about ten occupational health services. The initiative targets the improvement and harmonization of practices for the diagnosis of work-related diseases, the identification of emerging risks in occupational health, the identification and description of occupational risk situations, and helps to define priority actions [13,14,15,16].

Between 2001 and 2012, the RNV3P logged 294,243 consultations. Due to the size and importance of the RNV3P database, encoding data in a consistent manner is essential, especially for statistical analyses. The aim of using a standardized and shared terminology is to describe and characterize work situations related to occupational diseases, to develop prevention strategies for occupational risks, and to facilitate the exchange and sharing of information between different stakeholders. Thus, a common classification of occupational exposure factors was developed which is freely available for all healthcare professionals, including...
physicians and public health specialists [14]. In 2012, the most frequently encountered health problems in occupational consultation centers were related to mental and behavioral disorders (19%). However, no classification of occupational exposure factors for mental and behavioral disorders at work is currently available. Knowledge of the impact of the psychosocial work environment on mental and behavioral disorders can assist occupational physicians in the identification and description of occupational risk situations, and helps to define priority actions.

The primary aim was to build a thesaurus of “Organizational, Relational, Ethical and other Contributing Factors” (FOREC) that contribute to the onset of mental and behavioral disorders. In this article we present the methodology that led to its creation. The secondary aim was to describe the results obtained after using the FOREC thesaurus in clinical practice during consultations for work-related mental disorders.

Methods
Development of the FOREC thesaurus
The French agency for Food, Environmental and Occupational Health and Safety (ANSES) initiated and supervised a multidisciplinary working group to build the FOREC thesaurus. This working group was set up with the representatives of the main occupational and public health actors, such as the ANSES, the French National Health Insurance System (CNAM), Occupational Disease Centers, Occupational Health Services, the French Institute for Public Health Surveillance (InVS), the Interdepartmental Center of Health and Occupational Medicine in Factories (CISME), and the French Institute for Research and Security (INRS). This work was collaborative. The representatives of the main occupational and public health actors who attended the meetings for the creation of the FOREC thesaurus were nationally recognized experts in health, occupational medicine, mental disorders, and work-related stressors (organization, relation, or ethics). Specialized physicians from Occupational Diseases Centers of university hospitals, who undertake mental health consultations in the workplace [17,18], participated in the meetings. For two years, they were asked to list all organizational, relational, ethical and other contributing occupational factors linked with mental and behavioral disorders that were identified during their mental health consultations. Other actors also proposed other putative contributing factors from their own personal experiences. Eleven national meetings were held over three years. Firstly, the occupational exposure factors that could promote mental health and prevent mental and behavioral disorders were listed. All decisions regarding the inclusion of factors within the FOREC thesaurus were approved on a consensus basis. They were then classified, which led to an updated FOREC thesaurus.

Presentation of the FOREC thesaurus
The classification was proposed by members of the multidisciplinary working group on a consensus basis. Occupational factors linked with mental and behavioral disorders were grouped into clinically relevant headings and sections based on ICD-10. The multidisciplinary working group proposed a FOREC thesaurus composed of six chapters: inherent demand of the work, functional organization of the business, relations at work and violence, personal ethics, ethics of the business, and other contributing factors. The first five chapters classify the professional situation inside the enterprise. The sixth chapter concerns the “contributing factors” that are related to the person’s status or are totally external to the enterprise. These six chapters are divided into a total of 34 subchapters. Subchapters are coded with 3 digits and are divided into 186 items in total. Items are coded with 4, 5 or 6 digits. The FOREC thesaurus is presented in Table 1 in its entirety.
Table 1. Organizational, relational, ethical and other contributing factors–Thesaurus completed to 4, 5 or 6 digits.

