



# Persistent inequality: evolution of psychosocial exposures at work among the salaried population in Spain between 2005 and 2016

Mireia Utzet<sup>1,2</sup> · Clara Llorens<sup>3,4</sup> · David Moriña<sup>5</sup> · Salvador Moncada<sup>3</sup>

Received: 23 April 2020 / Accepted: 9 November 2020 / Published online: 25 November 2020  
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## Abstract

**Purpose** To assess the prevalence of poor mental health and of exposure to psychosocial risks among the working population in Spain in 2005, 2010 and 2016; to analyse the associations between workplace psychosocial exposures and mental health problems according to gender and occupation.

**Methods** Three representative samples of the Spanish working population were analysed, in 2005 ( $n = 7,023$ ), 2010 ( $n = 4,979$ ), and 2016 ( $n = 1,807$ ). Prevalence ratios between mental health and the five dimensions – job demands, job control, social support, employment insecurity and insecurity over working conditions—were estimated using multilevel mixed-effects Poisson regressions. All the analyses were separated by gender and occupation.

**Results** In 2016, there were improvements in job control, job demands and social support, and deteriorations in employment insecurity and insecurity over working conditions. The risk of poor mental health among manual workers rose if they were exposed to high demands, low social support and high employment insecurity; among non-manual workers, the risk increased if they were exposed to high demands, low control, low social support and high insecurity over working conditions. There were no differences according to gender.

**Conclusion** The new findings shed light on the evolution of the working conditions and health of the wage-earning population in Spain over the last 11 years. The stratification by gender and occupational group is relevant, since it allows a detailed analysis of the social disparities in the associations between psychosocial risks and mental health. The most vulnerable groups can be identified and preventive measures developed at source.

**Keywords** Psychosocial factors · Spain · Mental health · Evolution

## Introduction

The working environment is an important social determinant of health. As such, depending on the workplace organisation, the job content and the working conditions, it can either

cause ill-health or promote social and psychological well-being (Marmot and Wilkinson 2006).

Mental health disorders are the main cause of absenteeism and work incapacity in Europe today. Over the past 30 years, mental health issues have become established as a key focus of occupational health research (Fernandes and Pereira 2016; Stansfeld and Candy 2006). Karasek's demand-control model (Karasek 1979) characterises work

**Electronic supplementary material** The online version of this article (<https://doi.org/10.1007/s00420-020-01609-3>) contains supplementary material, which is available to authorized users.

✉ Mireia Utzet  
mireia.utzet@upf.edu

<sup>1</sup> Grupo de Investigación en Determinantes Sociales de la Salud y Cambio Demográfico, Departamento de Sociología 2, Universidad del País Vasco UPV/EHU, Leioa, Spain

<sup>2</sup> Center for Research in Occupational Health (CISAL), CIBER of Epidemiology and Public Health (CIBERESP), IMIM (Hospital del Mar Medical Research Institute), Universitat Pompeu Fabra, Doctor Aiguader 88, 08003 Barcelona, Spain

<sup>3</sup> Union Institute of Work, Environment and Health (ISTAS), Barcelona, Spain

<sup>4</sup> Sociology Department, Faculty of Sociology and Political Sciences, Autonomous University of Barcelona (UAB), Cerdanyola del Vallès, Spain

<sup>5</sup> Departament de Matemàtiques, Barcelona Graduate School of Mathematics (BGSMath), Universitat Autònoma de Barcelona (UAB), Barcelona, Spain

as a combination of two psychosocial dimensions: job demands, and job control, the latter comprising decision latitude and skill discretion. Johnson (1988) added a third dimension to the model: social support in the workplace, which has the potential to alter the impact of job demands. The assumed main and combined effects of low job control, high demands and low social support on employees' mental health have found support in both cross-sectional and longitudinal studies (Hausser et al. 2010; Harvey et al. 2017; Magnusson Hanson et al. 2019).

