

## OTS Panel: A cohort study to explore the relationship between work organization and health in Spain

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### ABSTRACT

**Introduction:** It is well known that work has a great influence on the well-being of workers. In the aftermath of the COVID-19 pandemic, it seems evident that work organization, in particular, plays a key role to face and control a pandemic. Consequently, it is essential to establish specific and sustainable tools to further study the relationship between work organization and workers' health. The aim of this paper is to describe the study design and baseline data of the OTS PANEL ("OTS" stands for "Work Organization and Health" in Spanish).

**Methods:** Panel-type cohort study to be carried out annually applying an online self-administered questionnaire. Work organization and health indicators and their corresponding questions were selected through a multistep process carried out by a team composed by professionals of different disciplines. The sample is composed of  $n = 1824$  salaried workers, aged 25–64, residing in Spain.

**Results:** Mean response time was  $17.4 \pm 7$  min (median 15.8). 84.6 % of the indicators had percentages of missing values lower than 3 %, with labor market insecurity being the highest (5.8 %). We compute 39 indicators in which, except for a few cases, women and manual workers show consistently worse results.

**Conclusions:** OTS PANEL can represent a valuable information source in Spain to contribute to generate solid evidence for research and for decision-making to improve the living and health conditions of the working population.

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## 1. Introduction

The course of the COVID-19 seems to have shown that the work organization (WO) plays a prominent role in pandemic contexts. The application of “new” labor management practices, some that have appeared or intensified in this pandemic (telework, temporary lay-off plans, etc) and others that may appear in the future, can become basic elements to face the pandemic and reduce the virus spreading risk. At the same time, however, they may have undesirable effects, because an inadequate WO leads to high psychosocial exposures that have a direct impact on the workers’ health and quality of life, especially among less qualified workers where the COVID-19 is experienced as a syndemic that interacts with noncommunicable diseases and existing social conditions (Bambra et al., 2020; King and Lamontagne, 2021), leading to contexts particularly severe in some vulnerable groups, for example the essential workers (Utzet et al., 2022).

In the first stages of the COVID-19 in Spain, sudden changes were observed in terms of labor management practices with a sharp increase of teleworkers (31 %) or workers that had been furloughed (involved in contract suspension or reduction) (23.6 %) (Salas-Nicás et al., 2021). Although both figures declined one year later to 17.1 % and 6 % (Llorens Serrano et al., 2021), they are no longer anecdotal as they were before the pandemic. Regarding the exposure to psychosocial risks factors, an important deterioration was observed: for instance, salaried workers in high strain (high psychological job demands and low job control) doubled to 44.3 % and those who reported labor market insecurity (fear about not finding another job, in case they lose their current one) or salary insecurity also increased compared to 2016 (Salas-Nicás et al., 2021). In terms of health, during the first months after the declaration of the state of alarm in Spain, it was estimated that the prevalence of psychological distress was around 65 % of all non-health workers (Ruiz-Frutos et al., 2021); approximately two in five salaried workers often or almost always slept poorly during the last four weeks, and more than half were classified in poor mental health (Salas-Nicás et al., 2021), figures that double and triple those estimated in 2016, respectively (Salas-Nicás et al., 2020, 2018). The drug consumption also increased remarkably among salaried population: tranquilizer use went from 9.5 % pre-pandemic to 21.5 %, and one in three workers who were already consuming either increased the dose or switched to a stronger drug. The consumption of opioid analgesics doubled, from 8.9 % to 18.6 % (Salas-Nicás et al., 2021). In May 2021 all these figures had not particularly improved (Llorens Serrano et al., 2021). Indeed, the deterioration of mental health has been among the most worrying consequences of the syndemic globally (Fountoulakis et al., 2022), and its burden is expected to persist and have long-lasting effects for several years (Kathirvel, 2020).

Most of the findings about WO and their effects in this new context obtained so far are based on cross-sectional studies. Therefore, even if the experience lived under the COVID-19 seems to clearly reveal that the working conditions and the workers’ health, especially mental health, have seriously worsened, more science-based evidence describing the effectiveness and possible adverse effects of these organizational measures are needed (Burdorf et al., 2020). In our opinion, this evidence should be based on more robust designs that assume the direct and bidirectional relationship between the pandemic and work organization. This includes the direct influence of the pandemic on living, working, and health conditions, as well as the indirect influence through work organization, all framed within a structural context (axes of inequality, legislation, health system, etc.).