| Code | Heading |
|------|---------|
| 70   | Inherent demand of the work |
| 700  | Work schedule |
| 7000 | Shift work (2x8, 3x8, 5x8….) |
| 7001 | Night work |
| 70010| Regular night work (>5 nights per month) |
| 70011| Occasional night work |
| 7002 | On-call working |
| 7003 | Working on Sundays and public holidays |
| 7004 | Length of working day consistently in excess of 10 hours |
| 7005 | Split shifts (divisible or split working day) |
| 7006 | Weekly rest period regularly less than 48 hours |
| 7007 | Unpredictability of working schedule |
| 7009 | Other working schedule capable of causing disturbance to health |
| 701  | Business travel |
| 7010 | Business travel (mission) disturbing social life without sleeping out |
| 7011 | Business travel (mission) disturbing social life with sleeping out |
| 7012 | Business travel (mission) disturbing chronobiology (jet lag) |
| 7019 | Other business travel capable of causing disturbance excluding chosen journeys/commuting cited in 7533. |
| 702  | Other specific features imposed by the work |
| 7020 | On call by telephone or email |
| 70200| On call by telephone (or SMS or email) only |
| 70201| On call by telephone (or SMS or email) with call out |
| 70209| Other on call |
| 7021 | Involuntary part-time work |
| 7022 | Imposed teleworking |
| 7023 | Imposed working from home |
| 7024 | Imposed temporary work |
| 7025 | Imposed overtime |
| 7026 | Requests at any time outside of working hours |
| 70260| Requests at any time outside of working hours by clients |
| 70261| Requests at any time outside of working hours by management or colleagues |
| 7029 | Other specific imposed conditions capable of causing disturbance |
| 703  | Distinctive feature of the work |
| 7030 | Poor quality of work content |
| 70300| Monotonous work, little or no creativity |
| 70301| Versatility of tasks resulting in a lack of identity (stand in) |
| 70309| Other features of poor quality of work content |
| 7031 | Specific demand of work content |
| 70310| Activities requiring alertness, concentration, very close attention |
| 70311| Function involving high human, financial or safety responsibilities (increase in responsibilities) |
| 70312| Regular contact with the public |
| 70313| Working alone (work with a lack of contact causing feelings of isolation) |
| 70314| Variability, unpredictability of workload |
| 70315| Work with strong emotional loading (e.g. empathy, contact with people who are suffering) |
| 70316| Work requiring continuous or excessive control of emotions (facticity, inauthenticity, hiding emotions) |

(Continued)
Table 1. (Continued)

| Code | Heading |
|------|---------|
| 70317 | Working under imposed time constraints (assembly line work, high throughput, performance based wages, pace imposed) |
| 70318 | Fragmented or segmented work: multiple, concurrent tasks or frequent interruptions. |
| 70319 | Other demands of work content capable of causing disturbance |
| 7039  | Other distinctive feature of the work capable of causing disturbance |
| 709   | Other general inherent demand of the work capable of causing disturbance |
| 71    | Functional organization of the business |
| 710   | Change in the organization and specific approach of management |
| 7100  | Major restructuring in preceding or coming months |
| 71000 | Elimination of position |
| 71001 | Outsourcing of business |
| 71002 | Takeover |
| 7101  | Change of personnel |
| 71010 | Change of colleagues |
| 71011 | Change of management |
| 71019 | Other change of personnel |
| 7102  | Change of methods |
| 71020 | Change of management methods |
| 71021 | Change of production methods |
| 7103  | Non-regulated matrix management or cross-cutting project |
| 7109  | Other change in the organization capable of causing disturbance |
| 711   | Insufficient or excessive workload experienced |
| 7110  | Excessive workload experienced |
| 71100 | Excessive workload experienced during working hours |
| 71101 | Excessive workload experienced requiring working at home |
| 7111  | Insufficient workload experienced |
| 7119  | Other workload conditions capable of causing disturbance |
| 712   | Excessive procedures and supervision |
| 7120  | Procedures perceived as excessive |
| 7121  | Supervision perceived as excessive |
| 7122  | Continuous supervision by material means (video surveillance, computer, recording, informer) |
| 7129  | Other procedure or supervision perceived as excessive |
| 713   | Low decision latitude in the organization of their work |
| 714   | Few opportunities to learn or develop their skills |
| 715   | Lack of recognition (encouragement, congratulations etc.) or reward (e.g. salary, promotion, annual appraisal) |
| 7150  | Perceived deficiencies in verbal expression, lack of expression of recognition in oral or written form |
| 7151  | Perceived deficiency of salary |
| 7152  | Perceived deficiency (lack or delay) of promotion |
| 7153  | Perceived deficiency of recognition of title or of degree |
| 7159  | Other perceived deficiency of recognition or of reward |
| 716   | Insufficiency of resources |
| 7160  | Mismatch objective/resources |
| 7161  | Insufficient training in connection with the task to be undertaken |
| 7162  | Failings in communications flow |
| 7163  | Objective deficiency of management (lack of management personnel or overly distant management) |

