Effects of Precarious Work on Mental Health: Evidence from Spain

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Abstract

Given that a relationship has been established between employment status and psychological well-being, the deepening segmentation of the Spanish labour market may be putting the mental health of part of the population at risk. However, the relationship between work and well-being could be influenced by unobservable subjective characteristics and, consequently, two people with the same job characteristics could be affected differently by precariousness. This research tackles the problem of the unobserved heterogeneity resulting from subjective variables related to work satisfaction. A finite mixed model is applied to analyse, firstly, how jobs characterized by greater instability may affect well-being and, secondly, to study how the way in which well-being is affected could depend on how the person evaluates their job satisfaction. Data from the National Health Survey of Spain have been used to perform the analysis. We conclude that the stability of permanent work contracts provides greater well-being if some previous conditions of job satisfaction are met. When these conditions are not met, the protective factor provided by permanent contracts is somehow diluted, and only tenured civil servants show advantages vis-à-vis the rest of work situations. Finally, the category of business owner appears to cause poorer well-being, regardless of job satisfaction.

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1- Introduction

During recent decades, working conditions in Europe have undergone significant changes aimed at achieving greater labour market flexibility (Cottini and Lucifora 2013). These changes have included the growth of work contracts characterized by worse wage conditions and, in general, more precarious forms of employment (Pirani and Salvini 2015). Precarious work has been reinforced by the increase in unemployment rates during the Great Recession of 2008 (Benach et al. 2016), and this phenomenon will surely continue to increase due to the economic crisis created by COVID-19, particularly in the sectors most affected by economic restrictions. All of the above has caused, for a significant part of the population, a substantive worsening of their working conditions, with an increase in job uncertainty and progressive loss of people's control over their working careers. This job insecurity (understood not only as job uncertainty but also discontinuity in the job or lack of social protection) has been related to an increase in the prevalence of mental disorders (Vancea and Utzet 2017; Matilla-Santander et al. 2020; Vives et al. 2013; Otterbach and Sousa-Poza 2016). Not surprisingly, empirical evidence points to an increase in anxiety and depression rates across the world (World Health Organization 2017). In the realm of work, almost 5.5 percent of the world population of working age may be suffering from severe mental health problems and 15 percent suffering from some type of problem, although less serious (OECD 2014).

This article analyses the impact of precarious work on the risk of suffering a self-reported mental health problem. However, when analysing self-reported mental health, the possibility of unobservable subjective characteristics of individuals having an influence should be taken into account (Greene, Harris, and Hollingsworth 2015). In other words, it is possible that not all individuals are affected in the same way by the same work situation because (subjective) perception of the labour precariousness may differs from the reality (Watson and Osberg 2018). If this is so, and it is not taken into account in the analysis, the results could be biased. Therefore, it is essential to take into account the fact that different individuals may have different responses to the same work situation, affecting their mental well-being in different ways.

In order to tackle this unobservable heterogeneity of the individuals, a finite mixture model (FMM) is proposed, allowing classification of the observations into groups and purging the estimated coefficients of the influence of unobservable heterogeneity (Llorca,

Rodriguez-Alvarez, and Jamasb 2020). The application of this methodology is expected to permit estimating the effect of job insecurity on mental health among groups of people whose responses to job insecurity may be different, thus controlling the subjectivity with which each person perceives their situation. The central idea of this article is that this response to precarious work depends on the way in which the person perceives and interprets their work situation. The proposed empirical model has already been applied in studies that address the complex relationship between job loss and well-being issues like being overweight and drinking, while trying to control the influence of unobservable heterogeneity (Deb et al. 2011).

The proposed analysis is carried out for a large sample of workers in Spain. According to Eurostat,[1] Spain's temporary employment rate is currently the highest of all the countries considered, at 25.1 percent well above the temporary employment rate of neighbouring countries such as France (15.6 percent), Italy (15.7 percent) or, to a lesser extent, Portugal (19.0 percent). Thus, given the relationship between temporary employment and precariousness, it should not be surprising that precarious work in Spain has increased significantly in recent years (García-Pérez, Prieto-Alaiz, and Simón 2020). These data and references justify the relevance of analysing the relationship between mental health and precarious work in Spain. They also make our analysis especially timely and policy relevant. Besides, to the best of our knowledge, this is the first research that addresses the objective of analyzing the unobserved heterogeneity from subjective variables related to work satisfaction in the relationship between employment status and mental health.