In Spain there are no sources of information specifically designed to record WO or health status indicators of the working population, and among the sources that include some indicators that might be of interest, either their periodicity is low (e.g. European Working Conditions Survey (EWCS)), or there are few indicators focusing to assess WO (e.g. Spanish Survey of Active Population (EPA)). Consequently, it is essential to design and implement a monitoring system of the main exposures

derived from WO, as well as to generate indicators of existing and emerging labor management practices, which allow to approach the study of their implementation and evolution. In addition, such a tool will facilitate to conduct of sound research on the WO effects on the labor market from several perspectives, particularly the workers’ health.

In view of that, the authors of this paper established the OTS PANEL (“OTS” for “Work Organization and Health” in Spanish), a panel-type cohort with annual measurements with the aim of having a sustainable tool to further study the relationship between work organization and workers’ health. The aim of this paper is to describe the study design and baseline data of the OTS PANEL.

## 2. Methods

### 2.1. Study design

Panel-type cohort study to be carried out annually applying an online self-administered questionnaire developed ad hoc to record the necessary information to calculate the WO and health (WOaH) indicators. The sample is composed by salaried workers, aged 25–64, residing in Spain.

### 2.2. Questionnaire elaboration

The questionnaire was structured in two main blocks from which the WOaH indicators will be generated (supplementary file 1): 1) work organization (includes questions related to labor management practices -coded questions as ‘pgl’, pages 6–8- and related to psychosocial risk factors -coded questions as ‘rps’, page 9-), 2) health (includes questions on mental health, drugs consumption and sickness absence/presenteeism -coded questions as ‘sal’, pages 10–11-). In addition, the questionnaire includes some sociodemographic, economic and occupational questions grouped in a third block with the aim to characterize the participants and, in some cases, to be used additionally as control variables for checking reasons (-coded questions as ‘car’, pages 3–5 and 16-).

The methodology used to elaborate the questionnaire and select the WOaH indicators was based on several steps, involving thirteen researchers of different disciplines (Public Health, Sociology, Psychology, Economics, Law and Statistics), who were part of the research team, plus the occasional assistance of other experts (Fig. 1):

1. A first draft of concepts and their related questions was made by three members of the research team, supported occasionally by other experts (of the research team and external) to clarify some specific consultations.
2. All research team members received the proposal to be checked following a pre-established guideline. They were required to: 1) propose new concepts if necessary; 2) modify some indicator or question among those proposed if necessary; 3) in some cases, choose the most appropriate formulation among several options of questions and set of answers; 4) prioritize four questions to delete in case the pilot study showed a too long questionnaire response time; 5) propose four questions to add, if the pilot study showed that the response time of the questionnaire allowed to incorporate more questions. A new proposal was made considering the comments gathered at this phase.
3. The proposal obtained in the previous step was examined in a 1-day workshop with the participation of the 13 members of the research team. They were distributed in three groups of 4–5 members to examine a preselected list of questions/answers assigned to each group (these lists did not include health questions). Then, every group presented its proposal to the whole team and the definitive list of questions/answers was approved by consensus of all research team members. Four questions remained open to be consulted with external experts. On the other hand, health questions/indicators were independently agreed by the “health” professionals of the research team (two epidemiologists, a psychologist and two nurses),