(Continued)
| Code  | Heading                                                                 |
|-------|------------------------------------------------------------------------|
| 7164  | Objective deficiency of non-managerial personnel, of work colleagues (unfilled position, absence not covered) |
| 7165  | Slippage of task and responsibility (ambiguity of roles)               |
| 7169  | Other insufficiencies of resources                                      |
| 717   | Dysfunction in the instructions of management                           |
| 7170  | Content of the work poorly defined (absence of job description or procedures) |
| 7171  | Paradoxical instructions                                                |
| 7172  | Regularly exceeding contractual hours, unpaid, unrecovered overtime     |
| 7173  | Perceived ambiguous positioning of management                            |
| 7174  | Management perceived as evasive (failure to arbitrate, not taking decisions, etc) |
| 7175  | Objectives seen as unattainable (pressure, not objective)               |
| 7179  | Other dysfunctions in the instructions from management capable of causing disturbance |
| 718   | Transfer to another position or another site (or announced in the 3 months preceding the first signs) |
| 7180  | Transfer for a determined period                                         |
| 71800 | Transfer for a determined period not requiring family relocation         |
| 71801 | Transfer for a determined period requiring family relocation             |
| 7181  | Transfer for an undetermined period                                     |
| 71810 | Transfer for an undetermined period not requiring family relocation      |
| 71811 | Transfer for an undetermined period requiring family relocation         |
| 7182  | Imposed redeployment                                                    |
| 71820 | Imposed redeployment to another position at the same site               |
| 71821 | Imposed redeployment to another position at another site                |
| 7189  | Other transfer to another position or another site                       |
| 719   | Other general features of the functional organization of the business capable of causing disturbance |
| 72    | Relations at work and violence                                          |
| 720   | Quality of relations at work                                            |
| 7200  | Deleterious relationships experienced                                  |
| 72000 | Deleterious relationship with management experienced                     |
| 720001| Deleterious relationship with management with constant criticism experienced |
| 720002| Deleterious relationship with management through lack of being heard experienced |
| 720003| Deleterious relationship with management through asymmetric communications experienced |
| 720004| Deleterious relationship with management with implicit threat of dismissal experienced |
| 72001| Deleterious relationship with the work group or peers experienced (sidelined, categorical divide) |
| 72002| Deleterious relationship in isolation with a colleague experienced       |
| 72003| Deleterious relationships experienced after undergoing disciplinary measures (suspension . . .) |
| 7201  | Deficiency of support experienced                                       |
| 72010 | Deficiency of support from management experienced                        |
| 72011 | Deficiency of support from the work group or peers experienced           |
| 7209  | Other qualitative feature of relations capable of causing disturbance    |
| 721   | External violence (persons outside of the workplace)                     |
| 7210  | Verbal aggression (external violence)                                   |
| 72100 | Verbal aggression without credible threat of death (external violence)   |
| 7211  | Verbal aggression with credible threat of death (external violence)      |
| 7211  | Physical aggression                                                     |
| 7212  | Robbery, hold-up                                                        |
| 7213  | Witnessing a traumatic event                                            |
### Table 1. (Continued)

