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RESEARCH ARTICLE

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Protective action in the workplace in the time of COVID-19: The role of worker representation

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Abstract

Background: This study addresses the contribution of worker representation to health and safety in the pandemic context. To do so, we examine whether the self-reported presence of representatives in workplaces is associated with the implementation of anti-COVID-19 protective action and with which type of measures their existence is most strongly associated (individual, collective or organizational). The article also explores how the presence of worker representatives and anti-COVID-19 protective measures are distributed according to workers' socio-professional characteristics and company features.

Methods: This is a cross-sectional study based on an online survey conducted in Spain (n = 19,452 workers). Multiple Correspondence Analysis was used for the multivariate description while the association between worker representation and protective measures was assessed by robust Poisson regressions.

Results: The maps resulting from the Multiple Correspondence Analysis allow for the identification of patterns of inequalities in protection, with a clear occupational social class divide. The regression models show that protective measures are applied more frequently where worker representatives exist, this association being particularly strong in relation to organizational measures.

Conclusions: The presence of worker representation is systematically associated with a greater presence of protective measures, which could have implications for the reduction of social inequalities resulting from labor-management practices.

KEYWORDS

COVID-19 pandemic, occupational social class, protective measures, Spain, worker representation

1 | INTRODUCTION

Since its inception, the struggle for the safeguarding of occupational health has been one of the main axes of mobilization of the labor movement.[1] In the context of the COVID-19 pandemic, this work has gained new traction. During the pandemic, trade unions have tried to influence the regulatory framework of occupational health and safety by promoting the development of new regulations, implementing legal actions to exercise health and safety rights, and demanding the classification of COVID-19 as an occupational disease, among other actions.[2–4] In some cases, demands for better workplace safety procedures and equipment have been the cause of strikes.[5,6] In the workplace context, the presence of workers' representatives has been linked to the improvement of health and safety conditions through the provision of personal protective equipment (mainly disinfectant gel, gloves, and masks),[7,8] the implementation of ventilation measures,[9] and

organizational measures allowing for physical distancing.[8] Prepandemic evidence focusing on occupational risk prevention has also shown that worker representative participation in workplaces has been related to higher implementation of the standards of the preventive management cycle (risk assessment, preventive planning, and implementation of preventive measures).[10–13] However, the pandemic has also made clear that the process of flexibilization of employment relations over the last decades has expanded precarious employment arrangements and has deteriorated the influence of organized labor, thus constraining the capacity of workers' representatives to act.[4,14]

1.1 | Worker representative participation in occupational health

Worker representative participation in occupational health refers to the collective representation of workers' interests in health and safety at work.[13] It is structured, legally recognized, and developed through collective representation structures that reach agreements on occupational health providing collective coverage. How representative participation in occupational health takes shape is determined by the traditions of industrial relations and is established on the basis of legislation or collective bargaining agreements.[15] In Europe, the main way in which worker representative participation in health and safety takes shape is through health and safety representatives,[15] that is, workers—usually union members—with a mandate to represent workers' interests in occupational health and safety matters. Yet, there are other forms of participation of workers' representatives in occupational health, such as through collective representation structures (e.g., works councils or workers' representatives) or via Health and Safety Committees (i.e., parity bodies with workers' and management representatives).[16] Notably, the lack of reliable and comprehensive register data makes it difficult to quantify the presence and coverage of worker representative participation in occupational health. In addition, surveys like the European Survey of Enterprises on New and Emerging Risks (ESENER) have limitations related to a low response rate and the forms of data collection, which lead to overestimation of the presence of workers' representatives (see Fondevila-McDonald et al.[17] for a test conducted in the Catalonia region of Spain. Since then, gathering of information on occupational risk prevention management in Catalonia has included documentary review of the information in the surveyed establishments to verify it).

In Spain, the mechanisms of specialized participation in occupational health are set by the Act on Prevention of Occupational Risks. Health and safety representatives may exist in workplaces with more than five workers who have called workers' representatives' elections. The number of health and safety representatives ranges between one and eight depending on the size of the firm. In the smaller workplaces, namely those from 6 to 30 workers, it is the worker representative who also takes on the role of health and safety representative. Health and Safety Committees (parity bodies) are mandatory in companies with at least 50 workers that have workers' representatives. In turn, both the health and safety representatives and those members of the Health and Safety Committee representing the workers are bodies of unitary representation, meaning that their actions affect the entire workforce, regardless of whether or not the workers are affiliated with a union.[18] Thus, the Spanish representation system enables a wide range of coverage.[19] For instance, in Catalonia, the coverage of representatives multiplied the system's presence fourfold in 2022: while an estimated 14% of firms with more than five workers had health and safety representatives, this helped cover more than half of the region's waged workers (approximately 60% of those in firms with more than five workers and 55% of overall waged workers).[20]

The Act on Prevention of Occupational Risks stipulates that health and safety representatives are designated by, and from among, representatives elected by workers at the workplace level. Although it is not legally required, in practice, workers' representatives usually act under the umbrella of a union (less than 5% of workers' representatives are independent of the unions).[19,21] The two class unions that have the largest representation in Spanish workplaces are *Comisiones Obreras* (CCOO) and *Unión General de Trabajadores* (UGT).[19] Since the 1980s, the two unions combined have accounted for more than two-thirds of the elected workers' representatives in Spain (in 2018: CCOO 35.7% and UGT 32.7%).[12]