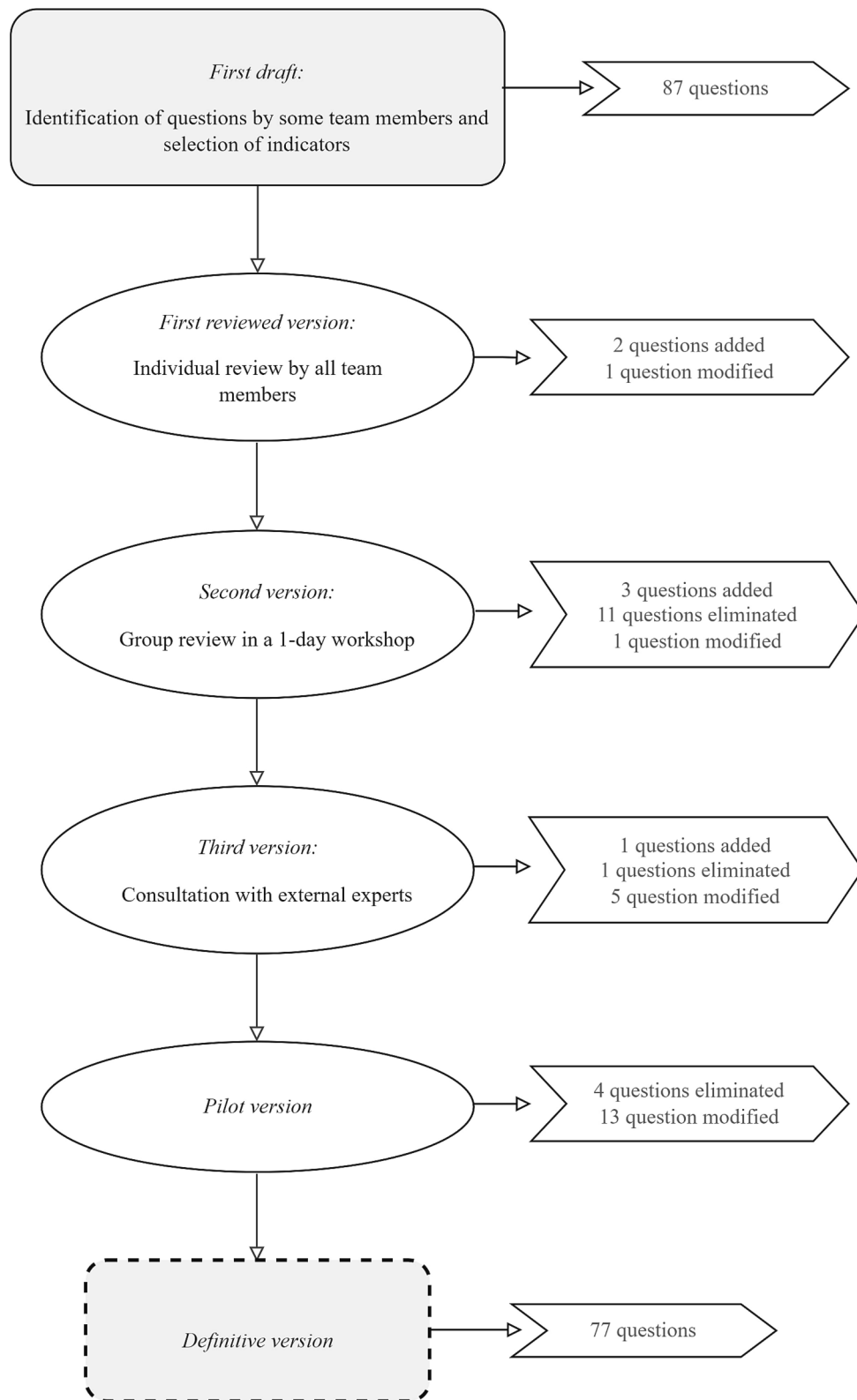


Fig. 1. Questionnaire elaboration process.

through a discussion session after reviewing the literature and assuring the free access of the proposed screening tools.

4. After clarifying some details with external experts (a gender specialist and another in migration), a final proposal was made and sent back to the research team members to obtain their final approval and design the definitive questionnaire to pilot.

5. A pilot study was carried out to 22 workers of different age, sex, occupation, and country of origin. Among them, 13 responded by computer whether 9 responded by mobile phone. In general, the feedback obtained was that the questionnaire had a good comprehension and functionality. Ten questions generated misunderstandings, and for each of them suggestions for improvement

were collected and considered and included formatting changes. The post-pilot research team discussion gave place to the definitive version of the questionnaire.