| Code | Heading |
|------|---------|
| 7219 | Other external violence |
| 722 | Internal violence (another company employee) |
| 7220 | Verbal aggression (internal violence) |
| 72200 | Verbal aggression without credible threat of death (internal violence) |
| 72201 | Verbal aggression with credible threat of death (internal violence) |
| 7221 | False accusation experienced |
| 72210 | False accusation experienced without a procedure |
| 72211 | False accusation experienced with involvement in a procedure |
| 7222 | Aggression, physical violence suffered |
| 7223 | Traumatic event experienced as a witness or through an account received |
| 72230 | Witnessing verbal or physical aggression |
| 72231 | Witnessing workplace death, excluding suicide |
| 72232 | Witnessing a suicide |
| 722320 | Witnessing a successful suicide at work |
| 722321 | Witnessing a suicide attempt at work |
| 72233 | Received account of verbal or physical aggression or of a suicide attempt |
| 722330 | Received account of verbal or physical aggression or of a suicide attempt linked to work, outside of workplaces (threats during journeys) |
| 722331 | Received account of verbal OR physical aggression or of a suicide attempt occurring in the workplace |
| 72234 | Received account of a successful suicide |
| 722340 | Received account of a successful suicide linked to work outside of the workplace |
| 722341 | Received account of a successful suicide in the workplace |
| 72235 | Received account of a death (excluding suicide) linked to work (colleagues) wherever the place of occurrence |
| 72239 | Other traumatic event related to work |
| 7224 | Sexual harassment experienced |
| 7225 | Discrimination experienced (gender, age, sexual orientation, etc.) |
| 7226 | Bullying at work experienced |
| 7227 | Deskilling |
| 7228 | Sidelined |
| 7229 | Other internal violence |
| 7229 | Other internal violence |
| 729 | Other general features of relations at work capable of causing disturbance |
| 73 | Personal ethics–conflict of values |
| 730 | Performing an act going against their principles (miss-selling, making redundancies) |
| 731 | Being a powerless witness to acts going against their principles |
| 732 | Lacking resources or time to do quality work |
| 739 | Other conflict of values relating to personal ethics |
| 74 | Ethics of the business |
| 740 | General level of safety or a low safety culture |
| 741 | General level of hygiene or poor hygiene culture |
| 742 | Lack of means |
| 7420 | Lack of collective means of protection |
| 7421 | Lack of individual means of protection |
| 743 | Lack of respect in verbal communications |
| 749 | Other ethical failing of the business capable of causing disturbance |
| 75 | Other contributing factors |
| 750 | Particular medical or social status capable of altering relationships |
| 7500 | Inadequate or inappropriate consideration of limitations of ability (excluding disability) |

(Continued)
| Code | Heading |
|------|---------|
| 7501 | Limitation of ability not accepted by the employee |
| 7502 | Return after absence |
| 75020 | Return after a break in working due to illness |
| 75021 | Return after an accident at work/occupation related illness/disease |
| 75022 | Return after maternity leave |
| 75023 | Return after parental leave |
| 75024 | Return after annual leave |
| 75025 | Return after individual training leave |
| 7503 | Person recognized as having a disability |
| 7509 | Other medical or social status able to alter relations |

**751 Claims for entitlements including: claims concerning leave, training, bonuses not being received, payment of overtime, signing a petition**

| Code | Heading |
|------|---------|
| 7510 | Action taken as a result of social commitment or elective mandate |
| 7511 | Action taken in a personal capacity |
| 7519 | Other feature of claiming rights |

**752 Taking a personal stance or action challenging the company**

| Code | Heading |
|------|---------|
| 7520 | Denouncing supposed or alleged dishonest actions connected with professional activities |
| 7521 | Externalization of an internal company issue *(with a labor inspectorate, a lawyer, etc)* |
| 7529 | Other personal stance or action challenging the company |

**753 Specific chosen working conditions**

| Code | Heading |
|------|---------|
| 7530 | Multiple employers |
| 7531 | Chosen teleworking |
| 7532 | Chosen working at home |
| 7533 | Home—work commute |
| 75330 | Home—work commute >2 hours per day |
| 75331 | Home—work commute >3 hours per day |
| 7534 | Overqualified at work |
| 7535 | Desired redeployment to another position |
| 75350 | Desired redeployment to another position at the same site |
| 75351 | Desired redeployment to another position at another site |
| 7536 | Position not meeting aspirations but accepted for economic reasons |
| 7537 | Chosen part-time work |
| 7538 | Chosen temporary work |
| 7539 | Other specific chosen working condition able to cause disturbance |

