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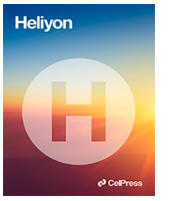

Research article

Psychosocial risks of workers in the plywood industry: A cross-sectional study in the Ecuadorian Amazon region

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ABSTRACT

This work assessed the psychosocial risks of 124 workers from the plywood industry in Ecuador's Amazon region. Two psychosocial risk assessment (PRA) methods were selected due to their widespread use in Ecuadorian organisations: FPSICO from the Spanish National Institute for Occupational Safety and Health and the "Psychosocial Risk Assessment Questionnaire" (PRAQ) from the Ecuadorian Labour Ministry. Therefore, two surveys of 89 and 58 items were applied to evaluate nine scales and eight risk dimensions for FPSICO and PRAQ, respectively. Results show that according to FPSICO, the main psychosocial risks were detected in the scales of working time (WT), variety and content (VC), and workload (WL), with a prevalence of 34.8 % and 41.7 %. For PRAQ, the margin of action and control (D4), load and work rate (D1), and leadership (D3) were the most affected dimensions, with a risk prevalence between 29.1 % and 43.6 %. Although there is a lower risk prevalence in the rest of the scales and dimensions assessed, improvement actions are needed in the short term. Furthermore, the findings suggest an association between gender and risk prevalence, especially in the dimensions of Leadership (D3), Skills development (D2), and Self-perceived health (D8.8), where being a woman increases the likelihood of suffering from these conditions by up to three times. In addition, a brief comparative analysis was conducted, looking for coincidences in the scales that each PRA instrument assesses and the prevalence of the psychosocial risks detected.

1. Introduction

Throughout the last decades, a significant evolution in production and manufacturing systems has been evidenced, mainly due to the appearance of technological and economic globalisation processes. Factors such as the internationalisation of markets, competitiveness, technological innovations, and new social relationships have significantly impacted organisations. These effects are reflected in a decreased security perceived by workers and an increase in the required job demands, with higher stress on mental than physical ones [1–3]. Industry has traditionally focused on enhancing safety conditions in the workplace to address the underlying causes of occupational accidents and injuries. However, new forms of work organisation have prompted a growing concern in the psychosocial aspects connected with cognitive, emotional, and social aspects of work that can impact workers' physical and mental health [4,5]. Psychosocial risks are work-related aspects (e.g., job design, content, work organisation and management, social relationships, and

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environmental context) that promote or have the potential to cause stressful conditions and psychological harm [6,7]. Some relevant psychosocial risk factors are related to the work environment, unmet worker needs, organisational culture, extra-work considerations, poor work management, and lack of support in the workplace [7]. On the other hand, the main health problems are usually mental (common mental disorders (non-psychotic)), such as anxiety disorders, work stress, depression, and diagnosed mental disorders, among others [7–9]. However, other possible conditions, such as premature ageing, conflicts in the reconciliation between work and family life, burnout, and mobbing, cannot be downplayed due to their potential to trigger personality disorders and workplace violence [9–11]. Organisations are also vulnerable to relevant consequences from psychosocial risks on their workers, such as reduced productivity levels or increased frequency of sick absence [12]. In addition, it is also concerning the increased possibility of human error due to reduced attention to tasks, which potentially drives production losses or accidents at work [5]. Within psychosocial risks, work stress has become a significant health problem; thus, its management is considered a priority in workplaces [13]. Between 50 and 60 % of workdays lost are related to stress-derived affections [14]. Several studies have linked exposure to occupational stressors with other types of physiological conditions, such as diabetes, cardiovascular problems [15,16], musculoskeletal disorders [17–20], metabolic syndrome [21], among others. These problems have attracted the attention of several developed countries, which have set up national systems for the surveillance of psychosocial risk factors in the workplace [22]. Similarly, Latin American countries reported poor psychosocial working conditions, potentially impacting workers' health. For instance, Chile and Central America workers were more likely to report poor self-perceived health than in countries such as Colombia [23]. In this sense, identifying, assessing and controlling psychosocial risks are crucial not only to preserving workers' safety and well-being at the organisational levels but also as a national concern [24].

A wide variety of psychosocial risk assessment (PRA) methods or instruments are currently available for use in organisations. However, it is usual that PRA methods with a general scope (i.e., for a first screening assessment) address different types of psychosocial factors or use different scoring scales, making the assessment results highly dependent on the method used [25]. In this sense, several of the most widely used methods in the Latin American context come from either translations or adaptations of methods developed internationally or, more rarely, from local instruments proposed by public bodies. Examples of the former include the Job Content Questionnaire (JCQ), Effort Reward Imbalance Questionnaire (ERI), Copenhagen Psychosocial Questionnaire (COPSOQ) and the FPSICO developed in the USA, Germany, Denmark and Spain respectively [25,26]. Examples of the latter are the Guide for the Identification of Psychosocial Factors from Mexico and the Battery of Instruments for the Evaluation of Psychosocial Risk Factors from Colombia [27]. In Ecuador, the assessment of psychosocial risks in public and private organisations has been considered mandatory since 1986 within the national regulatory framework [28]. Nonetheless, the implementation of national programs, preventive measures and inspections by the labour authority has traditionally focused on other kinds of occupational risks (e.g., related to work conditions, hygienic contaminants and ergonomic factors), neglecting psychosocial work issues [29,30]. Since the officialisation of Ministerial Agreement 082 in 2017 (issued by the Ministry of Labour), psychosocial risk assessment has gained relevance in the country [31]. As part of these efforts, a public-private partnership designed a specific PRA adapted to the national context called the "Psychosocial Risk Assessment Questionnaire" (PRAQ). PRAQ has become a widely used instrument in organisations throughout the country due to its promotion by the public administration [32].

Several studies have assessed the prevalence of psychosocial risks for different labour and economic sectors in Ecuador. For example, in Ref. [33], the psychosocial risk factors affecting workers in an emergency call centre were assessed. Psychosocial risks in the airport sector were analysed in Ref. [34], while [35] explores the prevalence of psychosocial risks in urban public transportation and their relationship with road accidents. Similarly, psychosocial risks affecting workers in the education sector, mainly in universities and technical colleges, have been assessed in Refs. [36,37]. In all these cases, FPSICO has been selected as an assessment tool for the first screening of the psychosocial risks of each organisation or collective of workers. This situation highlights the wide acceptance and deployment of FPSICO in Latin America and specifically in Ecuador, despite being an instrument initially developed for the Spanish context [38]. However, the increasing use of PRAQ, with a similar scope but different scales, can make it difficult to compare results across organisations and sectors or to analyse the situational evolution of the same organisation. Therefore, a better understanding of how the results of both instruments relate to each other is needed, especially considering their coexistence and prevalence at the national level.

Globally, few studies in the literature address occupational risks for workers in the plywood manufacturing sector. The existing studies have usually focused on factors generating occupational accidents (e.g., condition and use of equipment, tools and materials) and on hygienic contaminants with the potential to cause occupational diseases. For instance, Verma et al. [39] conducted a pilot study in 22 Ontario (Canada) plants, focusing mainly on wood dust, noise, and bioaerosols exposure. Similarly, Jones and Kumar [40] analysed major injury claims in the plywood industries in Alberta, Canada, using statistics from 1997 to 2002. In comparison, Fransman et al. [41] assessed workers' occupational exposure and respiratory symptoms of workers in a plywood industry through on-site monitoring and surveys. Furthermore, the studies by Lin et al. [42] and Makinen et al. [43] analyse occupational exposure to chemical pollutants such as formaldehyde and phenol-formaldehyde among plywood workers. These studies show an interest in studying the main occupational hazards in the sector. However, no attention has been given to the psychosocial risks affecting these workers.