The final version of the questionnaire includes questions obtained from other national and international tools. To develop WO indicators, questions of EWCS (Eurofound, 2015), EPA (Instituto Nacional de Estadística, 2023), Spanish Survey on Psychosocial Risks (ERP) (Moncada i Lluís et al., 2021), Copenhagen Psychosocial Questionnaire (COPSOQ) (Burr et al., 2019; Moncada i Lluís et al., 2021) and EPRES (Vives et al., 2010) were used. Health indicators correspond to WHO-Five Well-Being Index (WHO-5) (World Health Organization, 1998), Patient Health Questionnaire (PHQ) (Kroenke et al., 2009) and three questions of the Survey on Alcohol and other Drugs in Spain (EDADES) (Plan Nacional sobre Drogas, 2021).

The WOaH indicators are listed in the supplementary file 2. All of them are categorical indicators, which in general quantify the percentage of workers into the “bad” or “exposure” category.

### 2.3. Recruitment and data collection

Recruitment was carried out among a pool of contacts (n = 9834) members of the main union trade in Spain (Comisiones Obreras), who in a previous study (Llorens Serrano et al., 2021) conducted two years ago, explicitly stated the possibility of being contacted in the future to participate in other work-related studies. A stratified sample was obtained, corresponding each stratum to the cross-combination of sex (male; female), age group (25–34; 35–44; 45–54; 55–64) and Spanish territorial regions (NUTS units: Northwest; Northeast; Madrid; Center; East; South; Canarias) following the Spanish Labor Force Survey (EPA, for its acronym in Spanish). n = 5757 workers were invited to participate, of whom n = 1864 (32.4 %) completed the survey. This response rate is underestimated given that some of the contacts had already retired or were unemployed at that time.

Data collection was carried out in January and March 2023 through Computer Assisted Web Interviewing (CAWI) method, using the tool Limesurvey (https://www.limesurvey.org) to develop the online survey to be answered using mobile phone or computer. During the recruitment period, an e-mail or whatsapp message was sent with a personal link to access to the survey and fill it, after giving their consent. A reminder was sent to each participant who has not responded within one week to the first message, and a last reminder was sent after two weeks.

### 2.4. Imputation

A simple imputation was applied on all indicators constructed through scales (psychosocial risks indicators (COPSOQ scales), emotional wellbeing (WHO-5) and depression (PHQ-8)). Imputation was only performed in those cases where, for the same subject, the number of questions with valid answers was at least half of the total scale. A method for categorical variable using polytomous regression was applied (van Buuren and Groothuis-Oudshoorn, 2011), adjusting for sex, age, occupational class, self-rated health and the rest of questions of the same scale. No imputation was carried out for the single-item indicators.

### 2.5. Post-stratification weights

Post-stratification weights (w) were calculated to restore the differences found in the sample distribution compared to the population distribution. Weights were calculated as the product of two components (w = w1\*w2) according to: a) NUTS region, sex, age, and occupational class (w1); b) sex, age, occupational class and self-rated health (w2). Data to construct w1 was obtained from the EPA survey for the quarter corresponding to the sample acquisition (first quarter 2023), while w2 was developed from the 2022 EPA annual subsample, since the data corresponding to self-rated health is only available on a yearly basis.

### 2.6. Ethical approval

This study was approved by the Ethics Committee on Animal and Human Experimentation of the Universitat Autònoma de Barcelona (protocol number: CEEAH-6090).

## 3. Results

The final sample was composed of n = 1824 salaried workers, after excluding those who had some missing value in the variables necessary to calculate the weights (n = 23) and those who had not completed at least 75 % of the WOaH indicators (n = 17). Excluding extreme values, the mean response time was 17.4 ± 7 min (median 15.8).

Previous imputation, only five of the thirty-nine indicators presented a percentage of missing values higher than 5 %: depression (7.9 %), isostrain (7.7 %), labor market insecurity (5.8 %), high strain (5.6 %) and recognition (5.5 %). Once imputed, thirty-three indicators had percentages of missing values lower than 3 %.

Table 1 presents the unweighted, weighted and population distributions of the variables included in the sampling design and in the post-stratification weights calculation, as well as two “control” variables (type of contract and working time). The original sample is similar to the population in terms of region, sex and employment conditions, but it presents higher percentage of aged, non-manual and workers with poor self-rated health. It can be seen how these differences are corrected with the application of the weights.