**754 Contributing factor linked to the business (social context, economic context)**

| Code | Heading |
|------|---------|
| 7540 | Unfavorable socio-economic context |
| 75400 | Unfavorable social context *(social upheaval, strike, periods of notice)* |
| 75401 | Unfavorable economic context *(temporary lay-offs, wage freezes, company financial difficulties)* |
| 75409 | Other unfavorable socio-economic context |
| 7541 | Conventional procedure of contract termination or leaving voluntarily in progress *(only code if unfavorably experienced)* |
| 7542 | Job insecurity |
| 7543 | Involvement in a termination procedure |
| 75430 | Involvement in a redundancy procedure |
| 75431 | Involvement in an individual termination procedure |
| 7544 | Family business context or of specific links between the individual and management |
| 7549 | Other unfavorable context linked to the company |

**759 Other general feature constituting a contributing factor**

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The first chapter, "Inherent demand of the work", concerns all professional constraints that cannot be dissociated from the activity, but that may be the cause of various disorders. For example, being on call in a hospital can disturb social life or cause insomnia. This chapter is divided into 5 subchapters and consists of 44 items in total.

The second chapter, called "Functional organization of the business", also concerns strong professional constraints. It classifies occupational exposure factors, such as organizational changes, restructuring, insufficient or excessive workload, and workplace transfers. This chapter is divided into 10 subchapters and consists of 51 items in total.

The third chapter is entitled "Relations at work and violence" (referring to instances such as deleterious relationships experienced with management, verbal aggressions, and sideling). In this chapter, the notions of individual experiences of a more subjective nature are presented. This chapter is divided into 4 subchapters and consists of 47 items in total.

Chapters four and five are respectively related to "Personal ethics" (e.g. performing an act going against one’s principles) and "Ethics of the business" (e.g. lack of respect in verbal communications). These chapters provide justification of ethical issues based on case studies.

The sixth chapter, "Other contributing factors", regroups factors that may be viewed as directly related to a person (such as a return after parental leave) or totally external to the enterprise (such as an unfavorable socio-economic context). This chapter is divided into 6 sub-chapters and consists of 42 items in total.

**Multicenter study**

To check the exhaustiveness and clinical relevance of the FOREC thesaurus, we aimed to describe organizational, relational, ethical and other contributing occupational factors linked with mental and behavioral disorders identified during consultations for mental health issues at work. A French multicenter study (Clermont-Ferrand, Créteil, Toulouse, Bordeaux, Garches) was therefore implemented. The Occupational Disease Centers at these University Hospitals were chosen because they shared similar characteristics relating to the management of mental health consultations in the workplace. Included workers were addressed to those consultations by their general practitioner or their occupational physician because of a presumed diagnosis of mental health issues at work [17,18]. They were included over a period of twelve consecutive months. There were no exclusion criteria and all patients who attended a consultation for mental health issues at work were included. The protocol was approved by the ethics committee of the University Hospital of Clermont-Ferrand (approval number: n° 2015CE/69). Socio-demographic, occupational and clinical data were retrieved during two interviews, one with a psychologist and a nurse and a second with an occupational physician and a psychiatrist. The final diagnosis of a mental and behavioral disorder was made during this second, specialized, consultation for mental health issues at work, which also established a link between the issues and professional activity. The link was based on the specialist’s judgment, during the medical examination. Mental and behavioral disorder were coded according to the International Classification of Diseases 10th Revision (ICD-10) and all physicians were trained in this coding by the same organization (ANSES). A detailed medical report was systematically written by the occupational physicians and the psychiatrists for each consultation. The medical report mentioned the diagnosis and the socio-demographic, occupational and clinical data, as well as occupational exposure factors linked with the mental health issues of the workers. The medical reports identifiers were coded prior to analysis. One author (CL) reviewed all coded medical reports from all centers. The author identified and retrospectively coded the data and factors contributing to the workers’ health-related issues using the FOREC thesaurus from the perception of the worker.
Statistical analysis

Statistical analyses were performed using Stata software, version 13 (StataCorp, College Station, TX, US). Continuous data were expressed as mean ± standard deviation and categorical parameters as frequencies (associated percentages).