2. Literature review

The great diversity of work situations and contracts generates different employment statuses and conditions. In previous research the relationship between different working conditions and psychological health has been studied. Some of the evidence available highlights the relationship that exists between poor employment conditions and poorer psychological health. Inversely, people with permanent contracts and strong labour market attachment show better psychological health data (Waenerlund et al. 2014).

In a review of 46 papers (Vancea and Utzet 2017), it is concluded that there is clear evidence of psychological vulnerability amongst people who work under precarious

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[1] https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsq_etpga&lang=en.

working conditions. This vulnerability may manifest itself in multiple mental health variables such as greater propensity towards suicidal thoughts among precarious workers when compared to non-precarious workers (Min et al. 2015).

It is generally assumed that precarious work is associated with work discontinuity that makes it impossible for the person to maintain adequate standards of living. However, some authors (Rodgers and Rodgers 1989) have shown that job insecurity includes, in addition to inability to maintain employment over time, a lack of control over working conditions and a lack of legislation that protects workers as well as low wages. Each of these factors separately does not necessarily lead to precarious work; it is the combination of all these factors that leads the person into precariousness. Therefore, precarious work includes different concepts such as job insecurity, job discontinuity or lack of social protection (Benach et al. 2014; Pirani and Salvini 2015). Even so, recent studies (García-Pérez et al. 2020; Schneider and Harknett 2019) highlight the discontinuous time component as one of the dimensions most associated with the degree of worker satisfaction, even more so than the wage component. Not surprisingly, the available empirical data support the negative impact of both temporary and informal employment on well-being in an analysis across Europe (Karabchuk and Soboleva 2020).

Regarding temporary employment, (Moscone, Tosetti, and Vittadini 2016) conclude that the probability of prescription of drugs for mental health is higher for temporary workers. In addition, this probability is directly proportional to the number of days of work under a temporary contract and to changes from one temporary contract to another. They also find that changing from a permanent contract to a temporary one increases the risk of psychological deterioration and, conversely, changing a temporary contract to a permanent one reduces the risk of presenting poor mental health.

However, temporality has not been the only dimension of precariousness that has been studied in its relationship with psychological well-being. Phenomena such as job insecurity or lack of routine in working hours have been associated with the presence of worse psychological well-being. First, job insecurity is defined as exposure to fear of job loss and has been studied as a factor related to poorer psychological well-being using data from the United Kingdom (Ferrie et al. 2005), the United States (Burgard, Brand, and House 2009) and Korea (Kim et al. 2017). All of these studies have produced empirical evidence of the relationship between job insecurity and self-reported poor health, as well

as a higher degree of symptoms of depression. According to recent research (Kim and von dem Knesebeck 2016), there is a significant association between such perceived job insecurity and unemployment and symptoms of depression. Specifically, individuals exposed to job insecurity have a 29% higher risk of suffering from symptoms of depression when compared to those who claimed to have job security.

Secondly, exposure to variable working hours, shifts or night work is also an important dimension of job insecurity. Some studies (Schneider and Harknett 2019) conclude that a lack of routine in employment is associated with psychological problems, sleep problems and unhappiness. By sex, men seem more vulnerable to the consequences of night work and women to shift work (Bara and Arber 2009).

Third, objective features that are traditionally considered to affect life satisfaction and concerns about job insecurity, like the type of work contract, seem to be losing importance. Subjective concerns about job security, especially among the young, are affecting life satisfaction trajectories with gloomy consequences for young workers' lives (Helbling and Kanji 2018). However, the pernicious effect of certain work situations appears to be mitigated in areas with high unemployment rates, showing that people's perceptions adapt to the harmful consequences of joblessness (Gathergood 2013).

In this regard, an analysis with a British longitudinal sample (Robone, Jones, and Rice 2011) concluded that mental health effects as a result of differing types of work contract are not significant. The only exception is men working part-time, who are less likely to have health mental problems. However, when factors other than the contract and related to the degree of job satisfaction are taken into account, work contract variables start to become more significant and the results are even reversed. Which is to say that, the way in which work situation affects mental health may depend on subjective variables inherent to each individual. This is why the method applied in this article tries to tackle unobservable heterogeneity by grouping individuals with common behaviour patterns.

Thus, according to the literature analysed and included in this section, the following hypotheses are proposed:

H1: People who carry out their work in conditions associated with job insecurity will have a higher risk of developing mental health problems.

H2: The effect of the work situation on psychological well-being depends on different subjective factors for each individual. Controlling these effects is necessary to obtain unbiased results.