This paper aims to explore the prevalence of psychosocial risks in workers from the plywood industry in the Ecuadorian Amazon region for the first time. The most widely used PRA instruments in the Ecuadorian context (FPSICO and PRAQ) are applied to the entire universe of workers in the region to provide a comprehensive view of psychosocial risks. Accordingly, a large number of scales and dimensions are considered within this approach. In addition, overlaps and divergences between the factors included in the two methods are explored. The timber sector represents a significant economic driver in locations with abundant biomass resources, such as the Ecuadorian Amazon region. However, most activities are linked to the craft wood sector, and only a few are based on

technological manufacturing processes, such as the plywood industry. This work was applied among all the workers (124 people) from the only plywood company in the region. To the best of our knowledge, no studies have previously assessed psychosocial risks in plywood workers. Therefore, this study can provide valuable insights for policymakers, healthcare professionals, and stakeholders in developing policies and practices for adequate risk prevention in this and similar organisations.

This paper is structured as follows: Section 2 describes the methodology, including the type of study, population, and the scales and dimensions of the FPSICO and the PRAQ methods. Section 3 shows the results regarding the working population, all the scale's specific risk prevalence, and prevalence disaggregated by gender from each method. Section 4 discusses the psychosocial risks in the plywood industry, the coincidences and exclusions between the methods, and the study's limitations and future work. Finally, section 5 provides the conclusions.

2. Methodology

2.1. Study design and working population

This study is framed within quantitative research using a descriptive and cross-sectional design. Therefore, it seeks to identify characteristics of phenomena, subjects or populations by gathering, processing and assessing the information related to them [44]. The study population has been selected using a convenience sampling method to cover all available workers in the triplex panel industry in the Ecuadorian Amazon. Although the timber sector has traditionally been of high economic relevance in this region, its development has been mainly on an artisanal scale with activities such as carpentry, sawmilling, pallet making, furniture and other low-industrialised products. In this sense, the study covers the entire population of workers of Arboriente S.A., the only plywood manufacturing company located in the region (124 workers). The workers participating in the study met the following inclusion criteria: i) Being over 18 years of age, ii) Working at the company for more than three continuous months, and iii) Having expressed their written informed consent to participate in the study.

2.2. Survey and data collection procedure

The first part of the survey contains general socio-demographic questions adapted to the study population's particular conditions. In this sense, variables related to gender, age, working time, work organisation and type of contract are included. Subsequently, the questionnaire includes all items of the psychosocial risk assessment instruments FPSICO and PRAQ, comprising 147 multiple-choice questions. A comprehensive description of these instruments is provided in the following sections.

The data collection procedure was conducted according to the technical note on prevention 702 (Spain) [45] and the guidelines from the Labour Ministry (Ecuador) [32]. First, the company's management and employee representatives were informed about the objectives, methodology and structure of the survey to be applied. Subsequently, we obtained the approval of the study from the management and the ethics committee of the company through the statement approval number PRA-02-21, signed in February 2021. Data was collected using printed questionnaires during multiple sessions with groups of up to 15 workers between March and April 2021 (health recommendations for the SARS-COVID-19 pandemic were fulfilled). In these sessions, participants were informed about the objectives and structure of the questionnaire, emphasising confidentiality in the treatment of information and the requirement to express their written informed consent. The study was conducted following the ethical principles of the Helsinki Declaration [46]. Finally, the information collected was tabulated in an Excel database that will be used later for the prevalence calculation in each method and the association analysis with the gender variable through a chi-square test and the odds ratio calculation (using logistic regressions).

2.3. FPSICO method

The FPSICO method for psychosocial risk factors assessment is based on a questionnaire that relates items for the different psychosocial scales. The method is associated with a computer tool that manages the input information and performs the calculations, called FPSICO, which, by 2020, is in its 4.0 version. The first version released in 1997 contained seventy-five items with seven scales [47]. The 4.0 version (used in this study) analyses nine scales of psychosocial risk factors through forty-four items. Some items are multiple, so the final number reaches eighty-nine. FPSICO was validated through an extensive study involving 1718 workers from diverse companies of different sizes and economic sectors in various regions across Spain. As a result, the method showed high overall reliability in internal consistency, with a global Cronbach's alpha coefficient higher than 0.895 [48]. Moreover, the criterion validity has been checked using a correlation analysis with the *General Satisfaction Scale* (OJS, 1979) and the *General Health Questionnaire* (GHQ, 1979) [49,50]. In addition, the internal structure of the method has been verified by a confirmatory factor analysis, showing a good fit of data in the nine factors analysed. A comprehensive analysis of all psychometric properties of FPSICO is provided in Ref. [51].

FPSICO items are scored using 3, 4 and 5-level Likert-type rating scales, whose response options vary depending on the type of question. For example, the 3-level scale options such as 1) no information, 2) insufficient, 3) adequate are presented. In some items with 4-level scales, options such as 1) always or almost always, 2) often, 3) sometimes, 4) never or hardly ever are included. In other more specific ones, there are options such as 1) I can decide, 2) I am consulted, 3) I only receive information, and 4) No participation. The 5-level scale is used to add the non-application of a particular item to a rating scale, with texts such as 5) I do not have anyone, there is no one else.

The FPSICO calculation tool directly applies the scoring weighting to each item when entering the questionnaire responses. The method's developers reserve the information on these weightings, thus making them inaccessible to users [52]. Thus, a lack of knowledge of these values could make it challenging to interpret the results, especially the descriptive statistics, which are calculated automatically by the tool. FPSICO expresses group results, organising respondents by percentiles according to their scores. According to these results, four risk levels can be assigned: adequate situation (percentile $<$ P65), moderate risk (percentile between P65 to P75), high risk (percentile between P75 to P8) and very high risk (percentile $\geq$ P85). Table 1 shows the item distribution and Cronbach's alpha coefficient for every scale of FPSICO. The entire FPSICO questionnaire is included inTable A1 of Appendix A.

2.4. Psychosocial Risk Assessment Questionnaire (PRAQ)

PRAQ is a psychosocial risk assessment tool designed in 2017 for its application in Ecuadorian companies with more than ten workers. It originates from the need for evaluation instruments that adjust to the national context [53]. Like other PRA methods, the questionnaire relates scaling-rate items (58 in total) with psychosocial risk dimensions (a total of 8). Each item consists of 4 response options formulated on a Likert scale: 4 = completely agree, 3 = Partially agree, 2 = Slightly agree, and 1 = Disagree. Therefore, the scoring range for each item is between 1 and 4. In all the cases, the lower the score, the higher the psychosocial risk.

The results are the summed values of the rated items grouped into tertiles. According to these values, the risk situation can be in three categories: low risk (scores between 175 and 232), medium risk (scores between 117 and 174) and high risk (scores between 58 and 116). PRAQ allows for obtaining specific conclusions for each questionnaire and general conclusions for the entire population. The questionnaire was validated in a previous study by applying it to 3225 workers in Ecuadorian companies. High reliability was obtained in terms of internal consistency (Cronbach's $\alpha = 0.968$) and data adequacy to the factorial matrix (KMO = 0.968; Barlett = 93818.0, $<$0.05) [53]. Table 2 lists the dimensions evaluated by this model and the number of items per dimension [53]. The entire questionnaire is included in Table B1 of Appendix B.

2.5. Statistical analysis

First, descriptive statistics such as the mean, median and standard deviation were calculated for the scores obtained for each scale or risk dimension after applying FPSICO and PRAQ. As mentioned in previous sections, the FPSICO method does not provide information on the scale scoring and weighting, and therefore, it is not possible to have a detailed database of its results. The distribution of PRAQ data was examined using the Shapiro-Wilk, Skewness and kurtosis tests for normality. The results show that only the values of Workplace harassment (D8.2) follow a normal distribution. The data for the remaining PRAQ dimensions were not normally distributed, as in other similar studies that also use non-parametric tests [54–56]. Detailed results of the normality tests are shown in Table C1 in Appendix C. In addition, a bivariate association analysis between gender and prevalence of psychosocial risk (at any level) is performed for all scales and dimensions of FPSICO and PRAQ. For this purpose, the prevalence of risk will be dichotomised into a binary variable (i.e., the person who suffers or does not suffer from psychosocial risk, regardless of the risk level). Finally, logistic regressions were conducted using EPI INFO software to calculate the corresponding odds ratios. Statistical significance is assumed at $P < 0.05$ for all tests.