Table 2 shows the weighted distributions of the labor management practices indicators and Table 3 presents those of psychosocial risks and health, overall and stratified by the interaction sex-occupational class. With the exception of a few cases (i.e., extend working day, difficulties in exercising disconnection or quantitative demands), all indicators are notably worse among women than men and among manual workers than non-manual workers.

**Table 1**

Distributions of the variables included in the sampling design and in the post-stratification weights calculation plus type of contract and working time.

Variable	Unweighted		Weighted		EPA
	n	%	n	%	
Region					
Northwest	173	9.5	7.4	8.1	8.1
Northeast	174	9.5	10.5	9.8	9.8
Madrid	340	18.6	16.8	16.5	16.5
Center	192	10.5	11.2	10.9	10.9
East	537	29.4	30.5	30.2	30.2
South	327	17.9	19.2	19.7	19.7
Canarias	81	4.4	4.4	4.7	4.7
Sex					
Male	952	52.2	51.6	51.6	51.6
Female	870	47.7	48.3	48.4	48.4
Intersexual	2	0.1	0.1	–	–
Age					
25–34	181	9.9	21.5	22.1	22.1
35–44	471	25.8	26.7	28.0	28.0
45–54	693	38.0	32.9	31.1	31.1
55–64	479	26.3	18.9	18.8	18.8
Occupational class					
No manual	1219	66.8	47.8	47.5	47.5
Manual	605	33.2	52.2	52.5	52.5
Self-rated health					
Good/very good	1224	67.1	89.9	89.8	89.8
Fair/poor/very poor	496	32.9	10.1	10.2	10.2
Type of contract					
Permanent	1568	86.9	86.1	84.4	84.4
Temporary	236	13.1	13.9	15.6	15.6
Work time					
Full-time	1646	91.9	89.6	87.2	87.2
Part-time	145	8.1	10.4	12.8	12.8

**Table 2**  
Weighted distributions of the labor management practices indicators. Overall and stratified by sex-occupational class.

Variable	Indicator	Overall	Non-manual		Manual	
			Male	Female	Male	Female
Salary	Salary not cover basic household needs	32.8	16.3	24.5	38.2	51.5
Working time adaptability	Entirely determined by worker	1.0	1.5	0.9	0.7	0.9
	Worker can adapt it with certain limits	26.5	38.4	35.2	21.2	12.0
	Worker can choose between several fixed working times	8.5	8.3	7.0	9.7	8.4
Availability requirements by the employer	Entirely fixed by company	64.0	51.8	56.8	68.4	78.6
	Several times a month/Less often	45.6	42.0	43.7	48.1	48.1
Extend working day	Every day/Several times a week	8.9	7.0	5.9	8.9	14.6
	Sometimes/Seldom	63.1	67.7	68.7	61.6	54.3
Long working days	Always/Often	14.0	15.5	15.1	10.5	16.2
	49–54 h per week	4.3	3.3	2.6	7.4	3.2
Working time registration (WRM)	> 55 h per week	2.1	1.5	1.0	3.5	2.1
	There is a WRM, and all the worked hours are registered	61.7	59.6	57.9	65.4	62.8
	There is a WRM, but not all the worked hours are registered	16.9	18.4	16.6	17.7	15.1
Feeling replaceable	There is a WRM, but it does not apply to me	4.3	6.3	4.9	2.9	3.7
	There is no WRM	17.1	15.7	20.6	14.0	18.4
	Sometimes/Seldom	35.7	37.3	37.3	37.9	29.5
Horizontal functional mobility	Always/Often	32.9	20.9	28.6	36.9	44.3
	Yes	29.3	32.8	33.0	24.5	28.5
Upward vertical functional mobility	Yes	29.1	31.6	28.0	31.1	24.8
Downward vertical functional mobility	Yes	19.8	25.7	22.0	17.7	14.6
Direct participation	No	17.2	11.3	13.0	23.8	19.2
Enough staff	Delegative	36.5	32.7	35.5	38.7	38.5
	Consultative	5.5	4.8	4.2	4.1	9.8
	Delegative and consultative	40.7	51.2	47.2	33.4	32.5
Realistic work planning	No	68.0	64.4	67.9	71.3	67.5
Difficulties in exercising disconnection	No	65.6	63.4	65.0	65.7	68.2
	Sometimes/Seldom	51.8	57.8	56.6	46.9	46.9
Telework	Always/Often	11.4	10.3	12.6	9.3	14.1
	Yes; <30 % of the weekly working hours	6.3	14.1	10.6	1.1	0.3
	Yes; ≥30 % of the weekly working hours	9.5	22.0	15.9	0.1	2.7
Specific supervision of teleworking	Yes	30.9	26.2	33.9	27.1	57.2
Use of robots and/or artificial intelligence mechanisms	Yes	8.6	8.3	6.3	9.0	11.3