1.2 | Determining factors for the presence of worker representation in occupational health

Despite the positive contribution to occupational health made by workers' representatives, not all workforces are equally covered by their umbrella. Their existence is largely contingent on the size of the company and its branch of economic activity.[15,22] Thus, the larger the size of the company, the higher the percentage of workplaces with forms of worker representative participation in health and safety matters. The branches of economic activity with the highest prevalence of workers' representatives are extractive industries and electricity, gas, steam and air conditioning; education; and health and social services activities.[23] As mentioned above, in Spain—as in other countries—there is a threshold for having worker representation. In practice, almost 14% of workers in Spain, who are in companies with five or less workers, cannot have workers' representatives (equivalent to 2,049,037 workers).[24]

On the other hand, the presence of workers' representatives in health and safety is related to the extent and tradition of trade union activity in the workplace. The process of precarization of employment and working conditions and the restructuring of the labor market experienced in Western economies in recent decades have made it harder or impossible for an increasing proportion of workers to rely on the protection of workers' representatives.[25,26] By social groups, the precariousness of employment and working conditions is particularly frequent among women, young people, immigrants, workers in lower-skilled jobs, and those with lower levels of education.[27,28] By firm characteristics, private sector and primary sector firms concentrate more indicators of poor job quality.[27,29]

In the pandemic context, just like the precariousness of employment and working conditions, the distribution of the risk of SARS-CoV-2

infection is unevenly distributed among the working population. This has been termed the "Coronavirus class divide."[30] Some of the factors behind this are due to social determinants of health outside the work domain, while other factors are directly linked to the world of work. The former involve, among other factors, the place of residence, housing conditions, and the means of transport used to get to work.[31,32] Examples of the latter include intrinsic characteristics of the job such as whether the sector of activity is considered essential or not and whether teleworking or other physical distance measures are possible.[33–35] Another factor is the type of employment relations of the working population, since these modify the access or use of measures against COVID-19. For example, low wages and job insecurity influence workers' risk-taking or sick leave, and people in more precarious contractual situations do not experience the same occupational health and safety coverage.[2,36,37] In turn, occupational segregation by social class, gender, or race-ethnicity in more precarious jobs has also meant that some social groups are particularly at risk in their jobs.[33,35,37]

1.3 | Aim of the study

Historically, in situations of economic crisis, occupational risk prevention has been adversely affected by lower investment in health and safety in companies.[38,39] However, due to the focus on health during the pandemic, there is reason to believe that a lesser impact on health and safety management occurred in the context of COVID-19. This study will focus on the role that the existence of representative participation in workplaces may have played in COVID-19 protective action in companies, encompassing a wide range of economic sectors and axes of social inequality. Our analysis focuses on the Spanish experience and seeks to explore whether there is a relationship between the presence of workers' representatives and the COVID-19 protective measures applied in companies; to analyze which types of measures are most associated with the presence of workers' representatives; and to study whether there are differences in the extent of workers' representatives and the COVID-19 protective measures implemented in companies according to the sociodemographic and employment characteristics of the workers and according to the ownership and sector of economic activity of the company.

2 | MATERIALS AND METHODS

2.1 | Study design

Observational cross-sectional study.

2.2 | Data collection and sample

This study draws on survey data from the second wave of the survey "Working conditions, work organization and health of workers resident in Spain in the context of COVID-19" (referred to as COTS2 for its acronym in Spanish). This is an online survey conducted between April and May 2021 which was distributed to individuals affiliated with the greater trade union in Spain, *Comisiones Obreras*, via the trade union. Inclusion criteria were: (1) wage-earners residing in Spain who had a job on 14 March 2020 (the day the state of alarm began), (2) working as an employee at the time of answering the survey. The final sample comprised $n = 19{,}452$ respondents, including those affected by a partial temporary lay-off procedure (with a reduction of their working time). See Llorens-Serrano et al.[40] for further information about the survey.

2.3 | Instrument and variables

The COTS2 questionnaire included some ad hoc questions about the effects of the pandemic, and others from previously validated surveys. From this set of questions, we selected the following variables:

2.3.1 | Implementation of COVID-19 protective measures

The implementation of COVID-19 protective measures was explored through an ad hoc question reporting on a range of activities. Based on the classification provided by the Spanish Ministry of Health at the time of the survey,[41] the 13 original items were categorized into three types of protective measures, namely organizational, collective or individual protective measures. As a result, each type of protective measure comprised:

1. Organizational measures: to introduce teleworking; to introduce shift work; to change from split shifts to continuous shifts; to change start and finish times; to reduce working hours; to change tasks; and to transfer workers to other workplaces.
2. Collective measures: to provide dividers; to organize workstations to maintain a distance of 1.5 m; and to provide disinfectant gel.
3. Individual measures: to provide gloves; to provide masks; and to provide uniforms/special suits.

For each item, response categories were Yes or No.

2.3.2 | Worker representation

Worker representation was analyzed through a question on self-reported existence of workers' representatives in the workplace. Response categories were: Yes; No; Don't know (DK).

2.3.3 | Sociodemographic and employment-related features

The sociodemographic variables considered in the study were:

1. Gender identity, self-reported, using as response categories: Woman; Man; Nonbinary.
2. Nationality, dichotomizing answers into: Spanish; Non-Spanish.
3. Age, split into the age groups: 16–34 years; 35–49 years; 50 or more.
4. Social class was determined on the basis of occupation and dichotomized into: Manual; Nonmanual.
5. Type of contract, with the response categories: Permanent; Temporary; No contract.