3. Results

3.1. Sociodemographic information

The working population covered in this study consists mainly of men and full-time workers, 76.6 % and 92.7 %, respectively. The average age was 34.7 years old (SD $\pm$ 11.9), and only 4.8 % of the workers can be considered new, with a working time of less than one year. Most respondents (approx. 63 %) work rotating shifts, alternating between morning, afternoon, and evening shifts each week. Table 3 shows the main sociodemographic characteristics of the working population participating in the study.

Table 1
Scales evaluated in FPSICO method.

Scale	Related Items	Total Items[a]	Weight (%)[b]	Cronbach's alpha
Working time (WT)	1, 2, 5, 6	4	4.5	0.697
Autonomy (AU)	3, 7, 8-10	12	13.5	0.865
Workload (WL)	4, 21-32	13	14.6	0.733
Psychological demands (PD)	33–36	12	13.5	0.737
Variety/Content of work (VC)	37–40	7	7.9	0.705
Participation/Supervision (PS)	11, 12	11	12.4	0.732
Worker Interest/Compensation (WIC)	13, 41-44	8	9	0.844
Role performance (RP)	14, 15	11	12.4	0.842
Relationships and social support (RSS)	16–20	11	12.4	0.716

[a] Multiple items are included (e.g., item 10 has multiple questions (a-h)).
[b] Weight of each scale, considering the total number of items. Adapted according to Ref. [48].

Table 2
Dimensions evaluated in Psychosocial Risk Assessment Questionnaire (PRAQ).

Dimension	Related Items	Total Items[a]	Weight (%)[2]	Cronbach's alpha[2]
Load and work rate (D1)	1–4	4	6.9	0.714
Skills development (D2)	5–8	4	6.9	0.667
Leadership (D3)	9–14	6	10.3	0.900
Margin of action and control (D4)	15–18	4	6.9	0.823
Work organisation (D5)	19–24	6	10.3	0.836
Recovery (D6)	25–29	5	8.6	0.846
Support (D7)	30–34	5	8.6	0.796
Other dimensions (D8)				
Discriminatory harassment (D8.1)	35, 38, 53, 56	4	6.9	0.698
Workplace Harassment (D8.2)	41, 50	2	3.4	0.627
Sexual harassment (D8.3)	43, 48	2	3.4	0.687
Work addiction (D8.4)	36, 45, 51, 55,57	5	8.6	0.703
Working conditions (D8.5)	40, 47	2	3.4	0.504
Double presence (D8.6)	46, 49	2	3.4	0.490
Job and emotional stability (D8.7)	37, 39, 42, 52, 54	5	8.6	0.832
Self-perceived health (D8.8)	44, 58	2	3.4	0.509

[a] Weight of each dimension, considering the total number of Items. [2]Adapted according to Ref. [53].

Table 3
Sociodemographic characteristics of the working population.

Individual characteristic	Frequency	Percentage (%)
Gender		
Male	95	76.6
Female	29	23.4
Age (years old)		
From 18 to 24	12	9.7
From 25 to 40	56	45.2
From 41 to 55	37	29.8
Over 55	19	15.3
Time of work (year)		
From 0 to 1	6	4.8
From 1 to 3	24	19.4
From 3 to 10	41	33.1
Over 10	53	42.7
Work organisation		
Split working day	46	37.1
Rotating shift	78	62.9
Type of contract		
Halftime	6	4.9
Full time	115	92.7
Occasional services	3	2.4

3.2. Results of the FPSICO method

The response rate for FPSICO questionnaires was 92.8 %, considering those in which all the items have been completed as valid. Overall, observed results suggest a low prevalence of psychosocial risks in all the evaluated scales (i.e., more than 50 % of the workers are in the right situation). Interest and Compensation (WIC) is the scale with the best results, with 75 % of workers in the right situation (i.e., no risk prevalence at any level). Fig. 1 and Table 4 show the valuation profiles and the detailed results for each psychosocial scale considered in the FPSICO evaluation. The results show that working time (WT) has the highest impact on the working population, with an average score of 13.7 (SD $\pm$ 10.1) and a prevalence in the high and very high-risk levels of 16.5 % and 13.9 %, respectively. In addition, 6.1 % of workers present a moderate risk, accounting for a total prevalence of 36.5 % in an unfavourable situation in this scale (i.e., falling into any risk level).

Variety and Content (VC) and Workload (WL) are the following scales in importance, with an average score of 23.8 (SD $\pm$ 13.7) and 35.5 (SD $\pm$ 18.7), respectively. The frequency of high and very-high risks was 12.2 % and 14.8 % for VC, while for WL, it was 17.4 % and 7.8 %, respectively. Monitoring the WL factor is relevant since it has a prevalence of moderate risks of 16.5 %, representing 41.7 % of workers outside the right situation level. The prevalence in the other scales fluctuates between 5.2 % and 8.7 % for very high risks, 6.1 %–13 % for high risk, and 6.1 %–20.9 % for moderate risks. It is important to highlight the Autonomy (AU) scale, which has a prevalence at moderate risk of 20.9 %, the highest at this level.

According to gender, essential differences were observed in the risk prevalence on the different scales. In general, women seem to be more affected than men, especially in scales such as Autonomy (AU), Workload (WL) and Participation/Supervision (PS). For instance, 44.4 % of the women surveyed were at a risk situation in AU compared to only 29 % of the men. Similarly, in WL and PS,

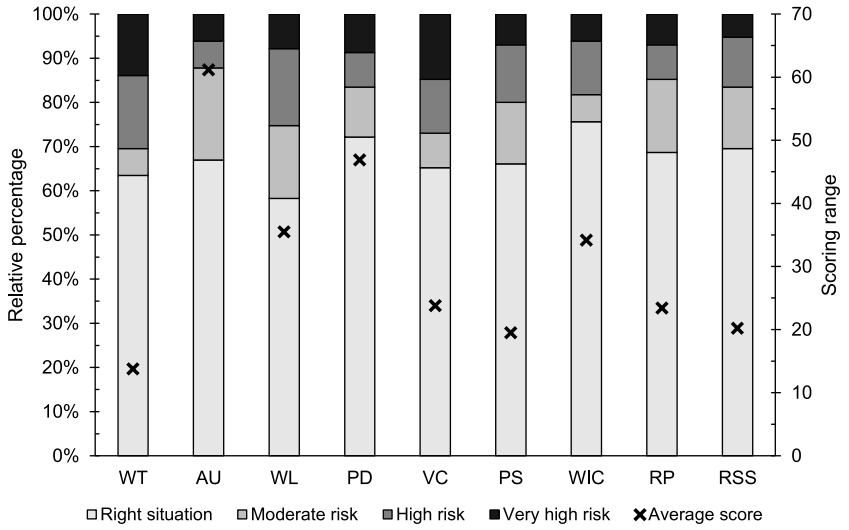

Fig. 1. Valuation profiles by scale for FPSICO.

Table 4
Detailed results by scale for FPSICO.

Scale	Scoring Range	Mean ± SD	Median
Working time (WT)	0–37	13.7 ± 10.1	17
Autonomy (AU)	0–113	61.2 ± 18.3	60
Workload (WL)	0–106	35.5 ± 18.7	34
Psychological demands (PD)	10–112	46.9 ± 20.1	43
Variety/Content of work (VC)	0–69	23.8 ± 13.7	22
Participation/Supervision (PS)	4–87	19.5 ± 15.4	15
Worker Interest/Compensation (WIC)	0–73	34.2 ± 18	34
Role performance (RP)	1–109	23.4 ± 15.3	28
Relationships and social support (RSS)	0–97	20.2 ± 12.1	20

women showed 8.3 to 13.7 percentage points higher risk prevalence than men. On the other hand, men showed a higher (slightly) prevalence of risk on the Working time (WT), Role Performance (RP) and Relationships and social support (RSS) scales. It is also important to highlight that in scales such as WT, WL, VC, RP, and RS, men seem to be more affected at higher risk levels. However, it is unclear whether associations between gender and risk prevalence can be made since no statistical significance was reached in any of the cases with Pearson's chi-square test at 95 % confidence (as shown in Table 5). Similarly, the odds ratios (obtained from logistic regressions) show that being male could be considered a protective factor, but again, these results do not present statistical significance at 95 % confidence.