Work and working conditions have changed deeply over last decades due to several factors as increased globalization, digitalization of work life and new types of management (Schnall et al. 2016). Precarious work, flexible working hours and time schedule expanded (Benach et al. 2014; Buchholz et al. 2009); employment is less stable (Buchholz et al. 2009; Eurofound 2017; Schnall et al. 2016) and working conditions deteriorated in many countries, but not in others (Eurofound 2019). In Spain, these changes have taken place in a historical context of high unemployment, temporary work and precariousness and have probably intensified to some extent by the economic crisis in 2008 raising concern among a large part of the working population regarding their working conditions (Eurofound 2012). Some papers suggest that workers are facing increased exposure to certain classic psychosocial risks such as high quantitative demands and low social support (Utzet et al. 2015)—exposures that have consequences on mental health (Utzet et al. 2016). At the same time, employees' employment insecurity has increased, in fact, it has become an intrinsic feature of the labour market with serious consequences for general and mental health (Kim and von dem Knesebeck 2016). It has been shown that Insecurity, understood as a psychosocial risk, represents a risk for the mental health of workers exposed to it (Salas-Nicás et al. 2018).

Previous studies have documented disparities in psychosocial exposures according to gender (Theorell et al. 2014) and occupational group (Siegrist and Marmot 2004). It has been shown that women are more likely to have jobs with high emotional demands, low control, and other indicators of job insecurity (Campos-Serna et al. 2013). Manual workers present more exposure to low control, low support and low rewards (Chandola and Marmot 2010), while non-manual workers are more exposed to high demands (Niedhammer et al. 2018). It has also been shown that the risk of job insecurity is higher in manual occupations (Keim et al. 2014) and in women (Campos-Serna et al. 2013). These social disparities in psychosocial exposures also have unequal effects on health, as manual workers have been found to present worse health indicators (Siegrist et al. 2014). Regarding gender differences, it seems that the effect on mental and physical health of exposure to psychosocial risks is reinforced in women by the two forms of segregation they face

in the labour market. In the one hand, they face a vertical segmentation, which is reflected in two very different realities: the barriers to promotion encountered by many women in qualified jobs, known as the “glass ceiling” effect, and the difficulties facing many women in precarious occupations seeking to improve their situation, known as the “sticky floor” effect (Torn and Recio 2012). On the other hand, women also face horizontal segmentation, that is to say, they are hired mainly in service sector jobs that transfer domestic tasks and care to the labour market, such as education, health or cleaning). This double segmentation of the labour market that places them in the lower strata (Campos-Serna et al. 2013).

The origin of these psychosocial risks lies in work organisation. In Spain, in recent decades, work has been organised along Taylorist principles, (Lahera Sánchez 2004) which has meant that a large proportion of workers (especially those in manual jobs) have little control over their work. However, since the economic crisis of 2008, job demands appear to have increased while control has remained low, thus increasing the exposure to high work-related strain (Eurofound 2012; Utzet et al. 2015). In this period Spain has also experienced a worsening of social support at work (Utzet et al. 2015) which was not observed in other European Union countries (Eurofound 2012). Given the continuing precariousness of the Spanish labour market since the 2008 crisis (Verd and López-Andreu 2012), and in view of the suggestion made by some authors that the consequences of the crisis lasted longer in Spain than elsewhere (Torá et al. 2015), in this study we were interested in determining whether this evolution was maintained after 2010.

Few studies to date have analysed the association between exposure to psychosocial risks and mental health in Spain (Utzet et al. 2016), and even fewer have explored the social disparities in relation to these psychosocial exposures. The availability of the three Psychosocial Risk Surveys in Spain (ISTAS 2019; Moncada et al. 2014, 2005) carried out at different time points between 2005 and 2016 and using the same items to measure both psychosocial exposures and mental health provides an opportunity to analyse the evolution of exposure to psychosocial risks among the wage-earning population in Spain over a decade that is of particular interest to social scientists due to the onset of the worldwide recession in 2008.

The aims of the present study are: to analyse the evolution of the workplace exposures to psychosocial dimensions demand, control and support (based on the Karasek and Johnson model), employment insecurity and insecurity over working conditions between 2005, 2010 and 2016 among the wage-earning population in Spain; to analyse this evolution according to occupational group and gender; and, finally, to estimate the associations between the different dimensions and poor mental health.

## Materials and methods

Three representative samples (ISTAS 2019; Moncada et al. 2014, 2005) of the working population in Spain from the years 2005, 2010 and 2016 were compared. At all three time points, the samples comprised people aged between 16 and 65 residing in Spain, who had been engaged in some form of work for at least one hour during the week preceding the interview. In 2005, with a response rate of 60%, 7,650 interviews were carried out; in 2010, with a response rate of 56%, 5,110 interviews and in 2016, with a response rate of 70%, 1,807. The sampling designs applied have been reported elsewhere, as well as the main results of the three surveys (ISTAS 2019; Moncada et al. 2014, 2005). The questionnaire was administered by interviews using CAPI (Computer Assisted Personal Interviewing) at the respondent's home. Participation was voluntary and confidential. In the present study, self-employed workers were excluded from the analysis (290 in 2005, and 118 in 2010). Thus, the final sample sizes were: 7,315 in 2005, 4,992 in 2010, and 1,807 in 2016.