2.3.4 | Company features

The following variables related to the characteristics of the enterprise have been included in the analysis:

1. Company ownership: Public sector; Private sector.
2. Economic activity, adapting the codes from the statistical classification of economic activities in the European Community (NACE Rev. 2) (see Table 1).

2.4 | Statistical analysis

We first performed a descriptive analysis through bivariate and multivariate analysis by means of multiple correspondence analysis. In the multiple correspondence analysis, we aimed to characterize the existence of the COVID-19 protective measures with respect to the presence of workers' representatives by also taking into account the sociodemographic and labor conditions of the working population and the characteristics of the workplaces. For this purpose, we used as active variables the COVID-19 protective measures (13 measures) and an interaction variable for the presence of workers' representatives according to occupational social class (6 response categories). Variables relating to other sociodemographic characteristics, employment conditions, and organizational characteristics, which were the supplementary variables, were projected onto the results obtained. The estimation of inertia was calculated using Greenacre's[42] adjustment.

Then, we carried out robust Poisson regression analyses with the implementation of COVID-19 measures as the dependent variables and the existence of workers' representatives as the main independent variable. For each of the 13 variables informing about protective measures, raw and adjusted prevalence ratios (PR) were calculated for "yes" versus "no" protective action, with 95% confidence intervals (CI), using "yes" as the referent. For the main independent variable, results on the presence of representatives are shown for the comparison of "yes" versus "no" as well as for "DK" versus "no", taking a lack of representatives as the reference category. Regression analyses were also adjusted by sociodemographic, employment-related conditions, and organizational features. Analyses were performed using STATA v.15.

TABLE 1 Sample description.

	Total *n* (%)
Age	
16 to 34-year-old	1745 (9.1)
35 to 49-year-old	8709 (45.2)
50 or more years old	8832 (45.8)
Gender identity	
Woman	10208 (52.9)
Man	9080 (47)
Nonbinary	28 (0.1)
Nationality	
Spanish	18329 (98.5)
Non-Spanish	288 (1.5)
Contract type	
Permanent	16042 (82.5)
Temporary	3402 (17.5)
No contract	8 (0.04)
Company ownership	
Private sector	11780 (60.8)
Public sector	7603 (39.2)
Occupational social class	
Manual	7224 (37.6)
Nonmanual	11968 (62.4)
Economic activity	
Primary (agriculture, livestock, forestry, and fishing)	232 (1.2)
Industry	2227 (11.6)
Education	2458 (12.8)
Health activities	2003 (10.5)
Care	1211 (6.3)
Social work	201 (1.1)
Construction	360 (1.9)
Wholesale and retail trade	1108 (5.8)
Transportation and storage	732 (3.8)
Hospitality (catering; hotels and restaurants)	575 (3)
Financial, insurance, and real estate activities	945 (4.9)
Administrative and related services	1061 (5.5)
Information and communications	722 (3.8)
Professional, scientific, and technical activities	683 (3.6)
Sanitation, waste management, and remediation activities	113 (0.6)
Cleaning of buildings and premises	439 (2.3)

TABLE 1 (Continued)

	Total *n* (%)
Private security	341 (1.8)
Others	3749 (19.6)
Worker representation in the company	
No	3008 (15.5)
Yes	15706 (80.7)
Don't know	661 (3.4)

The study was carried out in accordance with current legislation and received the approval of the Ethics Committee of the University to which the research group behind the study belongs. Participants signed an online written consent form.

3 | RESULTS

Table 1 presents the sample description, encompassing sociodemographic, employment-related and company features, along with the reported existence of workers' representatives. Approximately 9% of the sample consisted of individuals under 34-year-old, while the remaining participants were evenly distributed across age groups of 35–49 and 50 and above. Furthermore, 52.9% were women, with the overwhelming majority (98.5%) being of Spanish nationality, and 62.4% falling within the nonmanual occupational social class. Regarding employment characteristics, 82.5% held permanent contracts and 60.8% were employed in the private sector. In terms of economic activity, the highest frequencies were observed in education (12.8%), industry (11.6%), and health activities (10.5%). A substantial majority of the sample (80.7%) reported the presence of workers' representatives in their workplace.

3.1 | Results of multiple correspondence analysis

Figure 1 illustrates the distribution of the 26 categories corresponding to the 13 variables related to protective measures. Additionally, it encapsulates the interaction between worker representation in the company and occupational social class, along with the projection of sociodemographic characteristics, on two axes. The horizontal axis, accounting for 39.6% of the total variability, details the complexity of the implemented measures, segregating the adoption of complex measures (actions such as relocating workers or introducing shift work) on the left, and the nonimplementation of simpler measures (like providing disinfectant gel or masks) to the right. The vertical axis, explaining 36.6% of the variability, distinguishes the type of measure implemented and occupational social class. It displays personal protective measures above (more prevalent among manual workers) and organizational protective measures below (more common among nonmanual workers). Nonmanual workers with representation (Ywr_NoManual) appear on the left, indicating a higher likelihood of having complex measures in their companies. Conversely, manual workers without representatives (Nwr_Manual) or those uncertain about having representation (DKwr_Manual), are situated on the right, associated with the nonimplementation of even simple measures. It is worth noting that "Ywr_Manual," "Nwr_NoManual" and "DKwr_NoManual" categories are also on the right, suggesting that amongst all these workers the implementation of complex measures is not common. Finally, workers without contract are positioned at the far right of the figure, linked to the nonimplementation of simple protective measures. To a lesser extent, being young, nonSpanish, having a temporary contract, or identifying as nonbinary would be groups also associated with the nonimplementation of measures.