#### 4. Discussion

This project aims to bridge the gap detected in Spain in relation to the absence of information sources specifically designed to record WO or health status indicators of the working population, creating a sustainable tool which helps, in addition, to expand the research on the exposure to WO factors and their effects in the labor market, particularly, on workers' health. OTS Panel can enable a deeper exploration through a longitudinal study on novel or seldom studied subjects, such as the role of labor management practices or psychosocial risks on drug consumption among the salaried population, or the estimation of population attributable fractions over various time periods.

It is important to highlight that this project was designed to try to ensure that the monitoring system is financially sustainable in the future and does not depend on permanent financial resources by linking its viability to the systematic raising funds. This fact was an important factor in the choice of certain methodological aspects, such as the implementation of an online survey instead of a face-to-face one or the sampling strategy applied.

The main limitation is the fact that the method of sample acquisition does not assure the representativeness of the whole salaried working population living in Spain. Thus, strictly speaking, our sample could be representative of the members of the main trade union in Spain. To check the possible differences between the sample and the Spanish salaried population, in each wave we will carry out some sensitivity analyses including the comparison of the distribution of the control variables (type of contract, working time, etc) in the sample versus to the EPA ones. In any event, the possible lack of representativeness would have repercussions on the generalization of the indicators to the entire Spanish salaried population, but it would not invalidate having an approximation of its evolution, much less the performance of specific studies with the aim of prospectively examining the relationships between WO factors and specific outcomes (Richiardi et al., 2013;

Rothman et al., 2013).

As in any longitudinal study, and particularly in panel studies, another limitation is the sample attrition. To minimize it, a reminder system will be implemented in each wave, explaining why it is important to remain at the study. In addition, feedback actions will be carried out to reduce the attrition and to gain the participants' loyalty: 1) after answering the survey, an online short report presenting the individual psychosocial exposures will be generated automatically for each participant; 2) if explicitly requested by the participant, the main report published in the online platform (aggregated data) will be sent to him/her; 3) if explicitly requested by the participant, for the second and subsequent waves, an individual report will be sent comparing their results in consecutive waves. Nevertheless, sample attrition will be monitored by the research team to decide when and how new incorporations to the sample will be carried out to avoid the "natural ageing" of the sample and to recover other groups with high attrition rates.

#### 5. Conclusions

It is well known that work has a great influence on the well-being of workers. A lesson learned after the COVID-19 pandemic is that WO in particular plays a very important role to face and control a pandemic, but at the same time, the undertaken adjustments to do so seem to increase harmful WO exposures and lead to a remarkable deterioration of workers' health. It is therefore essential to have specific, systematic, and sustainable sources of information on WOaH indicators. The aim of this project is to establish this valuable information source in Spain to contribute to generate solid evidence for research and for decision-making to improve the living and health conditions of the working population.

**Table 3**  
Weighted distributions of the psychosocial risks and health indicators. Overall and stratified by sex-occupational class.