Data were obtained from three editions of a survey of work-related psychosocial risks which included three slightly different versions of the COPSOQ-ISTAS21, validated in previous studies (Burr et al. 2019; Moncada et al. 2014, 2005.) In the present article, only the items included in all three versions are compared. The Karasek and Johnson model (Johnson and Hall 1988) was measured with the partial scales for psychological demands and control and social support (see supplementary Table 1), which are considered to provide a good reflection of the original instrument (Burr et al. 2010). Job insecurity was measured based on two dimensions (see supplementary Table 1): employment insecurity and insecurity over working conditions (i.e., changes affecting working hours, tasks and salary). The self-reported scores obtained for the five scales in each year were dichotomised using cut-off points corresponding to medians for 2005, which indicated whether exposure in this group had risen or fallen.

Workers' health status was assessed on the basis of their mental health (a key variable due to its impact on quality of life), measured using the Mental Health scale of the Spanish version of the SF-36 (Vilagut et al. 2005), a generic instrument for assessing self-perceived health status. The mental health score was a sum of the five items standardised to lie between 0 and 100, with a score of 0 indicating the worst possible mental health status. The score was dichotomised and respondents were classified as having either "good" or "poor" mental health applying a cut-off value of 60 (a figure used in earlier studies) (Thorsen et al. 2013).

The type of contract was coded as permanent or precarious (fixed-term or no contract) and the number of working

hours as less than 20 h, 20–34 h, 35–40 h, 41–48 h, or more than 48 h.

Finally, other socio-demographic variables included in the analysis were age (16–24, 25–29, 30–39, 40–49, 50–59, 60–65), presence of dependants living in the household (yes, no), and proportion done of the household and care work (most of the work, around half, little or none). Job category was obtained using the 1994 National Classification of Occupations (CNO94), which is based on the International Standard Classification of Occupations (ISCO88) and was divided into non-manual and manual workers.

## Statistical analysis

Each variable of interest was described in terms of sample counts and percentages, separately for each year. Crude prevalences (95% CI) of the five psychosocial dimensions were calculated for each year and stratified by gender and job category. The age-standardised prevalence (95% CI) of poor mental health was calculated for each year and for each dimension and stratified by gender and job category.

Prevalence ratios (PR) and 95% CI between poor mental health (dependant variable) and the five dimensions (independent variables) were estimated using multilevel mixed-effects Poisson regressions (Snijders 2000), taking year as level (one level with three categories), assuming that individuals are nested in years. These models include fixed and random effects, which are especially useful when observations in the same level may share random effects and are potentially correlated.

This procedure makes it possible to model the intralevel correlation and allows, in this way, an accurate adjustment for the year. Four models were estimated: model 1, adjusted for age (continuous); model 2, adjusted for age and all the dimensions; model 3, adjusted for age, all the dimensions, type of contract and number of working hours; and model 4, further adjusted for housework and presence of dependants living in the household. We calculated total PR, and PR according to occupational group and gender.

All the analyses were carried out separately for men and women and also for manual and non-manual workers, using the data weighted according to gender and job category (CNO94) for the last quarter of each of the 3 years studied in the Survey of the Economically Active Population conducted by Spain's National Statistics Institute. ("INE. Encuesta de población activa.," 2019) All the calculations were conducted with STATA version 14.2 (Stata Corp., College Station, TX, USA).

## Results

Table 1 displays the main sociodemographic characteristics of the samples, both with and without weighting. The main differences between the samples were the fact that in 2005 more people under the age of 30 were in employment

(a finding also shown in the active population survey), an over-representation of women in the samples from 2005 and 2016, and an underestimation of non-manual workers in the samples from 2010 and 2016.