Table 5
Comparison of risk prevalence by gender for FPSICO.

Scale	Risk Prevalence[a] (%)		X^2	p-value	Odds Ratio (OR)[b]	p-value
	Male	Female				
WT	37.5	33.3	0.111	0.739	1.159	0.739
AU	29.5	44.4	2.366	0.124	0.514	0.127
WL	39.8	48.1	0.625	0.429	0.714	0.430
PD	26.1	33.3	0.732	0.392	0.679	0.394
VC	34.1	37	0.177	0.674	0.831	0.674
PS	30.7	44.4	2.029	0.154	0.541	0.157
WIC	23.9	25.9	0.135	0.713	0.838	0.713
RP	31.8	29.6	0.003	0.956	1.026	0.956
RSS	30.7	29.6	0.003	0.959	0.976	0.958

[a] Includes the cumulative risk prevalence considering moderate, high and very high risk levels.
[b] Male was taken as the basis for comparison.

3.3. Results of the PRAQ method

The response rate achieved for PRAQ was 94.3 %. Following this method, a low level of risk is observed for all evaluated dimensions with a prevalence of 50 % or higher. These results are similar to those of FPSICO, with a significant majority of workers in a favourable situation against psychosocial disturbances. For instance, the work organisation dimension (D5) obtained the most favourable assessment with 86 % of workers in a suitable situation (i.e., low-risk level). Practically all the risk dimensions have a low prevalence in the high-risk level, varying between 0 % for the case of discriminatory harassment (D8.1) and 8 % for double presence (D8.6). Nevertheless, many of these dimensions present a significant prevalence for the medium risk level, fluctuating between 10 % for work D5 and 45 % for workplace harassment (D8.2). In Fig. 2 and Table 6, the assessment profiles and the detailed results for each risk dimension of PRAQ can be observed.

The margin of action and control (D4) was the dimension that concentrated the highest prevalence of unfavourable situations, with an average score of 12.5 (SD $\pm$ 2.5) and a prevalence at the medium and high-risk levels of 37 % and 7 %, respectively. It is followed by load and work rate (D1) with a score of 13.4 (SD $\pm$ 2.2), leadership (D3) with 19.6 (SD $\pm$ 3.6), and support (D7) with 16.8 (SD $\pm$ 2.5). These dimensions obtained a combined prevalence for unfavourable situations (i.e., medium and high-risk levels) of 30 %, 29 %, and 28 %, respectively.

It should be noted that although dimension 8 (overall) presents a favourable situation for 89 % and a medium risk for 11 % of workers, it is advisable to pay attention to sub-dimensions of Workplace harassment (D8.2) and Double presence (D8.6). These dimensions showed a high prevalence of exposure at medium risk, with 45 % and 33 % and at high risk, with 5 % and 8 %, respectively. Each dimension's reliability was assessed using Cronbach's alpha (α). The Cronbach's alpha coefficient relative to the entire instrument was 0.95, which means high global reliability.

Table 7 shows the risk prevalence stratified by gender for PRAQ. Results revealed an average risk prevalence of 9 % higher in women than men across all dimensions, with an increase in the fractions corresponding to medium risk levels. Women showed higher affectation than men through all dimensions except D1, D4 and D8.2, which interestingly were the three dimensions with the highest cumulative prevalence of risk. The most significant gender differences were detected in Leadership (D3), Skills Development (D2), and Self-perceived health (D8.8). In these cases, a statistically significant association ($p < 0.05$) was observed between being female and suffering from psychosocial risks, with a prevalence higher in 20 %, 19.2 % and 18.5 % for D3, D2 and D8.8, respectively, compared to males. The logistic regression results suggest that being male is a protective factor that reduces the probability of suffering from such psychosocial risks by up to three times compared to women (e.g., OR = 0.36 for D2). Particular attention should be given to these dimensions in order to establish gender-oriented improvements.

As previously mentioned, the study follows a convenience sampling method to cover the totality of workers in the plywood sector in the Ecuadorian Amazon (refer to section 2.1). Nonetheless, a post-hoc power analysis has been applied in order to support the sample size used in the study (i.e., 124 workers). Using the G*Power tool, a T-test of independence was applied for two groups, for a confidence level of 95 % (α error probability = 0.05) and a size effect of 0.711 (calculated from the data stratified by gender, male and female). It is important to note that, given the large number of psychosocial risk dimensions and scales analysed using FPSICO and PRAQ, the average prevalence for each group was used in the calculation. The results showed a power level (1-β) of 0.954, higher than 0.8, a value usually considered a reference in this kind of analysis [57].

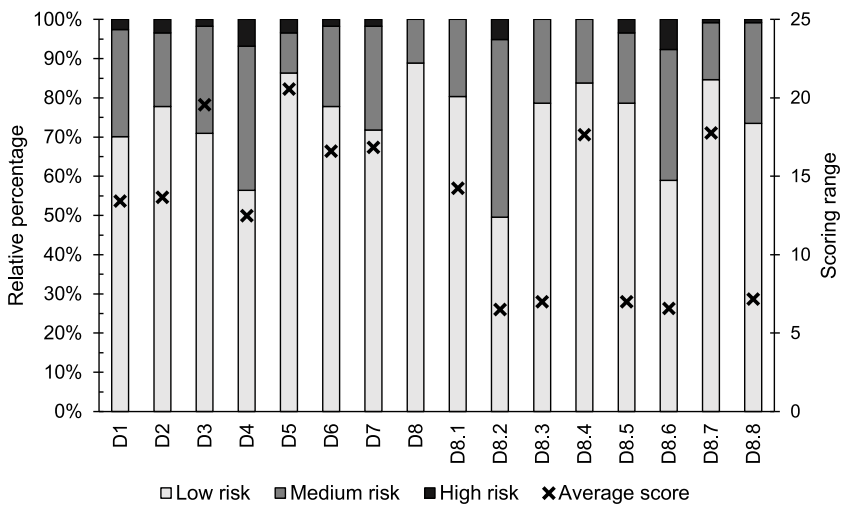

Fig. 2. Valuation profiles by dimension for PRAQ.

Table 6
Detailed results for PRAQ dimensions.

Dimension	Scoring Range	Mean ± SD	Median	Cronbach's alpha
Load and work rate (D1)	4–16	13.4 ± 2.2	14	0.67
Skills development (D2)	4–16	13.7 ± 2.3	14	0.75
Leadership (D3)	6–24	19.6 ± 3.6	20	0.84
Margin of action and control (D4)	4–16	12.5 ± 2.5	13	0.73
Work organisation (D5)	6–24	20.6 ± 3.3	21	0.84
Recovery (D6)	5–20	16.6 ± 2.9	17	0.81
Support (D7)	5–20	16.8 ± 2.5	17	0.7
Other dimensions (D8)				
Discriminatory harassment (D8.1)	6–24	14.2 ± 1.8	14	0.57
Workplace Harassment (D8.2)	2–8	6.5 ± 1.1	6	0.47
Sexual harassment (D8.3)	2–8	7 ± 1.3	7	0.65
Work addiction (D8.4)	5–20	17.6 ± 1.9	18	0.48
Working conditions (D8.5)	2–8	7 ± 1.1	7	0.39
Double presence (D8.6)	2–8	6.6 ± 1.2	7	0.59
Job and emotional stability (D8.7)	5–20	17.8 ± 2.4	18	0.75
Self-perceived health (D8.8)	2–8	7.2 ± 1	7	0.33

Table 7
Comparison of risk prevalence by gender for PRAQ.