Figure 2 illustrates the projection of the company's economic activity and ownership type. Employees engaged in health, care, social work, and sanitation and waste management activities are positioned in the upper part of the figure, characterized by the application of personal protective measures, particularly in proximity to the provision of uniforms/special suits and gloves. These categories also share proximity with manual workers with representation in the company (Ywr_Manual). Workers involved in cleaning buildings, private security, catering, hotels, and restaurants are likewise situated in the upper section but toward the right, marked by the nonimplementation of protective measures. These categories align more closely with manual workers lacking worker representation (Nwr_Manual) or those uncertain about it (DKwr_Manual). Conversely, financial, administrative, information, and communications activities as well as professional, scientific, and technical activities are located in the lower left section of the figure, characterized by the implementation of organizational protective measures, and are in close proximity to the category corresponding to nonmanual workers with representation in the company (Ywr_NoManual). Regarding the ownership type of the company, the public sector is placed in the upper section, slightly to the left, which is associated to the implementation of personal protective measures. The private sector is in the lower section, slightly to the right, linked to the nonimplementation of organizational protective measures. However, both categories are fairly close to the center, indicating minimal differences between them.

3.2 | Results of regression analyses

Table 2 presents the prevalence and prevalence ratios for the existence of protective measures based on the presence of worker representation in the company. The most frequently implemented protective measures include providing disinfectant gel (86.4%) and masks (83.1%), followed by offering gloves (44.3%), organizing workstations to maintain a distance of 1.5 m (42.4%), introducing teleworking (36.3%), and supplying dividers (31.6%). Consequently, both collective and personal protective measures were the most frequently adopted. Notably, a higher prevalence of almost all