Table 2 shows the prevalence of mental ill-health standardised by age. In 2016 there was a relative, but not significant, deterioration in mental health compared to previous

**Table 1** Main sociodemographic characteristics (*n*, %, weighted %)

	2005			2010			2016		
	<i>n</i>	%	Weighted %	<i>n</i>	%	Weighted %	<i>n</i>	%	Weighted %
<b>Gender</b>									
Male	3671	50.4	50.2	2747	55.1	55.1	885	49.0	49.0
Women	3615	49.6	49.8	2239	44.9	44.9	922	51.0	51.0
<b>Age</b>									
16–24	926	12.7	12.4	345	6.9	6.1	144	8.0	7.4
25–29	1289	17.7	17.4	694	13.9	13.4	169	9.4	9.2
30–39	2322	31.8	31.5	1417	28.4	29.0	421	23.3	23.6
40–49	1776	24.3	24.9	1399	28.1	28.6	568	31.4	32.2
50–59	836	11.5	11.7	939	18.8	18.8	433	24.0	23.7
60–65	146	2	2.0	192	3.9	4.0	72	4.0	3.9
<b>Occupational group</b>									
Manual	4515	62.5	60.0	3232	64.9	57.2	1260	69.7	56.5
Non-manual	2705	37.5	40.0	1747	35.1	42.8	547	30.3	43.5
<b>Type of contract</b>									
Permanent	5141	70.3	70.0	3700	74.2	76.0	1247	69.0	71.3
Precarious (temporary or no contract)	2167	29.7	30.0	1286	25.8	24.0	560	31.0	28.7
<b>Weekly working hours</b>									
Less than 20 h	458	6.3	6.5	572	11.5	11.4	275	15.2	14
21–30 h	438	6.0	6.3	397	8	8.5	178	9.9	9.6
31–35 h	630	8.7	9.1	416	8.4	9.1	94	5.2	5.9
36–40 h	4192	57.6	57.8	2609	52.4	52.3	938	51.9	53.3
41–45 h	600	8.3	8.1	361	7.2	6.9	96	5.3	5.2
More than 45 h	954	13.1	12.1	625	12.6	11.8	226	12.5	11.9

**Table 2** Age-standardised prevalence and 95% confidence intervals (95% CI) of poor mental health by year, gender and occupational group

	2005		2010		2016	
	%	95% CI	%	95% CI	%	95% CI
<b>Men</b>						
Total	25.3	(23.6; 26.9.1)	23.4	(21.8; 25.1)	25.9	(22.2; 29.6)
<b>Occupational group</b>						
Non manual	23.5	(20.7; 26.4)	21.5	(18.3; 24.6)	21.6	(16.0; 27.2)
Manual	25.9	(23.9; 27.9)	23.5	(21.2; 25.9)	28.3	(23.5; 33.1)
<b>Women</b>						
Total	31.8	(29.9; 33.7)	30.8	(28.4; 33.2)	33.8	(29.6; 37.9)
<b>Occupational group</b>						
Non manual	26.7	(24.2; 29.2)	29.0	(25.6; 32.4)	28.4	(22.9; 33.9)
Manual	35.9	(33.1; 38.6)	33.3	(29.7; 36.8)	38.5	(32.4; 44.6)

Weighted data

years, except in the case of non-manual workers, who presented a relative improve (also not significant). In all 3 years, female manual workers had significantly higher rates of poor mental health than other women and men.

Table 3 presents the prevalence of the five dimensions analysed according to the year of the survey (total and broken down by gender and occupational category). High demands and low social support increased significantly in 2010 for both genders and both occupational groups. But in 2016 these dimensions fell, returning to the levels of 2005 (falling even lower in the case of social support). Low control remained practically unchanged between 2005 and 2010, while in 2016 it decreased significantly in men and non-manual workers; in manual workers it remained stable and was the highest-scoring dimension. Finally, employment insecurity and insecurity over working

conditions improved in 2010 but deteriorated in 2016, returning approximately to the levels of 2005.

Table 4 presents workers' scores on our four poor mental health models for each psychosocial dimension. The most important result was that the risk of poor mental health among manual workers (both men and women) was higher if they were exposed to high demands, low social support and high employment insecurity, but not if they had low control or high insecurity over working conditions. In contrast, for non-manual workers (both men and women) the risk of poor mental health increased if they were exposed to high demands, low control, low social support and high insecurity over working conditions, but not if they were exposed to high employment insecurity. This situation was recorded at all three time points.