Results

We recruited 323 workers (31.3% males) with an average age of 44.9±9.2. The most commonly encountered diagnoses in the consultations for mental health issues at work were ‘generalized anxiety’ (106 workers, 32.8%) and ‘moderate depressive episodes’ (86 workers, 26.7%) (Table 2).

During the study period, 1357 occupational factors linked with mental and behavioral disorders were identified, i.e. an average of 4.2 factors per worker. Among them, 575 (42.4%) were relational, 515 (37.9%) were organizational and the remaining 12.2% represented other contributing factors (Table 3). All identified factors were successfully encoded using the thesaurus. Two subchapters were not found in medical reports: “Other general inherent demands of the work capable of causing disturbance” (subchapter 709) and “General level of hygiene or poor hygiene culture” (subchapter 741).

Relational factors were the most common in cases of depressive episodes (41.7%) and anxiety disorders (44.4%), followed by managerial factors (Table 4). Managerial factors were most frequently identified in cases of post-traumatic stress disorder (62.5%) and burn-out (59.6%).

Discussion

This study presents the first thesaurus of occupational exposure factors responsible for mental health issues at work, grouped into clinically relevant headings and sections.

Table 2. Characteristics of the workers.

| Demographic characteristics | n = 323 |
|-----------------------------|---------|
| Gender (male)               | 101 (31.3) |
| Age (years)                 | 44.9 ± 9.2 |
| Disorders encountered       |         |
| F320 –Mild depressive episode| 9 (2.8)  |
| F321 –Moderate depressive episode| 86 (26.7) |
| F322 –Severe depressive episode without psychotic symptoms| 39 (12.1) |
| F410 –Panic disorder        | 3 (0.9)  |
| F411 –Generalized anxiety   | 106 (32.8) |
| F412 –Mixed anxiety and depressive disorder| 47 (14.6) |
| F419 –Unspecified anxiety disorder| 13 (4.0)  |
| F431 –Post-traumatic stress disorder| 2 (0.6)  |
| Z730 –Burn-out              | 11 (3.4) |
| Z03 –No pathology           | 3 (0.9)  |
| Other pathology             | 2 (0.6)  |
| No answer                   | 2 (0.6)  |

Data are presented as frequencies (associated percentages) or as mean ± standard deviation. Encountered diseases are presented with their ICD-10 corresponding code. Other pathology: lateral epicondylitis (M77 1) and irritability and anger (R454).
Table 3. Number of factors identified for each chapter and subchapter.