Dimension	Risk Prevalence[a] (%)		X^2	p-value	Odds Ratio (OR)[b]	p-value
	Male	Female				
D1	30	29.6	0.026	0.872	0.928	0.871
D2	17.8	37	5.102	**0.024**	0.356	**0.027**
D3	24.4	44.4	4.584	**0.032**	0.393	**0.035**
D4	44.4	40.7	0.072	0.788	1.123	0.788
D5	11.1	22.2	1.559	0.212	0.502	0.218
D6	22.2	22.2	0.026	0.872	1.087	0.873
D7	24.4	40.7	3.233	0.072	0.452	0.076
D8.1	16.7	29.6	2.780	0.095	0.450	0.100
D8.2	51.1	48.1	0.097	0.755	1.141	0.076
D8.3	20	25.9	0.751	0.386	0.656	0.388
D8.4	14.4	22.2	0.582	0.445	0.662	0.447
D8.5	20	25.9	0.751	0.386	0.656	0.388
D8.6	36.7	55.6	3.083	0.079	0.474	0.082
D8.7	13.3	22.2	0.840	0.359	0.607	0.361
D8.8	22.2	40.7	4.226	**0.040**	0.402	**0.043**

[a] Includes the cumulative risk prevalence considering moderate, high and very high risk levels.
[b] Male was taken as the basis for comparison.

4. Discussion

4.1. Psychosocial risks in the plywood industry

Industries devoted to transforming wood through manufacturing processes are of great economic interest in regions with abundant forest biomass, such as the Ecuadorian Amazon. However, they are also considered high-risk industries for workers. For example, in Maine (USA), accident rates up to twice as high for woodworkers compared to other industrial sectors have been reported [58]. The main risk factors for injuries in this sector are related to a high physical workload, the continuous handling of machinery and an intense pace of work [59]. Similarly, other risk factors, such as hygiene and ergo-nomic, are recognised to be significant in wood manufacturing. The former is due to exposure to vibrations, noise, heat, and chemical substances, among other pollutants [60]. The latter is due to workload and work organisation, with factors such as: i) forced postures, ii) repetitive movements and iii) manual handling of loads [59].

Psychosocial risk factors have received less attention in the wood sector. Only a few studies in the literature have specifically addressed these issues. For instance, findings from Ref. [61] suggest that the main psychosocial risks are linked to the supervision mode, which can lead to contradictory orders and role conflicts and the pressure exerted on the worker due to the pace of work. Other studies have discussed the importance of managing psychosocial risks for socially responsible organisations [62]. However, psychosocial risks are still considered a minor issue in the wood sector's management of occupational safety and health [61].

The psychosocial risks detected in our study are strongly linked to the PRA method used. For example, through FPSICO, it was detected that, on average, 33 % of the workers face some psychosocial risks, while when using PRAQ, this frequency was 26 %. According to FPSICO, 37 % of the workers are affected by working time (WT), more than any other scale for high and very high risk levels. WT allows for evaluating the impact of quality and quantity of rest times concerning worked hours and its effect on workers'

Table 8
Scales and dimension coincidences between FPSICO and PRAQ.

		PRAQ														
		D1	D2	D3	D4	D5	D6	D7	D8.1	D8.2	D8.3	D8.4	D8.5	D8.6	D8.7	D8.8
FPSICO	WT				✔		✔									
	AU					✔								✔		
	WL	✔	✔													
	PD															
	VC															
	PS			✔				✔								
	WIC														✔	
	RP															
	RSS								✔	✔	✔					

social lives. Likewise, the Variety and Content (VC) and Workload (WL) scales affect 42 % and 35 % of workers, respectively. VC analyses the worker's perception of the value of their tasks for the company and society, focusing on the expected recognition beyond salary. WL assesses the level of labour demand in terms of time pressures, attention efforts and the amount and difficulty of the tasks [48].

The findings of our study align with the literature, emphasising time and workload as the main risk factors in the wood sector. Nevertheless, through PRAQ, we have also detected the need to pay more attention to other psychosocial dimensions affecting between 28 % and 50 % of the workers. For example, the margin of action and control (D4) assesses workers' participation in decision-making concerning their tasks, methods, and work pace. Leadership (D3) allows the analysis of personal characteristics to lead, coordinate, influence or motivate people. The support dimension (D7) assesses the actions and resources of superiors and co-workers to facilitate work issues. Workplace Harassment (D8.2), analyses forms of psychological abuse that can destabilise workers and affect their integrity. Finally, the double presence dimension (D8.6) assesses the conflicting demands between work and family life [53].

The goal of conducting a comprehensive overview of the psychosocial risk profile that motivated the application of two PRA methods. These results favour the proposal of a wide range of organisational strategies to reduce the prevalence of the main psychosocial risks in the sector. Therefore, early interventions and the establishment of policies and practices related to the workload and work time dimensions in the plywood industry could reduce the likelihood of individuals developing disorders; for example, through effective time management techniques, incorporation of short breaks, stress management techniques, maintenance of work-life balance, and open communication with supervisors. Nevertheless, certain limitations must be considered when extrapolating these results to other similar organisations (as discussed below).

4.2. Coincidences and exclusions between FPSICO and PRAQ

Another advantage of applying two PRA methods (i.e., FPSICO and PRAQ) lies in the possibility of exploring points of compatibility and exclusions. In the present study, a brief comparative analysis of both instruments has been conducted through a descriptive approach. FPSICO and PRAQ have shown high levels of reliability. However, each method considers scales or dimensions associated with specific psychosocial items scored using proprietary rating scales. While in PRAQ, the lower the score for all items, the higher the risk level [53]. That cannot be known for FPSICO since the specific items' scoring, and weight information is unavailable to users (as mentioned in section 2.2). Nevertheless, both methods allow the evaluation of results from analysing exposure prevalence (the basis of our comparison approach). This parameter expresses the proportion of workers included in each level of risk [63].

Table 8 shows the coincidences identified between the psychosocial factors addressed in the two methods. FPSICO was taken as the basis for comparison. Certain correspondences between the concepts, aspects, and fields of applying the different scales and dimensions were observed. For instance, the Working time (WT) of FPSICO refers to the temporal ordering of work activity, emphasising the distribution of rest periods, which is related to the margin of action and control (D4) and recovery (D6) dimensions of PRAQ. Autonomy (AU) of FPSICO assesses the ability of the worker to decide on the management of their work activity, which coincides in several points with work organisation (D5), and with double presence (D8.6) (considering temporal autonomy) of PRAQ.

Workload (WL) of FPSICO assesses the levels of demand and the set of demands that the worker must face in their work activity. It coincides practically with the aspects evaluated in load and work rate (D1), and at some points with skills development (D2) of PRAQ. D1 assesses the physical and mental requirements of the worker, emphasising the time and speed required to complete the task, while D2 is related to the opportunities to develop working skills, abilities, knowledge, and attitudes. Participation and supervision (PS) of FPSICO assesses both the worker's control over their activity and exercised by the organisation through supervision processes. It has high compatibility with support (D7) and medium with leadership (D3) of PRAQ.

FPSICO's Worker Interest and Compensation (WIC) assesses how concerned the company is with the worker over the long term. It presents a partial correspondence with Job and emotional stability (D8.7) of PRAQ. In D8.7, aspects such as training, promotion, and rewards are not considered, while WIC does not delve into the precariousness of the work and motivation. Moreover, FPSICO's relationships and social support (RSS) assess the working conditions derived from horizontal and vertical relationships among the working population. This approach is compatible with the treatment of discriminatory harassment (D8.1), workplace harassment (D8.2), and sexual harassment (D8.3) from PRAQ.

Relating the scale-dimension overlap analysis to their resultant prevalence, we observed that the main risks for FPSICO and PRAQ were working time (WT) (37 % prevalence) and scope of action (D4) (44 % prevalence), respectively. Something similar occurs with other significant risk factors, such as workload (WL) and load and work rate (D1). Furthermore, it should be noted that variety and content (VC) uncovered in PRAQ resulted in a significantly unfavourable situation according to the FPSICO assessment. Therefore, if only PRAQ had been used, this result could not have been detected.