**Table 3** Prevalence and 95% confidence interval (95% CI) of psychosocial exposure dimensions, by year, gender, and occupational group

		2005		2010		2016		
		%	95% CI	%	95% CI	%	95% CI	
<b>Total</b>	High demands	38.4	(37.3; 39.6)	42.2	(40.6; 43.7)	35.4	(32.9; 38.1)	
	Low control	54.5	(53.3; 55.7)	53.7	(52.1; 55.2)	46.8	(44.1; 49.5)	
	Low social support	53.6	(52.3; 54.8)	61.3	(59.8; 62.9)	40.8	(38.1; 43.4)	
	High employment insecurity	41.7	(40.5; 42.9)	36.6	(34.1; 38.1)	45.7	(43.0; 48.5)	
	High insecurity over working conditions	39.4	(38.2; 40.6)	20.9	(19.4; 22.0)	32.6	(30.1; 35.2)	
<b>Gender</b>	<b>Women</b>							
	High demands	40.3	(38.6; 41.9)	41.4	(39.4; 43.4)	34.7	(31.3; 38.3)	
	Low control	51.3	(49.6; 53.0)	53.1	(51.1; 55.2)	47.7	(44.0; 51.4)	
	Low social support	52.3	(50.6; 54.0)	61.8	(59.8; 63.8)	42.0	(38.4; 45.6)	
	High employment insecurity	39.7	(38.0; 41.4)	36.4	(34.4; 38.3)	37.0	(34.6; 39.3)	
	High insecurity over working conditions	39.0	(37.3; 40.7)	20.0	(18.5; 21.7)	31.4	(28.0; 34.9)	
	<b>Men</b>							
	High demands	36.6	(34.9; 38.3)	43.2	(40.8; 45.6)	36.2	(32.4; 40.2)	
	Low control	57.8	(56.0; 59.5)	54.4	(51.9; 56.8)	45.9	(42.0; 49.9)	
	Low social support	55.0	(53.3; 56.7)	60.8	(58.4; 63.1)	39.5	(35.7; 43.4)	
High employment insecurity	43.8	(42.0; 45.5)	37.0	(34.6; 39.3)	44.9	(40.9; 48.9)		
High insecurity over working conditions	40.0	(38.2; 41.6)	21.5	(19.5; 23.6)	33.8	(30.1; 37.7)		
<b>Job category</b>	<b>Non-manual</b>							
	High demands	36.5	(34.6; 38.5)	42.3	(39.8; 44.8)	34.9	(30.5; 39.5)	
	Low control	41.2	(39.2; 43.2)	39.6	(37.2; 42.1)	28.1	(24.3; 32.4)	
	Low social support	45.7	(43.7; 47.7)	58.1	(55.5; 60.5)	31.2	(27.2; 35.6)	
	High employment insecurity	38.8	(36.8; 40.7)	30.3	(28.0; 32.7)	36.7	(32.4; 41.2)	
	High insecurity over working conditions	39.3	(37.4; 41.3)	19.6	(17.6; 21.7)	31.7	(27.6; 36.2)	
	<b>Manual</b>							
	High demands	39.7	(38.2; 41.2)	42.1	(40.1; 44.0)	36.0	(33.0; 39.0)	
	Low control	63.5	(62.0; 64.9)	65.1	(63.2; 67.0)	63.0	(59.9; 66.0)	
	Low social support	58.9	(57.4; 60.4)	64.0	(62.1; 65.9)	49.0	(45.9; 52.1)	
High employment insecurity	43.7	(42.2; 45.2)	41.8	(39.9; 43.7)	53.6	(50.5; 56.7)		
High insecurity over working conditions	39.5	(38.0; 41.0)	21.6	(20.0; 23.2)	33.3	(30.4; 36.3)		

Weighted data

**Table 4** Prevalence ratios (PR) and 95% confidence intervals (95% CI) of poor mental health according to psychosocial exposures, gender, and occupational group. Weighted data