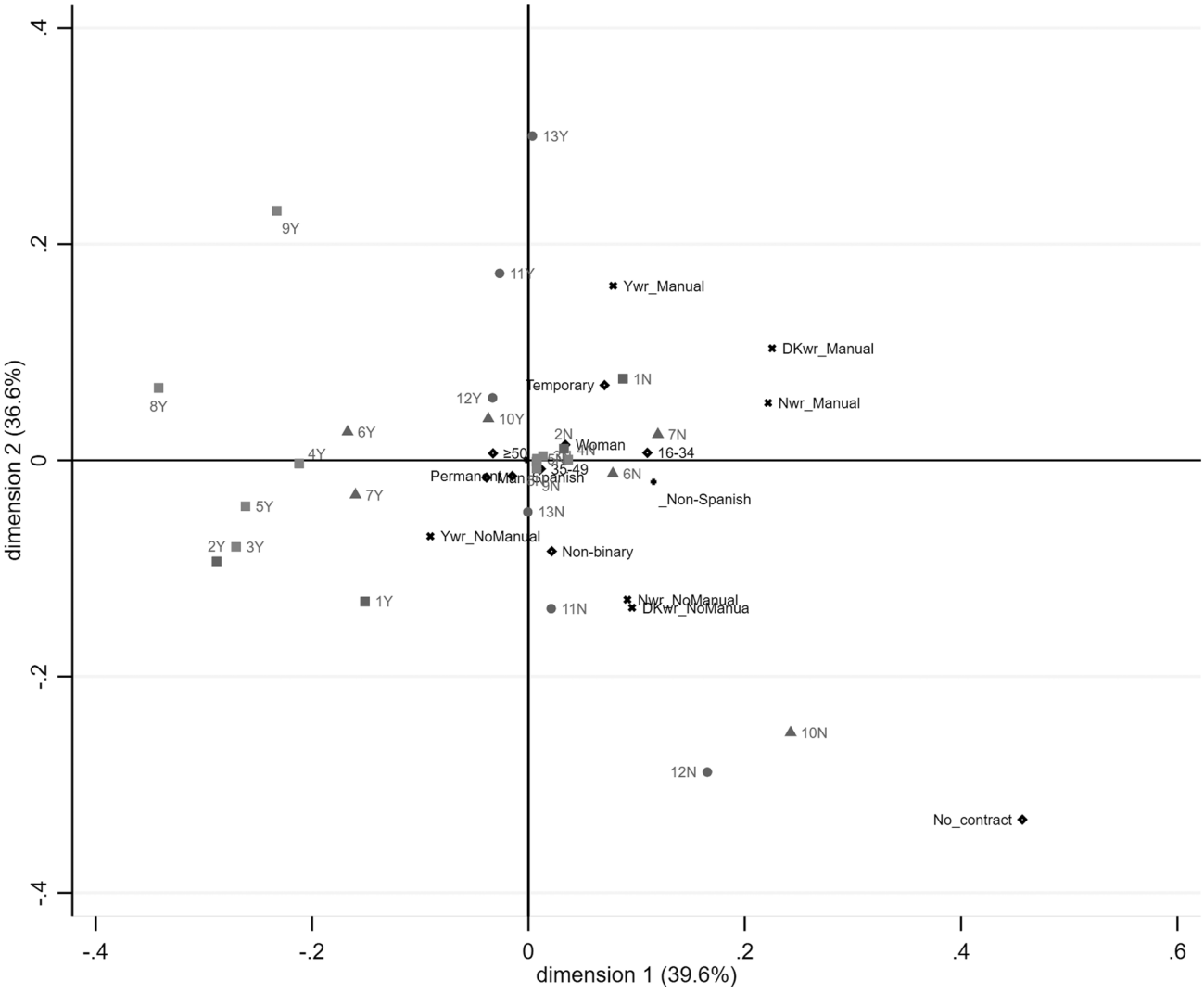
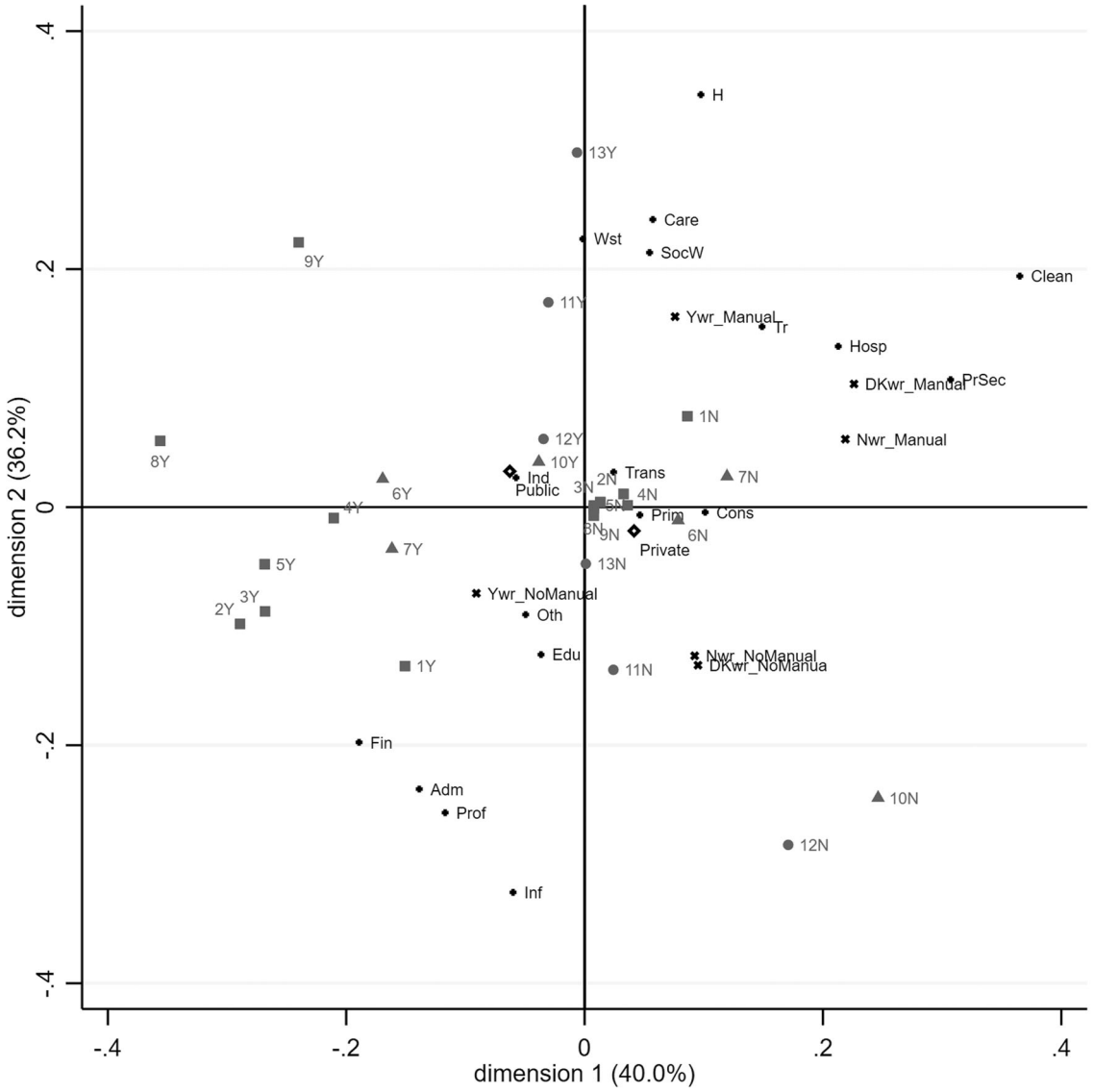


FIGURE 1 Multiple correspondence analysis: projection of sociodemographic and employment-related characteristics onto the map generated by variables of protective measures and the interaction between worker representation in the company and occupational social class.

protective measures stands out among those who have worker representation in the company, compared to those without representation or unaware of the presence of worker representation, even after adjusting for explanatory variables. With the exception of shortening working hours (PR: 0.9; CI 95% 0.7–1.15), all organizational, collective, and personal protective measures are more prevalent when worker representation is present. Particularly noteworthy is the robust association between the presence of representatives and organizational measures, especially regarding moving workers to other workplaces, changing start and finish times or introducing teleworking, where prevalence increases by 168%, 65%, and 63%, respectively, with the presence of worker representation. In contrast, the association with protective measures diminishes when comparing workers without representation with



■ Worker representation and occupational class	◆ Company ownership
• Economic activity	■ 1. Introduce teleworking
■ 2. Introduce shift work	■ 3. Change from split to continuous shift
■ 4. Change start and finish times	■ 5. Shorten working hours
▲ 6. Provide dividers	▲ 7. Organize workstations to maintain a distance of 1.5m
■ 8. Move workers to other workplaces	■ 9. Change tasks
▲ 10. Provide disinfectant gel	• 11. Provide gloves
• 12. Provide masks	• 13. Provide uniforms/special suits

■ Organisational protective measures; ▲ Collective protective measures; ● Personal protective measures. "Y" refers to the implementation of the measure while "N" refers to its non-implementation.