3. Method

As already explained, the main aim of this work is to analyse how mental health may be influenced by precarious work, among other variables. Given that the dependent variable (self-reported mental health) is categorical, taking values 0 or 1, a probit model is proposed.

However, since we are working with heterogeneous individuals, it is crucial to consider the possibility that there are different profiles of individuals. In order to identify these profiles, a finite mixture model (FMM), also known as a latent class model, is used. It consists of modelling the underlying relationships between the observed variables, assuming that the structure of these relationships can be explained by a discrete latent variable that classifies individuals into different groups or classes according to their probability of having a given response pattern. Thus, each class includes individuals with a high probability of having a similar response pattern.

In the FMM model both intercepts and slopes are allowed to vary across groups of individuals, which implies that individuals belonging to different classes may have different coefficients and, therefore, different marginal effects for each variable. Therefore, an FMM model differs from a standard probit model, where the slope is the same for different individuals, which means that it is not possible to capture heterogeneity in individual responses, that is to say, marginal effects are the same for all individuals. An FMM solves this issue by allowing the obtaining of different parameters for individuals belonging to classes with different characteristics (the model is explained in Annex 1).

The application of this methodology is expected to consistently estimate the effect of precarious work on mental health among different groups of workers. The central assumption of this article is that the effect of precarious work on mental health may depend on certain subjective factors of individuals, especially if we take into account the fact that the dependent variable is self-reported mental health. Unobservable subjectivity thus results from different precarious work effects on mental health for different

personalities. To control for this unobservable subjectivity, this article proposes introducing into the model variables separating class membership probabilities (class determinants) in order to allocate the individuals to classes. As we explain below, these class determinants will include self-reported variables (which may be correlated with the subjective variable of self-reported health), thus allowing us to purge the effect of precarious work on self-assessed health (Llorca, Rodriguez-Alvarez, and Jamasb 2020).

4. Data

This research uses a data set that results from merging the last three editions of the Spanish National Health Survey (in Spanish, ENSE) corresponding to the years 2006, 2011 and 2017. The possibility of having three editions of the National Health Survey allows us to analyze how the relationship between job insecurity and psychological well-being could have been affected by the Great Recession. This is possible thanks to the ENSE edition carried out in 2011, in the midst of the long crisis in the Spanish economy (2008-2013), which adds to the pre-crisis edition (2006) and the post crisis one (2017).

The large samples of this survey and the information regarding working conditions make it an adequate instrument to address the relationship between working conditions and health. The way to collect the information in this survey is similar in the three editions. Another advantage of these surveys is the integration of the General Health Questionnaire (Bara and Arber 2009) (GHQ-12), a 12-item psychometric test that has been validated for the Spanish population and that serves as the basis for the dependent variable. There is ample evidence of the use of this psychometric test to evaluate the relationship between mental health and certain work conditions such as the participation in the labour market of vulnerable groups (Harkness 2016) or the enrolment in Active Labour Market Polices (Sage 2015).

In order to operationalize the dependent variable and following the correction instructions in the questionnaire manual (Golberdg and Williams 1996), the GHQ-12 scores have been dichotomized, assigning a 0 to responses that indicate an absence of risk relating to suffering mental health problems, and a 1 to responses associated with an increased risk (high-risk punctuation).

The final variable is calculated by adding each of these dichotomized scores. The total result of each person ranges between a maximum score of 12 and a minimum score of 0.

According to the aforementioned GHQ-12 administration manual for the Spanish population, the threshold is between two and three. Following previous research also performed with Spanish population (Urbanos-Garrido and Lopez-Valcarcel 2015; Artazcoz et al. 2004), in this research, a score equal to or greater than three is used as a cut-off point. The main explanatory variables of this research, on which the hypotheses included in the previous section rest, are work situation and type of workday.

Work situations are classified in the following categories: civil servant, salaried employee with permanent contract, salaried employee with temporary contract, business owner (including self-employed) and other situations. Type of workday is divided into split shift, continuous shift and rotating shifts.[2] In addition, different control variables related to individual and socioeconomic characteristics have been included in the analysis: sex, education, age, possession of Spanish nationality, size of municipality (population) and region of residence.[3]

Finally, as already described, to identify the different types of people and minimize self-evaluation bias, the model includes class membership determinants, which can help explain the different groups of individuals. Specifically, the variables used as class determinants are levels of self-reported satisfaction and work stress. These determinants are, like the dependent variable, self-reported variables, as respondents score both their satisfaction and their stress on two scales ranging from 1 to 7. Thus, it seems reasonable to assume that they are related to the (subjective) responses of the individuals. As stated above, class determinants try to control bias due to the potential subjectivity which influences how individuals respond when asked about their mental health. It seems reasonable to assume that both variables are closely related to self-assessment of mental health. Thus, these determinants can serve to control subjectivity and thus reveal the true effect of precarious work on mental health.