Variable	Indicator	Overall	Non manual		Manual	
			Male	Female	Male	Female
High quantitative demands	Exposed	39.2	43.8	49.4	30.2	34.9
High work pace	Exposed	35.6	27.7	37.3	32.4	45.7
High emotional demands	Exposed	51.4	47.0	63.2	39.5	57.8
High work-life conflict	Exposed	63.7	54.7	66.1	63.1	70.5
Low influence	Exposed	34.8	25.4	30.9	40.3	41.1
Low possibilities for development	Exposed	48.6	32.9	31.7	67.0	58.7
Job loss insecurity	Relatively likely	10.5	8.1	9.6	12.4	11.1
Labor market insecurity	Quite/Very likely	7.8	6.3	9.2	6.9	8.7
	Relatively likely	29.5	26.8	27.1	33.1	29.9
Wage insecurity	Quite/Very likely	35.0	33.3	33.7	34.0	39.8
	Relatively likely	5.4	5.7	5.9	4.1	6.5
Schedule insecurity	Quite/Very likely	2.8	2.4	1.6	3.8	3.4
	Relatively likely	12.8	9.3	8.4	15.5	17.8
Low social support from colleagues	Quite/Very likely	16.5	10.0	15.3	17.2	23.7
	Exposed	67.7	64.8	64.9	68.6	72.6
Low social support from supervisors	Exposed	66.4	58.9	61.8	71.9	71.5
Low recognition	Exposed	72.9	65.1	69.1	78.2	77.7
High strain	Exposed	31.6	21.2	30.0	33.5	41.4
Iso strain	Exposed	29.8	18.4	27.4	32.8	40.0
Sickness presenteeism (1)	Yes	34.9	29.0	35.7	34.6	40.3
Sickness presenteeism (2)	Yes	55.9	51.6	55.2	56.7	59.3
Emotional wellbeing	Emotional distress	39.7	35.5	45.9	34.1	43.7
Depression	Moderate depressive symptoms	22.7	19.9	26.6	15.6	30.8
	Severe depressive symptoms	3.9	2.3	2.7	2.4	9.0
	Yes, due to non-work-related reasons	3.6	3.9	3.4	2.2	5.4
Tranquilizers/ sedatives/ somnifers consumption	Yes, due to work-related reasons	4.1	3.6	3.4	4.3	4.9
	Yes, due to both work-related and non-work-related reasons	6.9	4.9	6.2	6.1	10.8
	Yes, due to non-work-related reasons	28.1	34.5	36.8	23.3	18.1
Non-opioid anti-inflammatory drugs/analgesics consumption	Yes, due to work-related reasons	13.7	7.8	9.4	15.1	22.8
	Yes, due to both work-related and non-work-related reasons	21.5	13.2	20.3	17.6	36.5
	Yes, due to non-work-related reasons	2.0	1.5	2.7	1.1	3.1
Opioid analgesics consumption	Yes, due to work-related reasons	3.2	1.0	2.3	3.8	5.7
	Yes, due to both work-related and non-work-related reasons	3.1	1.9	2.5	3.6	4.5
	Yes, due to non-work-related reasons					

\*Sickness presenteeism (1): in relation to the total number of workers.

†Sickness presenteeism (2): in relation to “sick” workers.

**CRedit authorship contribution statement**

**Albert Navarro-Giné:** Writing – review & editing, Writing – original draft, Project administration, Funding acquisition, Methodology, Investigation, Formal analysis, Conceptualization. **Laura Esteve-Matalí:** Writing – review & editing, Project administration, Visualization, Investigation, Conceptualization, Software. **Pilar Carrasquer:** Writing – review & editing, Conceptualization, Methodology. **Maria Feijoo-Cid:** Writing – review & editing, Conceptualization, Methodology. **María Isabel Fernández-Cano:** Writing – review & editing, Conceptualization, Methodology. **Clara Llorens-Serrano:** Writing – review & editing, Conceptualization, Methodology. **Óscar Molina:** Writing – review & editing, Conceptualization, Methodology. **David Moríña:** Writing – review & editing, Conceptualization, Methodology. **Alberto Pastor:** Writing – review & editing, Conceptualization, Methodology. **Mariona Portell:** Writing – review & editing, Conceptualization, Methodology. **Albert Recio:** Writing – review & editing, Conceptualization, Methodology. **Sergio Salas-Nicás:** Writing – review & editing, Conceptualization, Methodology. **Xavier Solà:** Writing – review & editing, Conceptualization, Methodology.

**Declaration of competing interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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**Appendix A. Supplementary data**

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssci.2024.106443>.

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