	Model 1		Model 2		Model 3		Model 4	
	PR	95% CI	PR	95% CI	PR	95% CI	PR	95% CI
Male non-manual								
High demands	<b>2.01</b>	<b>(1.89; 2.14)</b>	<b>1.84</b>	<b>(1.81; 1.86)</b>	<b>1.76</b>	<b>(1.69; 1.82)</b>	<b>1.76</b>	<b>(1.72; 1.81)</b>
Low control	<b>1.35</b>	<b>(1.24; 1.47)</b>	<b>1.25</b>	<b>(1.08; 1.44)</b>	<b>1.27</b>	<b>(1.10; 1.45)</b>	<b>1.26</b>	<b>(1.13; 1.40)</b>
Low social support	<b>1.92</b>	<b>(1.83; 2.02)</b>	<b>1.63</b>	<b>(1.37; 1.95)</b>	<b>1.60</b>	<b>(1.33; 1.94)</b>	<b>1.59</b>	<b>(1.40; 1.81)</b>
High employment insecurity	1.33	(0.97; 1.82)	0.99	(0.89; 1.10)	0.93	(0.84; 1.02)	0.93	(0.82; 1.05)
High insecurity over working conditions	1.64	(0.98; 2.75)	1.53	(0.99; 2.35)	<b>1.61</b>	<b>(1.12; 2.32)</b>	<b>1.64</b>	<b>(1.24; 2.17)</b>
Female non-manual								
High demands	<b>2.00</b>	<b>(1.83; 2.19)</b>	<b>1.83</b>	<b>(1.68; 1.99)</b>	<b>1.80</b>	<b>(1.61; 2.00)</b>	<b>1.79</b>	<b>(1.61; 1.98)</b>
Low control	<b>1.20</b>	<b>(1.09; 1.33)</b>	<b>1.06</b>	<b>(1.03; 1.10)</b>	<b>1.08</b>	<b>(1.01; 1.15)</b>	<b>1.08</b>	<b>(1.02; 1.14)</b>
Low social support	<b>2.00</b>	<b>(1.80; 2.17)</b>	<b>1.80</b>	<b>(1.62; 2.01)</b>	<b>1.77</b>	<b>(1.56; 2.01)</b>	<b>1.76</b>	<b>(1.53; 2.03)</b>
High employment insecurity	1.10	(0.71; 1.81)	1.02	(0.75; 1.38)	0.98	(0.73; 1.33)	1.00	(0.74; 1.34)
High insecurity over working conditions	1.20	(0.80; 1.79)	1.10	(0.94; 1.29)	<b>1.13</b>	<b>(1.01; 1.27)</b>	<b>1.12</b>	<b>(1.02; 1.24)</b>
Male manual								
High demands	<b>1.83</b>	<b>(1.70; 1.97)</b>	<b>1.67</b>	<b>(1.65; 1.69)</b>	<b>1.67</b>	<b>(1.65; 1.69)</b>	<b>1.65</b>	<b>(1.63; 1.67)</b>
Low control	1.12	(0.97; 1.29)	1.01	(0.90; 1.69)	1.00	(0.89; 1.12)	1.00	(0.87; 1.15)
Low social support	<b>2.06</b>	<b>(1.87; 2.28)</b>	<b>1.98</b>	<b>(1.72; 2.29)</b>	<b>1.95</b>	<b>(1.69; 2.25)</b>	<b>1.93</b>	<b>(1.72; 2.18)</b>
High employment insecurity	<b>1.22</b>	<b>(1.05; 1.43)</b>	<b>1.11</b>	<b>(1.08; 1.15)</b>	<b>1.10</b>	<b>(1.06; 1.15)</b>	<b>1.11</b>	<b>(1.09; 1.13)</b>
High insecurity over working conditions	<b>1.37</b>	<b>(1.01; 1.85)</b>	1.21	(0.98; 1.49)	1.22	(0.99; 1.50)	1.22	(1.00; 1.48)
Female manual								
High demands	<b>1.62</b>	<b>(1.46; 1.80)</b>	<b>1.48</b>	<b>(1.47; 1.49)</b>	<b>1.49</b>	<b>(1.48; 1.50)</b>	<b>1.49</b>	<b>(1.48; 1.50)</b>
Low control	0.93	(0.80; 1.09)	<b>0.86</b>	<b>(0.78; 0.95)</b>	<b>0.84</b>	<b>(0.75; 0.94)</b>	<b>0.84</b>	<b>(0.74; 0.94)</b>
Low social support	<b>1.54</b>	<b>(1.35; 1.76)</b>	<b>1.52</b>	<b>(1.32; 1.75)</b>	<b>1.52</b>	<b>(1.32; 1.75)</b>	<b>1.51</b>	<b>(1.32; 1.72)</b>
High employment insecurity	<b>1.17</b>	<b>(1.03; 1.33)</b>	<b>1.07</b>	<b>(1.04; 1.10)</b>	<b>1.06</b>	<b>(1.05; 1.08)</b>	<b>1.07</b>	<b>(1.05; 1.09)</b>
High insecurity over working conditions	1.34	(0.93; 1.93)	1.18	(0.87; 1.60)	1.20	(0.91; 1.15)	1.20	(0.90; 1.60)

PR and CI9% in bold if they are significant.