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[2] Typically, a continuous shift in Spain takes place during the morning and early afternoon; a split shift means a long, "Mediterranean" lunch break and ends around 7pm; and a rotating shift includes day shifts or night shifts depending on the week.

[3] For reasons of model convergence regions have been grouped into seven zones following a geographical criterion: Northern zone (Galicia, Asturias, Cantabria. Basque Country); Central zone (Castilla – La Mancha, Castilla y León, Aragon, Extremadura, Navarra, La Rioja); Mediterranean zone (Catalonia, Valencia, Murcia); Islands (Canary and Balearic Islands); Andalusia; Madrid; and Ceuta and Melilla.

5.   Results

Descriptive statistics of the variables are presented in Table 1, which shows the percentage of scores compatible with a higher risk of mental disorder among the rest of the variables.

Regarding work situation, the category that groups together atypical work[4] situations (wage earners with a verbal contract, wage earners without a contract, contributing family workers) shows the highest percentage of people at risk (23.7 percent). On the other hand, among civil servants, the percentage of individuals at risk is less than half (11.8 percent). By sex, women show a higher percentage of risk scores than men. Higher percentages are registered also by the groups with lower education, people with a nationality other than Spanish and, with regard to the size of the municipalities of residence, people who live in cities with more than half a million inhabitants.

A second table with descriptive data (Table 2) shows the distributions of the different variables used in relation to work situation, the variable most used when describing precarious work.

First, the high disparity between men and women within atypical work situations, with a predominance of women, as well as in the group of business owners, among whom the percentage of men is much higher, can be seen. Regarding education, the significant presence of university graduates among civil servants stands out. A high average age is found among business owners and civil servants, while workers with temporary contracts are the youngest. Regarding nationality, the proportion of non-Spanish nationals working in atypical situations almost triples the weight of this group in the survey. A significant difference between civil servants and business owners is that the former shows the highest incidence of continuous shift work and the lowest of split shift work, while the reverse situation occurs among the latter. Finally, business owners and civil servants present the highest average scores of job satisfaction, while people in atypical situations seem to have the lowest stress score. Satisfaction averages are greater than stress averages for all groups.

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[4] Following the European Foundation for the Improvement of Living and Working Conditions, the term atypical work is used to define employment relationships that do not conform to the standard or 'typical' model of full-time, regular, open-ended employment with a single employer over a long-time span. (https://www.eurofound.europa.eu/observatories/eurwork/industrial-relations-dictionary/atypical-work).

Table 3 presents the results obtained from the estimation of a standard probit (Model 1, columns 1 and 2). Regarding work situations atypical work, working on a temporary contract and being a business owner show a greater probability of mental health risk than working on a permanent contract. Civil servants have a lower probability of mental disorder. In terms of workdays, people who work continuous shifts and rotating shifts have a greater tendency to report mental health risk than those who work split shifts. The remaining variables follow rather standard patterns, as reported in the literature: women, older people, people with lower educational levels; people with nationalities other than Spanish and those who live in provincial capitals are at higher risk of suffering a mental health problem (Paul and Moser 2009; Chevalier and Feinstein 2006; Rocha et al. 2010; Peen et al. 2010). Lastly, while in 2011 no significant differences were observed compared to 2006, in 2017 an improvement in mental health was observed compared to the reference year.