4.3. Study limitations and future work

In order to interpret the results presented in this study, certain limitations must be taken into account. Firstly, as this is a cross-sectional study, it limits association interpretations as the prevalence of psychosocial risks and their relationship with some sociodemographic characteristics are specific to the study population. In addition, although plywood manufacturing is an important player in the Ecuadorian wood sector, there are other industries, such as particleboard, where similar studies could be applied. Therefore, these findings may only be generalisable within the plywood industry in the region, and it would be advisable to contrast them with new cross-sectional studies in the sector to extend the implications of these results. Response rate constitutes another limitation and bias due to self-reported data since although the PRA methods were applied to all workers in the company, 100 %

participation was not achieved, which is a common problem in this type of study.

Not having the data series corresponding to the FPSICO scales' graded scores constitutes an obstacle to performing specific statistical analyses or correlation studies. For example, to link the prevalence of psychosocial risks with musculoskeletal disorders, the syndrome of burnout, and job satisfaction, as developed in several studies in the literature [64–66]. Due to this drawback, it was not possible to compare the specific scoring of different scales and dimensions of FPSICO and PRAQ using statistical correlation tests (e.g., Chi-Square). Therefore, future research could incorporate a further inferential approach, providing deeper insights into the psychosocial risks in the plywood industry and serving as the basis for developing new practices and policies to support individuals' well-being. Among these studies, comparative analyses on the prevalence of psychosocial risks across different demographics, correlational studies through correlation coefficients or regression analyses and/or predictive models regarding the likelihood of psychosocial risk based on a range of independent variables could be considered.

5. Conclusions

This study assessed the psychosocial risks of 124 workers from the plywood industry in the Amazon region of Ecuador. Two PRA assessment methods, FPISCO and PRAQ, were applied to provide an extended overview of the main psychosocial effects on this population. PRAQ is a local Ecuadorian instrument developed according to the national context, and FPSICO is a Spanish instrument widely accepted in the Latin American context. These methods were selected because they are the most widely applied in Ecuadorian organisations. In this sense, the approach used (i.e. applying both methods) allows a comprehensive assessment of psychosocial risks for workers in the plywood sector in the region for the first time.

The results mainly show an unfavourable situation (including medium, high risk and very-high risk levels) according to FPSICO in the dimensions of workload (WL), working time (WT) and variety and content (VC) for 42 %, 37 %, and 35 % of the surveyed workers. It is essential to emphasise WT due to its substantial prevalence of high and very-high risk levels, with 13.9 % and 16.5 %, respectively. Concerning PRAQ, unfavourable situations (encompassing medium-risk and high-risk levels) were obtained in the dimensions of margin of action (D4), load and work rate (D1), and leadership (D3) for 44 %, 30 %, and 29 % of the working population, respectively. Findings from both methods suggest an association between the female gender and a higher prevalence of risk in most of the psychosocial factor scales and dimensions assessed. This association is particularly relevant for D3, D2, and D8.8 of PRAQ, with a prevalence in women up to 20 percentage points higher than men, and a probability up to three times higher of falling into a risky situation (at 95 % confidence level).

The content analysis and the risk prevalence suggest some compatibilities between the applied PRA methods. It is noteworthy that statistical correlation analysis could not be conducted for further comparison because FPSICO 4.0 does not provide information on the different items' specific rating weights and scores, as PRAQ does. However, future research could consider a broader sample of plywood workers (beyond the Amazon region) and other methods for further inferential analysis to provide deeper insights into the psychosocial risks. However, this study detected similar risk prevalence in dimensions with equivalent descriptive approaches. Finally, in both PRA methods, workload and work pace were detected as the main psychosocial risk factors in the plywood industry. Therefore, this study provides insights for policymakers, healthcare professionals, and stakeholders in primarily developing organisational actions, early interventions, policies, practices and strategies to reduce these risks.

Institutional review board statement

The study was conducted following the Declaration of Helsinki. The company's Ethics Committee has accepted the entire application procedure through the statement approval ref: PRA-02-21. Written informed consent was obtained from all subjects involved in the study.

Data availability

Data will be made available on request.

CRediT authorship contribution statement

R. Gutiérrez-Alvarez: Writing – original draft, Software, Methodology, Formal analysis, Data curation, Conceptualization. **K. Guerra:** Writing – review & editing, Investigation, Formal analysis, Data curation. **M. Gutiérrez:** Writing – original draft, Supervision, Methodology, Data curation, Conceptualization.

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

Table A1
FPSICO questionnaire

1. Do you work on Saturdays?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
2. Do you work on Sundays and holidays?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
3. Can you take days or hours off to attend to personal matters?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
4. How often do you have to work long hours, work over time, or take work home?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
5. Do you have at least 48 h straight of rest in the course of a week (7 consecutive days)				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
6. Does your work schedule allow you to combine your free time (vacations, days off, start and finish time) with that of your family and friends?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
7. Can you decide when to take the regulatory breaks (lunch or snack break)?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
8. During the working day, apart from regulatory breaks, can you stop working or make a short break whenever you need to?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
9. Can you set your own pace of work during the working day?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
10a. Can you make decisions concerning: what you must do (activities and tasks to carry out)?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
10b. Can you make decisions concerning: the distribution of tasks throughout your working day?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
10c. Can you make decisions concerning: the distribution of the direct environment at your workplace (space, furniture, personal objects …)?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
10d. Can you make decisions concerning: how you must do your job (method, protocols, work procedures …)?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
10e. Can you make decisions concerning: your workload?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
10f. Can you make decisions concerning: the standard of your work?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
10g. Can you make decisions concerning: the resolution of irregular situations or incidents occurring at your job?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
10h. Can you make decisions concerning: the distribution of rotating shifts?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't work in rotating shifts [5]
11a. What is your level of participation in the following aspects of your job: introducing changes in equipment and materials				
I can decide [1]	I am consulted [2]	I only receive information [3]	No participation [4]	–
11b. What is your level of participation in the following aspects of your job: introducing changes in the way of working				
I can decide [1]	I am consulted [2]	I only receive information [3]	No participation [4]	–
11c. What is your level of participation in the following aspects of your job: launching new or better products or services				
I can decide [1]	I am consulted [2]	I only receive information [3]	No participation [4]	–
11d. What is your level of participation in the following aspects of your job: restructuring or reorganising departments or work areas				

(*continued on next page*)

Table A1 (*continued*)