Model 1: adjusted for age (continuous); Model 2: adjusted for age and all psychosocial dimensions; Model 3: adjusted for age, all psychosocial dimensions, type of contract and weekly working hours; Model 4: model 3 + housework and presence of household dependants

## Discussion

This article aimed to analyse the evolution of psychosocial exposure at work and its association with the mental health of the wage-earning population in Spain between 2005 and 2016. The results show slight improvements in exposure to work control, quantitative demands, social support, and insecurity over working conditions in 2016, comparing to 2005, and a worsening of employment insecurity. These figures are partially consistent with the results from the European Survey of Working Conditions over the last 15 years (Eurofound 2019). EWCS data show also no dramatic changes over the past 15 years in work demands, control and social support, but more jobs appeared to be secure in 2016 considering the whole UE; and all 3-year estimations are consistent with EWCS's for Spain as well. Additionally, other analyses of job quality show Spain as the worst country in the UE for the same 3-year period concerning job security.

The changes presented few differences regarding gender or occupational group. In addition, the association with health was similar throughout the period analysed; for all the wage-earning population (both men and women) poor mental health was associated with exposure to high demands and low social support. In addition, among male manual workers, poor mental health was associated with high employment insecurity and insecurity over working conditions, while among female manual workers the association was only with insecurity over working conditions; among non-manual workers, poor mental health was associated with low control and high insecurity over working conditions. These differences may relate to both gender-specific relationships to mental health and the use of affective items in the insecurity dimensions of COPSOQ that may link to mental health.

The distribution of poor mental health did not present significant changes over the 3 years analysed. This result is at odds with most previous publications which have reported worsened mental health in the general population since the

onset of the crisis in 2007–2008, especially among the unemployed (Heggebø et al. 2019). The differences with respect to previous research may be due to the fact that the survey used in this study only includes wage-earners who are, a priori, healthier than the general population (Arrighi and Hertz-Picciotto 1994); and among whom levels of temporary work fell due to the destruction of employment during the recession (Rocha and Aragón 2012). Disparities in the prevalence of mental health according to occupational group and gender were maintained over the three time points analysed: that is, women and manual workers presented worse mental health than men and non-manual workers respectively, as already reported in previous studies (Hämmig and Bauer 2013; Marmot 2006). The monotonous, repetitive work that characterises manual occupations has been associated with this higher prevalence of mental health problems (Siegrist and Marmot 2004). The disparities according to gender may be due to the inequalities between women and men in the access and participation in the labour market, and also to differences in reproductive tasks and gender-related roles (Leupp 2017). Spain, as many other European states, is characterized by a sexual division of labour and a dual horizontal and vertical segmentation, which generally places women in a more vulnerable position than men. Despite the incorporation of women into the work force, there has been little change in the distribution of reproductive work in Spanish households, with the result that reconciling family and work life remains more difficult for women than for men (Esteban-Gonzalo et al. 2018). Inevitably, this situation conditions the way in which workers participate in the labour market and affects the impact of their employment on their mental health. Therefore, additional research should be carried out to focus exclusively on this topic for in-depth analysis.

The evolution of psychosocial exposures showed two interesting features in the period 2005–2016. On the one hand, high demands and low social support increased significantly in 2010 but fell in 2016; demands returned to 2005 levels, and social support fell even lower. On the other, high employment insecurity and insecurity over working conditions improved in 2010 but worsened in 2016, returning more or less to 2005 levels. According to occupational group, manual workers were more exposed than non-manual workers to all the psychosocial risks studied except for insecurity over working conditions; their exposure was twice as high in low control and almost 20% higher in low social support and high job insecurity. There were virtually no differences by gender [the only disparity being higher levels of employment insecurity in women, which is line with previous publications (Campos-Serna et al. 2013)]. The improvement in job security in 2010 compared to 2005 is closely linked to the expulsion from the labour market of a large proportion of part-time workers as the first effect of the economic recession of 2008 (characterised in Spain

by large-scale destruction of employment). By 2016 the situation had returned more or less to that of 2005 (“INE. Encuesta de población activa,” 2019; Rocha and Aragón 2012). Similar results for the temporal evolution and the social gradient of psychosocial exposures were found in the EWCS data (Eurofound 2019), with no dramatic changes over the past 15 years in job demands but slight increases in job intensity, emotional demands, and job control since 2010.