| Chapter | Factor Description                                                                 | n   |
|---------|------------------------------------------------------------------------------------|-----|
| 70      | Inherent demand of the work                                                        | 1357|
| 700     | Work schedule                                                                     | 27  (2.0) |
| 701     | Business travel                                                                    | 8   (0.6) |
| 702     | Other specific features imposed by the work                                        | 2   (0.1) |
| 703     | Distinctive feature of the work                                                    | 2    (0.1) |
| 709     | Other general inherent demand of the work capable of causing disturbance           | 0   (0.0) |
| 71      | Functional organization of the business                                            | 515 (37.9) |
| 710     | Change in the organization and specific approach of management                     | 148 (10.9) |
| 711     | Insufficient or excessive workload experienced                                    | 67  (4.9) |
| 712     | Excessive procedures and supervision                                               | 22  (1.6) |
| 713     | Low decision latitude in the organization of their work                            | 17  (1.3) |
| 714     | Few opportunities to learn or develop their skills                                 | 4   (0.3) |
| 715     | Lack of recognition (encouragement, congratulations etc.) or reward (e.g. salary, promotion, annual appraisal) | 101 (7.5) |
| 716     | Insufficiency of resources                                                          | 66  (4.9) |
| 717     | Dysfunctions in the instructions of management                                     | 61  (4.5) |
| 718     | Transfer to another position or another site (or announced in the 3 months preceding the first signs) | 25 (1.9) |
| 719     | Other general features of the functional organization of the business capable of causing disturbance | 4 (0.3) |
| 72      | Relations at work and violence                                                     | 575 (42.4) |
| 720     | Quality of relations at work                                                       | 306 (22.6) |
| 721     | External violence (persons outside of the workplace)                               | 17 (1.3) |
| 722     | Internal violence (another company employee)                                       | 250 (18.4) |
| 729     | Other general features of relations at work capable of causing disturbance          | 2 (0.1) |
| 73      | Personal ethics–conflict of values                                                 | 57 (4.2) |
| 730     | Performing an act going against their principles (miss-selling, making redundancies) | 12 (0.9) |
| 731     | Being a powerless witness to acts going against their principles                   | 19 (1.4) |
| 732     | Lacking resources or time to do quality work                                       | 11 (0.8) |
| 739     | Other conflict of values relating to personal ethics                                | 15 (1.1) |
| 74      | Ethics of the business                                                             | 17 (1.3) |
| 740     | General level of safety or a low safety culture                                     | 8 (0.6) |
| 741     | General level of hygiene or poor hygiene culture                                    | 0 (0.0) |
| 742     | Lack of means                                                                      | 4 (0.3) |
| 743     | Lack of respect in verbal communications                                           | 3 (0.2) |
| 749     | Other ethical failing of the business capable of causing disturbance                | 2 (0.1) |
| 75      | Other contributing factors                                                         | 166 (12.2) |
| 750     | Particular medical or social status capable of altering relationships               | 45 (3.3) |
| 751     | Claims for entitlements including: claims concerning leave, training, bonuses not being received, payment of overtime, signing a petition | 11 (0.8) |
| 752     | Taking a personal stance or action challenging the company                          | 73 (5.4) |
| 753     | Specific chosen working conditions                                                  | 3 (0.2) |
| 754     | Contributing factor linked to the business (social context, economic context)      | 32 (2.4) |
| 759     | Other general feature constituting a contributing factor                            | 2 (0.1) |

Data are presented as frequencies (associated percentages).

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Consequences to mental health following exposure to occupational factors

Mental health issues at work are a public health concern. More interestingly, some factors related to work, such as organizational, relational, ethical and other contributing factors were directly linked with some health-related issues. For example, it has been shown that cardiovascular diseases were associated with job strain [19], low decision latitude [20], low reward [21] and low social support [22,23]. It has also been reported that low social support positively predicts depression [24]. Similarly, changes in organization (10.9% of the 1357 identified factors) and conflict of loyalties resulting from workplace changes may also lead to suicide [25]. Moreover, it has long been recognized that depression and anxiety share similarities in their pathogenesis [26]. Among the mental disorders identified in the present study, anxiety and depression seem to share the same exposure profile, i.e. relational (~40%) [27], whereas burnout was mainly linked with organizational factors (~60%), as previously reported [28,29,30].

Occupational factors linked with mental and behavioral disorders

In our study, identified factors were mainly relational (42.4%). Relational regulation theory has previously been proposed as a novel way to improve mental and behavioral disorders [31]. On the other hand, inherent work demands were infrequently cited (2%), which consequently may not be a major source of mental health issues at work. In our study, the inherent work demands that cannot be dissociated from the professional activity seem to be accepted and well tolerated by workers, which might appear contradictory to some previous literature [20]. We demonstrated that 1.3% of the factors identified were related to low decision latitude, 7.5% to lack of recognition or reward and 4.9% to perceptions of a deficiency of support. Supervisor support has previously been shown to buffer the impact of excessive work demands [31]. One hundred and sixty-six contributing and contextual factors (12.2%) showed some new insights into particular medical or social status (such as perceived limitations of ability, return after absence) that may be capable of altering relationships or altering work-related self-efficacy. Studying those factors could provide possibilities for changing practices in the workplace.