Economic activity: Prim (Primary); Ind (Industry); Edu (Education); H (Health activities); Care; SocW (Social Work); Cons (Construction); Tr (Wholesale and retail trade); Trans (Transportation and storage); Hospitality (Catering; Hotels and restaurants); Fin (Financial, insurance and real estate activities); Adm (Administrative and related services); Inf (Information and communications); Prof (Professional, scientific and technical activities); Wst (Sanitation, waste management and remediation activities); Clean (Cleaning of buildings and premises); PrSec (Private security) ; Oth (Others)

FIGURE 2 Multiple correspondence analysis: projection of company's economic activity and company ownership onto the map generated by variables of protective measures and the interaction between worker representation in the company and occupational social class.

TABLE 2 Prevalence and prevalence ratio (PR) of the existence of protective measures according to worker representation in the company.

	Total *n* (%)	Worker representation in the company NO-rep *n* (%)	DK-rep *n* (%)	YES-rep *n* (%)	aPR (CI 95%)[a]	aPR (CI 95%)[b]
Organizational protective measures						
Introduce teleworking	6796 (36.3)	575 (21.2)	132 (21.5)	6089 (39.5)	**1.63 (1.52–1.76)**	1.24 (1.06–1.45)
Introduce shift work	1890 (10.1)	173 (6.4)	41 (6.7)	1676 (10.9)	**1.47 (1.25–1.72)**	1.22 (0.87–1.7)
Change from split to continuous shift	882 (4.7)	110 (4.1)	24 (3.9)	748 (4.9)	**1.38 (1.12–1.71)**	1.37 (0.88–2.12)
Change start and finish times	2739 (14.6)	261 (9.6)	59 (9.6)	2419 (15.7)	**1.65 (1.45–1.88)**	1.04 (0.79–1.38)
Shorten working hours	539 (2.9)	90 (3.3)	13 (2.1)	436 (2.8)	0.9 (0.7–1.15)	0.67 (0.37–1.22)
Move workers to other workplaces	392 (2.1)	21 (0.8)	9 (1.5)	362 (2.4)	**2.68 (1.72–4.2)**	2.01 (0.89–4.54)
Change tasks	587 (3.1)	59 (2.2)	17 (2.8)	511 (3.3)	**1.33 (1–1.78)**	0.93 (0.52–1.64)
Collective protective measures						
Provide dividers	5931 (31.6)	578 (21.3)	108 (17.6)	5245 (34.0)	**1.46 (1.35–1.59)**	0.94 (0.78–1.13)
Organize workstations to maintain a distance of 1.5 m	7944 (42.4)	850 (31.4)	205 (33.4)	6889 (44.7)	**1.29 (1.22–1.37)**	1.03 (0.91–1.17)
Provide disinfectant gel	16204 (86.4)	2259 (83.4)	494 (80.5)	13451 (87.2)	**1.03 (1.01–1.05)**	0.96 (0.92–1)
Personal protective measures						
Provide gloves	8312 (44.3)	1016 (37.5)	241 (39.3)	7055 (45.7)	**1.18 (1.12–1.24)**	1.06 (0.95–1.18)
Provide masks	15583 (83.1)	1948 (71.9)	453 (73.8)	13182 (85.5)	**1.15 (1.12–1.18)**	1.02 (0.97–1.07)
Provide uniforms/ special suits	2564 (13.7)	212 (7.8)	66 (10.8)	2286 (14.8)	**1.38 (1.21–1.57)**	1.04 (0.82–1.31)

Note: Text in bold indicates that the interval does not overlap 1, which implies that there are no differences between the groups compared in the prevalence ratios.

[a]PR (CI 95%) calculated for "yes" protective action, using "NO-rep" as reference vs. "YES-Rep," adjusted by age, gender identity, nationality, contract type, company type, occupational social class, economic activity.

[b]PR (CI 95%) calculated for "yes" protective action, using "NO-rep" as reference vs. "DK-Rep," adjusted by age, gender identity, nationality, contract type, company type, occupational social class, economic activity.

those unsure about having representation. Out of the 13 protective measures analyzed, only the introduction of teleworking is more prevalent among workers unaware of the existence of worker representation compared to those without representation (PR: 1.24; 1.06–1.45).

4 | DISCUSSION

The present study addressed the following objectives: to examine whether there is a relationship between the presence of workers' representatives and the application of protective measures during the pandemic, to analyze the types of protective measures most associated with the presence of workers' representatives, and to characterize the protective measures available to the salaried population according to sociodemographic, professional, and company characteristics. On the one hand, the results allow for a deeper understanding of the extent of the protective coverage of workers' representatives and on the other for the identification of inequalities, especially those linked to occupational social class.