As regards the analysis of associations, we found that high demands and low social support were associated with a higher risk of poor mental health across the entire wage-earning population. This association has been extensively documented in the literature (Stansfeld and Candy 2006). On the other hand, the association of insecurity and mental health was not homogeneous for all workers, as high employment insecurity increased the risk of poor mental health only in those in manual occupations. This result corroborates the conclusions of two systematic reviews on the association between employment insecurity and various health indicators, which also reported a stronger effect on health among manual workers (De Witte et al. 2016; Sverke et al. 2002). In contrast, exposure to high insecurity over working conditions (e.g., wages and working hours) seems to increase the risk of mental health problems among non-manual workers, both men and women. This difference in the association of high job insecurity with mental health among manual and non-manual workers is difficult to explain satisfactorily and requires more research. Perhaps in a context like Spain, where unemployment has never fallen below 9% and during the crisis rose to around 21% (“INE. Encuesta de población activa,” 2019), manual workers regard keeping their jobs as their top priority, and so the deterioration of their working conditions does not have a direct impact on their mental health.

Finally, the association between low job control and poor mental health differed according to occupational group and gender. In non-manual workers of both genders, we found that the higher the job control, the better the mental health, a result that is consistent with a large part of the occupational health literature (Harvey et al. 2017); however, in male manual workers there was no significant association and in female manual workers low control was associated with better mental health. These last two results are more difficult to explain (especially the second one), and in fact they are at odds with much of the literature referenced in this article. However, one systematic review of the impact of psychosocial risks on mental health found that the association between control and mental health was moderate (Stansfeld and Candy 2006) and other studies in Spain found no association at all (Navarro et al. 2017; Utzet et al. 2016). Despite the association of low control and mental health is still controversial, recent research suggest that lack of

autonomy at work is an independent predictor of employees' mental health (Too et al. 2020). More research is needed on the effect on mental health of the interaction between job control, occupational group, and gender.

This study has several limitations. As it comprises an analysis of three cross-sectional studies, the association between psychosocial exposures and poor mental health among the wage-earning population could be due to reverse causation. However, there is a large body of evidence supporting the association between exposure to harmful psychosocial risks in the workplace and mental health problems. A second limitation is that we do not know whether the populations had mental health problems before starting work. The third limitation is that the time of exposure to the different psychosocial risks analysed was not recorded. Finally, the samples analysed do not include self-employed or freelancers. Therefore, a part of the most vulnerable working population is excluded from the analysis, a fact that may have led to an underestimation of the exposures and of the associations calculated.

The main strength of the study is that the three samples compared are large and are representative of the wage-earning population in Spain. In addition, the 3 years analysed cover a considerable period of time, punctuated by the systemic crisis of 2008. This article is one of the first studies using Spanish data (apart from the European working conditions surveys) to shed light on the evolution of the working conditions and health of the wage-earning population over the last 10 years. Finally, the stratification by gender and occupational group is relevant, since it allows a detailed analysis of the social disparities in the associations between psychosocial risks and mental health. In this way, the most vulnerable groups can be identified, and preventive measures can be developed at source to reduce the exposure to psychosocial risks and thus improve workers' mental health.

**Acknowledgements** We specially thank Emilia Molinero for assessing preparing the files. David Moriña acknowledges financial support from the Spanish Ministry of Economy and Competitiveness, through the María de Maeztu Programme for Units of Excellence in RandD (MDM-2014-0445) and from Fundación Santander Universidades.

**Author contributions** SM and MU conceived the idea of the paper. MU and DM were responsible for the analysis of data. SM, MU and CL were responsible for the interpretation of data. SM and MU wrote the paper. All authors read and approved the final manuscript.

**Funding** This project was partially funded by the Instituto de Salud Carlos III (Spanish Health Ministry, IP12/02403). Fieldwork for the 2005, 2010 and 2016 Surveys of Psychosocial Risks in the Workplace was financed by Grants from the Instituto de Salud Carlos III (Spanish Health Ministry, IP031499), the Fundación para la Prevención de Riesgos Laborales (Spanish Ministry of Labor), and the Generalitat de Catalunya (Catalan Government).

**Availability of data and materials** Under request.

**Code availability** Under request.

## Compliance with ethical standards

**Conflict of interest** There is no duplicate publication of any part of the work and the authors declare that they have no conflict of interests.

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