Recommendation

The FOREC thesaurus has a worldwide application as the use of a standardized and shared terminology is needed to describe at-risk occupational factors that generate mental and behavioral disorders. Identifying those factors is essential for effective prevention in the workplace and must be based on useful evidence-based information in order to help to define priority.

Table 4. Number of factors identified for each chapter, according to work-related challenges.

| Chapter                                      | Depressive episode | Anxiety disorders | PTSD | Burn-out | No pathology | Other pathology | No answer |
|----------------------------------------------|--------------------|-------------------|------|----------|--------------|----------------|-----------|
| (n = 575)                                    | (n = 699)          | (n = 8)           | (n = 47) | (n = 11) | (n = 5) | (n = 12) |
| 70 Inherent demand of the work               | 10 (1.8)           | 12 (1.7)          | 0 (0.0) | 5 (10.6) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| 71 Functional organization of the business   | 227 (39.5)         | 248 (35.5)        | 62.5 | 28 (59.6) | 2 (18.2) | 0 (0.0) | 5 (41.7) |
| 72 Relations at work and violence            | 240 (41.7)         | 310 (44.4)        | 2 (25.0) | 10 (21.3) | 6 (54.5) | 2 (40.0) | 5 (41.7) |
| 73 Personal ethics-conflict of values        | 22 (3.8)           | 33 (4.7)          | 0 (0.0) | 2 (4.3) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| 74 Ethics of the business                    | 7 (1.2)            | 8 (1.1)           | 12.5 | 1 (2.1) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| 75 Other contributing factors                | 69 (12.0)          | 88 (12.6)         | 0 (0.0) | 1 (2.1) | 3 (27.3) | 3 (60.0) | 2 (16.6) |

Data are presented as frequencies and associated percentages.

ICD-10 corresponding codes were F320, F321, F322 for depressive episode; F410, F411, F412, F419 for anxiety disorders; F431 for post-traumatic stress disorder (PTSD); Z730 for burn-out; Z03 for no pathology; M771 (lateral epicondylitis) and R454 (irritability and anger) for other pathologies.

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actions. At-risk workers should receive follow-ups from occupational physician [32,33], and may benefit from a targeted intervention on the occupational factors that have been identified as generating mental and behavioral disorders [34].

**Limitations**

There are limitations to this study. Some subchapters of the thesaurus may seem less relevant because they were less common. However, a detailed thesaurus is required for exhaustively encoding exposures. This thesaurus can be improved, as are other thesauruses which are continuously enriched by the French National Occupational Diseases Monitoring and Prevention Network (RNV3P) [35,36,37], which also guarantees that they will remain current. The sample size used for describing results from the FOREC thesaurus may seem low, however workers were recruited at the Occupational Diseases Centers of the University Hospitals’ during specialized consultations for mental health issues at work [17,18]. Moreover, a relevant number of occupational factors linked with mental and behavioral disorders were identified (over one thousand), providing substantial data. Variability between independent coders also needs to be assessed. Comparing encoding between a physician and an administrative employee would be of interest. Furthermore, personality traits of the coder may influence data encoding and should be evaluated. Further studies are needed to assess the profile of occupational exposure factors with regard to socio-professional occupations and workers’ demographic characteristics.

**Conclusion**

We built the first thesaurus of “Organizational, Relational, Ethical and other Contributing Factors” (FOREC) that may help to generate profiles of mental and behavioral disorders at work. Using the FOREC thesaurus in clinical practice during consultations for work-related mental health issues has shown that the factors identified during previous consultations were successfully encoded (all factors were described in the thesaurus). The FOREC thesaurus may provide a worldwide standardized and shared terminology, which will help to understand the impact of the psychosocial work environment on the onset of mental and behavioral disorders related to work. The identification and description of occupational risk situations can assist occupational physicians in defining priority actions in the workplace to address mental health issues.

**Supporting information**

S1 Appendix. French version of the FOREC thesaurus.

S1 Database. Titles of columns are written without abbreviations.

S1 Table. Number of workers per occupational group and per level of function according the ISCO-08 classification (n = 322 because of one missing value).

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