I can decide [1]	I am consulted [2]	I only receive information [3]	No participation [4]	–
11e. What is your level of participation in the following aspects of your job: changes in management or among your superiors				
I can decide [1]	I am consulted [2]	I only receive information [3]	No participation [4]	–
11f. What is your level of participation in the following aspects of your job: hiring or incorporating new employees				
I can decide [1]	I am consulted [2]	I only receive information [3]	No participation [4]	–
11g. What is your level of participation in the following aspects of your job: preparing work rules				
I can decide [1]	I am consulted [2]	I only receive information [3]	No participation [4]	–
12a. How do you rate your immediate boss's supervision of the following aspects of your job? Work method				
Does not participate [1]	Insufficient [2]	Adequate [3]	Excessive [4]	–
12b. How do you rate your immediate boss's supervision of the following aspects of your job? Work planning				
Does not participate [1]	Insufficient [2]	Adequate [3]	Excessive [4]	–
12c. How do you rate your immediate boss's supervision of the following aspects of your job? Work pace				
Does not participate [1]	Insufficient [2]	Adequate [3]	Excessive [4]	–
12d. How do you rate your immediate boss's supervision of the following aspects of your job? Work standard				
Does not participate [1]	Insufficient [2]	Adequate [3]	Excessive [4]	–
13a. How do you rate the degree of information your company provides you with on the following aspects? Chances for training				
No information [1]	Insufficient [2]	Adequate [3]	–	–
13b. How do you rate the degree of information your company provides you with on the following aspects? Chances for promotion				
No information [1]	Insufficient [2]	Adequate [3]	–	–
13c. How do you rate the degree of information your company provides you with on the following aspects? Requirements to fill promotions				
No information [1]	Insufficient [2]	Adequate [3]	–	–
13d. How do you rate the degree of information your company provides you with on the following aspects? The company's situation on the market				
No information [1]	Insufficient [2]	Adequate [3]	–	–
14a. In order to do your job, how do you rate the information provided on the following aspects? What you must do (functions, competences, and assignments)				
Very clear [1]	Clear [2]	Unclear [3]	Not clear al all [4]	–
14b. In order to do your job, how do you rate the information provided on the following aspects? How you must do it (methods, protocols, work procedures)				
Very clear [1]	Clear [2]	Unclear [3]	Not clear al all [4]	–
14c. In order to do your job, how do you rate the information provided on the following aspects? The amount of work you are expected to do				
Very clear [1]	Clear [2]	Unclear [3]	Not clear al all [4]	–
14d. In order to do your job, how do you rate the information provided on the following aspects? The standard of the work you are expected to attain				
Very clear [1]	Clear [2]	Unclear [3]	Not clear al all [4]	–
14e. In order to do your job, how do you rate the information provided on the following aspects? The time assigned to conduct the job				
Very clear [1]	Clear [2]	Unclear [3]	Not clear al all [4]	–
14f. In order to do your job, how do you rate the information provided on the following aspects? The responsibility of the job (which mistakes or shortcomings can be blamed on your performance and which cannot)				
Very clear [1]	Clear [2]	Unclear [3]	Not clear al all [4]	–
15a. State how often the following situations occur at your job: you are assigned tasks you may not conduct for lack of human or material resources.				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
15b. State how often the following situations occur at your job: in order to carry out some tasks you must ignore the established methods.				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
15c. State how often the following situations occur at your job: you are forced to make decisions or conduct tasks with which you disagree because they pose a moral, a legal, or an emotional conflict.				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
15d. State how often the following situations occur at your job: you receive contradictory instructions (different people ask you to do opposite tasks)				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
15e. State how often the following situations occur at your job: you are required to assume responsibilities, assignments, or tasks that are beyond your functions and which should be carried out by other workers.				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
16a. If you must carry out delicate or complicated tasks and you need help or support, you can count on: your bosses				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have anyone, there is no one else [5]
16b. If you must carry out delicate or complicated tasks and you need help or support, you can count on: your colleagues				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have anyone, there is no one else [5]
16c. If you must carry out delicate or complicated tasks and you need help or support, you can count on: your subordinates				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have anyone, there is no one else [5]
16d. If you must carry out delicate or complicated tasks and you need help or support, you can count on: other people working in the company				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have anyone, there is no one else [5]

(*continued on next page*)

Table A1 (*continued*)

17. How do you rate your relationship with your co-workers?				
Good [1]	Average [2]	Bad [3]	I have no co-workers [4]	–
18a. How often do the following situations occur at your job: interpersonal conflicts				
Rarely [1]	Often [2]	All the time [3]	They do not occur [4]	–
18b. How often do the following situations occur at your job: situations of physical violence				
Rarely [1]	Often [2]	All the time [3]	They do not occur [4]	–
18c. How often do the following situations occur at your job: situations of psychological violence (threats, insults, silent treatment, verbal abuse …)				
Rarely [1]	Often [2]	All the time [3]	They do not occur [4]	–
18d. How often do the following situations occur at your job: situations of sexual harassment				
Rarely [1]	Often [2]	All the time [3]	They do not occur [4]	–
19. Your company, when faced with situations of interpersonal conflict between workers:				
Lets the people involved solve the problem [1]	Asks the bosses of the people involved to try to find a solution to the problem [2]	Has a standard formal procedure to deal with it [3]	I don't know [4]	–
20. At work, do you feel discriminated (for reasons of age, sex, religion, race, training, category …)?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
21. During your working day, how long must you pay exclusive attention to your work (so that you cannot talk, move around, or just think about things unrelated to your job)?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
22. Generally speaking, how do you rate the attention you must pay to do your job?				
Very high [1]	High [2]	Medium [3]	Low [4]	Very Low [5]
23. The time you have to do your job is sufficient and adequate:				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
24. Are you forced to work quickly to fulfil your task?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
25. How often do you have to speed up your work pace?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
26. In general, your workload is:				
Excessive [1]	High [2]	Adequate [3]	Scarce [4]	Very scarce [5]
27. Do you have to conduct several tasks at the same time?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
28. Is the job you do difficult or complicated for you?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
29. At work, do you have to conduct tasks so difficult that you need to ask someone for advice or help?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
30. At work, do you have to interrupt the task you are doing to carry out an unexpected one?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
31. In case of interruptions, do they highly disrupt your work?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
32. Is your workload irregular and unpredictable?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
33a. To what extent does your job require you to: learn new things or methods?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
33b. To what extent does your job require you to: adapt to new situations?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
33c. To what extent does your job require you to: take initiatives?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
33d. To what extent does your job require you to: have a good memory?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
33e. To what extent does your job require you to: be creative?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
33f. To what extent does your job require you to: deal directly with people who do not work at your company (clients, passengers, students, patients …)?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
34a. At work, how often do you have to hide your emotions and feelings in front of … ? Your superiors in hierarchy?				

(*continued on next page*)

Table A1 (*continued*)

Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have any, I have no relationship [5]
34b. At work, how often do you have to hide your emotions and feelings in front of … ? Your subordinates?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have any, I have no relationship [5]
34c. At work, how often do you have to hide your emotions and feelings in front of … ? Your colleagues?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have any, I have no relationship [5]
34d. At work, how often do you have to hide your emotions and feelings in front of … ? People who do not work at the company (clients, passengers, students, patients …)				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have any, I have no relationship [5]
35. Given your line of work, are you exposed to situations that affect you emotionally?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
36. Given your line of work, how often are you expected to deal with the emotional and personal problems of your external clients (passengers, students, patients, etc.)?:				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	–
37. Do you find your job monotonous?:				
No [1]	Sometimes [2]	Quite [3]	Very [4]	–
38. In general, do you find the tasks you do make sense?				
A lot [1]	Quite a lot [2]	Not much [3]	Not at all [4]	–
39. How does your work contribute to your company or organisation as a whole?				
It's not very important [1]	It's important [2]	It's very important [3]	I don't know [4]	–
40a. In general, is your job recognised and appreciated by? Your superiors?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have any, I have no relationship [5]
40b. In general, is your job recognised and appreciated by? Your colleagues?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have any, I have no relationship [5]
40c. In general, is your job recognised and appreciated by? The public, clients, passengers, students, patients … (if there are any)?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have any, I have no relationship [5]
40d. In general, is your job recognised and appreciated by? Your family and friends?				
Always or almost always [1]	Often [2]	Sometimes [3]	Never or hardly ever [4]	I don't have any, I have no relationship [5]
41. Does your company foster your professional development (promotion, career plan …)?				
Adequately [1]	Average [2]	Insufficiently [3]	There is no chance of professional development [4]	–
42. How would you define the training your company provides?				
Very adequate [1]	Sufficient [2]	Insufficient in some cases [3]	Completely insufficient [4]	–
43. Generally speaking, the relationship between your effort and the rewards the company provides is:				
Very adequate [1]	Sufficient [2]	Insufficient in some cases [3]	Completely insufficient [4]	–
44. Considering the duties and responsibilities of your job, are you satisfied with your salary?				
Very satisfied [1]	Satisfied [2]	Unsatisfied [3]	Very unsatisfied [4]	–

Appendix B

Table B1
Psychosocial Risk Assessment Questionnaire (PRAQ)

	Completely agree	Partially agree	Slightly agree	Disagree
Load and work rate (D1)				
1. I consider that the requests and requirements that other people ask me are acceptable (co-workers, users, clients).	[4]	[3]	[2]	[1]
2. I decide the rhythm of work in my activities	[4]	[3]	[2]	[1]
3. The activities and/or responsibilities assigned to me do not cause me stress	[4]	[3]	[2]	[1]
4. I have enough time to carry out all the activities that have been entrusted to me within my workday.	[4]	[3]	[2]	[1]
Skills development (D2)				
5. I consider that I have sufficient knowledge, abilities and skills to carry out the job I was hired for.	[4]	[3]	[2]	[1]