4.1 | Worker representation and COVID-19 protective action

While exploring the association between the presence of workers' representatives in companies and the implementation of different types of COVID-19 protection measures, our results show that the

presence of workers' representatives acted as a differential factor in the increase in protection standards during the pandemic. In line with prepandemic evidence focusing on occupational risk prevention, the presence of workers' representatives in the workplace is associated with increased preventive activity[10–12]; in this case being systematically related to the implementation of almost all of the 13 COVID-19 protection measures analyzed. The positive impact of worker representation on the application of measures against COVID-19 is particularly strong in relation to organizational protective measures, even though the application of this type of measure is less frequent. For example, while the implementation of organizational measures such as shortening working hours, changing tasks and moving workers to other workplaces registered under 5%, the two most frequently applied protective measures—namely providing disinfectant gel and masks—did not have an organizational nature and were reported by around 80% of respondents in our study. Yet, except for reducing working hours, when workers' representatives existed the values of prevalence ratios were greater for organizational measures (in particular, the highest prevalence ratios were recorded for the introduction of teleworking, moving workers to other workplaces and the modification of working hours or shifts). This would indicate that the effect of the presence of workers' representatives on the implementation of organizational protective measures is higher than that of collective and individual measures.

Some caveats may be nevertheless added to these results. First, as this is a cross-sectional study it is not possible to determine a clear temporal sequence between the dependent variable and the independent variables and adjustment covariates. Also, the fact that the participants were members of the *Comisiones Obreras* union may lead to an overestimation of the presence of workers' representatives and therefore of protective measures. For instance, in the study, 80.7% of the respondents claimed to have a representative in their workplace, while the average in Spain is approximately 50%.[19] However, sample representativeness is not essential for the objectives of this study. Unlike studies primarily focused on describing population parameters, the use of specific populations to understand how a phenomenon behaves does not necessarily require sample representativeness.[43] Our goal is to verify the association between variables (or categories), and the analyses are conducted using multivariate techniques, thereby considering multiple variables. Even if the exposure of interest is associated with the probability of sample selection, the valid inference of the associations between exposure and outcome is possible when confounding factors are appropriately controlled, and there is no reason to believe that controlling for confounding is easier to achieve in a study in the general population than in a restricted population.[44]

The greater implementation of organizational protective measures we found could also be due to a bias triggered by the type of survey respondents: as they are members of *Comisiones Obreras*, this would imply that they are more represented by this union and there might be a "union effect" confounding our results. The survey COTS2 was not particularly designed to measure the degree of implementation of COVID-19 protective measures and the presence of workers' representatives[40] so we lacked some variables of interest for the object of study under consideration here, such as the number of representatives present in the workplace, whether the representatives are unionized or not, and to which union they belong. Trade union support for workers' representatives, for example, through training, information and advice, is a factor that enhances representatives' performance in health and safety matters and can help them to be more pro-active,[4,45] or in Hall and colleagues[4,46] words, to become knowledge activists. At the same time, *Comisiones Obreras* has special technical-scientific resources aimed at workers' representatives[15,p.16] and gives priority to preventive action focused on the origin, that is, on the organization of work (see the example of psychosocial risk prevention in Moncada et al.[47]). Should a union effect occur we believe that it would not greatly affect our results. This is because in Spain the type of representation system in the workplace is not voluntaristic and does not depend on presence (union membership); it is based on audience (election of representatives)[19] so workers' representatives' action affects and covers all workers whether there are members or not, whether they voted or not. So, if such an effect were to exist, it would favor the entire workforce of respondents' workplaces. In addition, *Comisiones Obreras* is the union with the largest share of representatives in the country (more than 33%) but it does not have a dominant position in companies, nor does it usually act alone in companies with 50 or more workers.

To this end, the company/work center size variable is also missing in the survey. This is an important variable to know whether or not workers are entitled to have representatives as well as the number of representatives and the type of representation they can have due to the thresholds established by law. In general, studies show a relationship between size of the company and greater presence of workers' representatives[20,23] and implementation of preventive activity.[20] Precisely because of the interrelationship between these variables, the impact of not having the firm/work center size variable could be relatively weak for the regression analysis as workers' representatives' existence might already be capturing it to some extent. In fact, a study carried out in Spain shows a precedent: it found an association at the bivariate level between work center size and preventive action but the introduction of a variable for self-reported existence of health and safety representatives in a logistic regression model caused workplace size to lose significance.[11]

4.2 | Worker representation and COVID-19 protective action: Inequalities in the waged population

Until now we have focused on how the presence of workers' representatives is associated with COVID-19 protective action and of what type, not querying what type of worker profiles can be discerned according to the extent they have been covered by protective measures and the presence of representatives. This is

analyzed through the Multiple Correspondence Analyses and the resulting positioning maps reveal three clusters or patterns of association.

The first cluster is made up of people employed in nonmanual jobs, high value-added sectors (information and communications, professional and financial activities), with job stability (permanent contract) and having representation in their company, who are associated with the application of more sophisticated organizational protective measures (teleworking, shift work, change of shifts, or working hours). This could explain why this profile had lower positivity and mortality rates during COVID-19.[33,48,49]

A second pattern of association is found at the opposite extreme, where the most precarious workers were located: immigrants, employed in manual jobs, without a formal employment contract, employed in private companies in the primary and construction sectors, and who had no representation or were unaware of the existence of such representation. Thus, this situation of labor vulnerability is associated with a minimal level of protection, as even the most basic COVID-19 protection measures were not available to them. In fact, manual and low-income workers have been identified in previous studies as generally having less access to adequate personal protective equipment,[50] as well as with difficulties in demanding the implementation of protective measures in the absence of representative bodies,[51] which would also explain their higher rates of COVID-19 positivity[34] and higher levels of mortality.[49,52]