(*continued on next page*)

Table B1 (*continued*)

	Completely agree	Partially agree	Slightly agree	Disagree
6. In my work, I learn and acquire new knowledge, abilities and skills from my co-workers.	[4]	[3]	[2]	[1]
7. In my job there is a career plan, training and development training of my knowledge, abilities and skills.	[4]	[3]	[2]	[1]
8. I have enough time to carry out all the activities that have been entrusted to me within my workday.	[4]	[3]	[2]	[1]
Leadership (D3)				
9. In my work, people who do a good job or achieve their goals are recognised and given credit.	[4]	[3]	[2]	[1]
10. My immediate boss is willing to listen to proposals for change and work initiatives.	[4]	[3]	[2]	[1]
11. My immediate boss establishes goals, clear and feasible deadlines to fulfil my functions or activities.	[4]	[3]	[2]	[1]
12. My immediate boss steps in, provides support, support, and worries when I have too much work to do.	[4]	[3]	[2]	[1]
13. My immediate boss gives me enough guidelines and feedback for the performance of my job.	[4]	[3]	[2]	[1]
14. My immediate boss considers the work team, the decisions that can affect everyone.	[4]	[3]	[2]	[1]
Margin of action and control (D4)				
15. In my work, there are spaces for discussion to debate common problems and differences of opinion openly.	[4]	[3]	[2]	[1]
16. I am allowed to carry out the work in collaboration with my co-workers and/or other areas.	[4]	[3]	[2]	[1]
17. My opinion is taken into account regarding deadlines in the fulfilment of my activities or when there is a change in my functions.	[4]	[3]	[2]	[1]
18. I am allowed to contribute ideas to improve activities and work organisation.	[4]	[3]	[2]	[1]
Work organisation (D5)				
19. I consider that communication forms in my work are adequate, accessible, and easily understood.	[4]	[3]	[2]	[1]
20. In my work, all workers and servants are regularly informed of the management and achievements of the company or institution.	[4]	[3]	[2]	[1]
21. In my work, the limitations of people with disabilities are respected and taken into account to assign roles and tasks.	[4]	[3]	[2]	[1]
22. In my work we have sufficient and significant meetings for the fulfilment of the objectives.	[4]	[3]	[2]	[1]
23. The goals and objectives of my work are clear and achievable.	[4]	[3]	[2]	[1]
24. I always have tasks and activities to do in my day and workplace.	[4]	[3]	[2]	[1]
Recovery (D6)				
25. After work I have enough energy to do other activities.	[4]	[3]	[2]	[1]
26. In my work, I am allowed to take short breaks to renew and regain energy.	[4]	[3]	[2]	[1]
27. In my work, I have time to dedicate myself to reflect on my work performance.	[4]	[3]	[2]	[1]
28. I have a schedule and workday that meets my expectations and work demands.	[4]	[3]	[2]	[1]
29. Every day, I feel that I have rested enough and have the energy to start my work.	[4]	[3]	[2]	[1]
Support (D7)				
30. Work is organised in a way that encourages team collaboration and dialogue with other people.	[4]	[3]	[2]	[1]
31. In my work, I perceive a feeling of companionship and well-being with my colleagues.	[4]	[3]	[2]	[1]
32. In my work, the necessary support is provided to substitute workers or workers with some degree of disability and illness.	[4]	[3]	[2]	[1]
33. In my work, I get technical and administrative help when I need it.	[4]	[3]	[2]	[1]
34. In my work, I have access to a doctor, psychologist, social worker, counsellor, etc., in crisis and/or rehabilitation situations.	[4]	[3]	[2]	[1]
Other dimensions (D8)				
35. In my job, everyone is treated the same, regardless of their age.	[4]	[3]	[2]	[1]
36. The guidelines and goals that I set for myself fulfil them within my working day and hours.	[4]	[3]	[2]	[1]
37. There is a good work environment in my work.	[4]	[3]	[2]	[1]
38. I have a job where men and women have the same opportunities.	[4]	[3]	[2]	[1]
39. In my work, I feel accepted and valued.	[4]	[3]	[2]	[1]
40. The physical spaces and environments in my work provide access facilities for people with disabilities.	[4]	[3]	[2]	[1]
41. I consider that my work is free from threats, humiliation, ridicule, repeated slander, or defamation to harm me.	[4]	[3]	[2]	[1]
42. I feel stable despite changes in my work.	[4]	[3]	[2]	[1]
43. In my work, I am free of sexual behaviours that affect my physical, psychological and moral integrity.	[4]	[3]	[2]	[1]
44. I consider that the work I do does not cause negative effects on my physical and mental health.	[4]	[3]	[2]	[1]
45. I find it easy to relax when I am not working.	[4]	[3]	[2]	[1]
46. I feel that my family or personal problems do not influence the performance of my work activities.	[4]	[3]	[2]	[1]
47. The facilities, environments, equipment, machinery and tools that I use to carry out the work are adequate to avoid accidents at work and occupational diseases.	[4]	[3]	[2]	[1]
48. My work is free from sexual harassment.	[4]	[3]	[2]	[1]
49. In my work, I am allowed to solve my family and personal problems.	[4]	[3]	[2]	[1]
50. I have a job free of stressful conflicts, malicious or slanderous rumours about myself.	[4]	[3]	[2]	[1]
51. I have a balance, and I separate my work well from my personal life.	[4]	[3]	[2]	[1]
52. I am proud to work in my company or institution.	[4]	[3]	[2]	[1]

(*continued on next page*)

Table B1 (*continued*)

	Completely agree	Partially agree	Slightly agree	Disagree
53. My ideology, political opinion, religion, nationality and sexual orientation are respected in my work.	[4]	[3]	[2]	[1]
54. My work and the contributions I make are valued and motivate me.	[4]	[3]	[2]	[1]
55. I feel guilt-free when I am not working on something.	[4]	[3]	[2]	[1]
56. In my work there are no spaces for the exclusive use of a specific group of people linked to a privilege, for example, exclusive cafeteria, exclusive bathrooms, etc., which causes discomfort and damages my work environment.	[4]	[3]	[2]	[1]
57. I can stop thinking about work during my free time (hobbies, recreational activities, others).	[4]	[3]	[2]	[1]
58. I consider that I am physically and mentally healthy.	[4]	[3]	[2]	[1]

Appendix C

Table C1
Data normality tests for PRAQ dimensions

Dimensions	Skewness		kurtosis		S–W Test
	Value	Pr	Value	Pr	(pr > z)
Load and work rate (D1)	−1.075	0.000	4.101	0.036	0.000
Skills development (D2)	−1.677	0.000	6.854	0.000	0.000
Leadership (D3)	−0.563	0.014	2.520	0.261	0.000
Margin of action and control (D4)	−0.928	0.000	3.842	0.075	0.000
Work organization (D5)	−1.226	0.000	4.137	0.032	0.000
Recovery (D6)	−1.343	0.000	4.504	0.012	0.000
Support (D7)	−0.738	0.002	3.222	0.435	0.000
Other dimensions (D8)	−0.641	0.006	2.712	0.640	0.000
Discriminatory harassment (D8.1)	−0.833	0.001	3.085	0.620	0.000
Workplace Harassment (D8.2)	−0.318	0.149	2.388	0.095	**0.418**
Sexual harassment (D8.3)	−1.645	0.000	5.840	0.000	0.000
Work addiction (D8.4)	−0.643	0.006	2.607	0.419	0.001
Working conditions (D8.5)	−1.531	0.000	5.603	0.001	0.000
Double presence (D8.6)	−0.782	0.001	3.055	0.668	0.000
Job and emotional stability (D8.7)	−1.366	0.000	5.163	0.002	0.000
Self-perceived health (D8.8)	−0.815	0.001	2.461	0.176	0.001

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