Finally, the third pattern of association identified corresponds to a situation of intermediate social vulnerability. This cluster is mainly made up of women, employed part-time, engaged in manual work, in sectors related to the health and social-health field (health, care, social work activities) and who have representation in their workplace. This group is characterized by the availability of basic collective and individual protective measures (disinfectant gel, protective suits, masks, and gloves) but the organizational measures of physical distancing would not apply to them. This pattern could be explained by the intervention and effect of two decisive factors. On the one hand, the presence of representatives in the workplace would have ensured the most basic levels of protection. Indeed, a study in nursing homes showed that in un-ionized facilities there was greater access to protective equipment and COVID-19 mortality was reduced by 30%.[7] On the other hand, many manual jobs (health care, geriatric care workers, cashiers, home care, and cleaning services, food production workers, etc.) were declared essential and yet no organizational protective measures were applied, resulting in a higher rate of positivity and mortality in the over-represented female and immigrant population groups in these jobs.[34,48,49]

From the three clusters identified in the results of the Multiple Correspondence Analyses, a clear pattern of coronavirus class divide can be distinguished[30] and from this inequalities in protection according to socioprofessional and organizational characteristics emerge. We observe that the worst off are workers without representatives or who are unaware of their existence as well as those who, despite having representatives, are employed in sectors with less collective bargaining power (or less scope for action, at least during the pandemic context). Given that the share of workers without representation is growing[15] and that the action of organized labor has the potential to prevent occupational health inequalities,[53] pp.567–568 the present results have implications for worker representative action by shedding light on issues where it is essential to take steps.

In those work environments where worker representation can exist, the existence and function of workers' representatives in occupational health as well as workers' rights in occupational health should be made known to workers via direct communication, information activities, or communication campaigns promoted by unions. This is especially necessary for those having more precarious employment arrangements, as the Spanish representation system could have a particularly positive effect on this segment of the workforce given the inclusive effect caused by the fact that the coverage of the representatives' actions affects the entire workforce. Workers' representatives should develop a more “knowledge activist” stance[4,46] in occupational health which could help them to have a broader view of health and safety at work and repertoire of actions, as well as to promote the interaction between workers and representatives. This is not a minor issue given the context of union decline and unions' crisis of legitimacy for some workers so those fostering organized labor are in need to regain workers' support and trust.[54] Again, direct communication could be promoted along with greater worker participation in the making of decisions and also special attention should be given to the situation, needs, and knowledge of workers under more precarious employment conditions.

Where there can be no worker representation, more macro-level lines of action are possible; including social and trade union pressure on political decisions (something for which the “reconnection” of unions with the working population[55,pp.16–17] is again important). Precarious employment must be combatted and labor market policies which promote quality employment (i.e., employment that is secure, with wages appropriate to the cost of living and which guarantees workers' rights and social protection, among other qualities) must be bolstered.[56] An example along these lines is the recent labor reform approved in Spain, that took place as a result of social dialogue, which has reduced the abnormally high rates of temporary employment in the labor market and increased the minimum interprofessional wage. In addition to promoting mobilization, here unions can campaign to inform the general public about the negative consequences of precarious employment and make workers' rights known. Trade unions can also lobby for the strengthening of collective action and workers' participation at the workplace and even promote the reform of the workers' representation model (e.g., by strengthening the capacity for representation and collective action in smaller companies).[56]

Finally, our Multiple Correspondence Analysis shares limitations already mentioned, such as the lack of some variables of interest to characterize the study phenomenon or the fact that it is calculated on the basis of a specific population. However, since Multiple Correspondence Analysis is a multivariate technique[42] with which

we have explored the association between variables/categories, the lack of representativeness of the sample does not invalidate the findings of our study.[43]

5 | CONCLUSIONS

The results of this study indicate that the presence and involvement of workers' representatives brought about a positive effect on the improvement of COVID-19 protection standards. The contribution of the presence of workers' representatives was greatest in the introduction of organizational measures; however, these were implemented at a reduced scale. The distribution of protective measures was uneven among different segments of the salaried population: the least powerful measures were applied to the population with the lowest individual and collective bargaining power, or no measures were applied to this population when there was no labor representation or workers were unaware of their existence. The presence of worker representation could not prevent the use, reproduction, and reinforcement of the social inequalities implied by labor management practices but, according to this study, it would imply reducing them, insofar as the presence of worker representation was always associated with a greater presence of protective measures.

AUTHOR CONTRIBUTIONS

Laia Ollé-Espluga conceptualized the study and its analysis plan, and was engaged in drafting and revising the paper. Raúl Payá Castiblanque analyzed the data and drafted and revised the paper. Clara Llorens-Serrano designed the survey and revised the draft paper. Laura Esteve-Matalí analysed the data and drafted and revised the paper. Albert Navarro-Giné designed the survey, monitored data collection, revised the draft paper, and acted as guarantor.

CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest.

DISCLOSURE BY AJIM EDITOR OF RECORD

Jian Li declares that he has no conflict of interest in the review and publication decision regarding this article.

DATA AVAILABILITY STATEMENT

Research data are not shared.

ETHICS APPROVAL AND INFORMED CONSENT

The study was conducted in accordance with current legislation and received approval from the Ethics Committee of the Autonomous University of Barcelona (CEEAH-5470). Participants signed an online written consent form.

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