However, a standard probit model does not take into account possible differences between workers that could be latent and that could be biasing the results obtained with the probit models. Therefore, in what follows, different alternative FMM models are presented that use the same explanatory variables as the standard probit one, but which start with the advantage of classifying the sample into groups or classes, taking into account the potential unobservable heterogeneity among workers. In addition, the introduction of two subjective variables (stress and job satisfaction) as class determinant or separating variables is explored.[5]

We have analysed several alternative models. As stated above, Model I is a standard probit model. Model II is a FMM with two classes and with the level of job satisfaction as class determinant. Model III also considers two classes but uses job stress as a class determinant. Finally, Model IV includes the two separating class variables (job satisfaction and job stress) in the two-class model. According to the results shown in Table 4, the two information theoretical criteria used - the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) indicate that when we model two classes, the criteria for the comparison of the models improves when compared with a standard probit (Model I). Also, both indicators improve when we use two class determinants instead of only one. In summary, results show an improvement in the

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[5] The FMM model was estimated using Stata 16 that uses the EM algorithm.

goodness of fit of the estimates when unobserved heterogeneity is addressed in a model with two classes including two class determinants (Model IV).[6]

Therefore, from now on the results obtained according to model IV are analysed. Regarding class determinants, Table 5 shows that job satisfaction and high stress at work are highly significant in explaining classes and therefore provide relevant information when it comes to identifying different types of individuals. Specifically, people belonging to Class 2 tend to suffer less stress and higher levels of satisfaction in their work when compared with people in Class 1, which is used as the reference.

To assign workers to each class, the highest posterior probability of belonging to each class is taken into account according to Equation (5).

In Table 6 some characteristics of each class are specified. Class 2 is the largest with 85 percent of the sample. The remaining 15 percent have been classified within Class 1. Regarding the GHQ-12 index (a dichotomous variable that, as indicated above, takes values between 1 and 0, the unit indicating the highest risk of suffering from a mental disorder), the results of Table 6 indicate that the individuals in Class 1 have an average score of 0.52 in the GHQ-12 index while the average for those belonging to Class 2 does not reach 0.09. That is to say, the minority group (Class 1) is that with a higher risk of suffering from a mental disorder. Furthermore, based on subsequent probabilities, individuals in Class 2 have, on average, a 91 percent probability of belonging to that class, and individuals in Class 1 have an almost 74 percent probability of being classified within Class 1.

Table 7 shows the distribution of the explanatory variables between the two estimated classes: Class 1, with a higher mean in the GHQ-12 (see Table 6) and with a higher level of stress and less satisfaction (see Table 5); and Class 2, with a lower mean in the psychometric test, a lower level of stress and a higher job satisfaction.

Regarding the distribution of the employment situation between the two classes, Class 1 has a higher percentage of civil servants and business owners than Class 2, and a lower percentage of permanent and temporary contracts and atypical situations. Regarding

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[6] We have tried to estimate a model with 3 classes. However, it does not converge.

workday, Class 1 has a higher percentage of split and rotating shifts and a lower percentage of continuous one.

On the other hand, columns 3-6 of Table 3 show the estimated parameters according to Model IV. Comparing these with Model I (a standard probit model) it is observed that the results corresponding to Class 2 are quite similar: workers with a permanent contract have a greater probability of reporting better mental health when compared with those on less stable contracts. When compared with civil servants, however, the differences in coefficients are not significant. The results regarding the type of workday follow the same trend as in the standard probit model: the split shift seems to protect workers from risk of poor mental health. Finally, the parameters related to the control variables follow exactly the same pattern as in Model I.

However, if we analyse the results for Class 1, it is observed that all the control variables except gender become less significant. Changes are also observed with respect to work situations: people with greater job stability, that is, civil servants, are less likely to suffer consequences for their psychological well-being than people with permanent contracts. This effect, despite appearing in the standard probit model, is not reported among people in Class 2. Finally, as happened with people in Class 2, the group of business owners show worse mental health compared to people on permanent contracts. In summary, for people with poorer occupational health, that is, those with greater stress and less job satisfaction, there is no difference between holding an open-ended, temporary or verbal work contract. Only the categories of business owners and civil servants present statistically significant results.

The analysis, then, concludes that permanent contracts reduce the risk of mental illness when compared with less stable contracts (temporary and verbal ones) as long as preconditions of job satisfaction and the work being carried out are met (Class 2). When these minimum preconditions are not met and workers are more vulnerable to higher stress or lower job satisfaction (Class 1), having a stable category such as a permanent contract does not seem to influence self-reported mental health. This comes from comparing these individuals with others in more precarious work situations. The protection of permanent contracts when compared with less stable work contracts that is observed among individuals in Class 2 seems to be transferred to the civil servant category. This may be indicating a similar pattern of responses, in which Class 1 workers

(that is, those in unfavourable work situations) have poorer psychological well-being regardless of whether the contract is temporary, permanent or atypical.

Regarding the type of workday, results indicate the same pattern. If for Class 2 there were significant differences according to the type of workday, these disappear when we analyse the members of Class 1. That is, individuals in an unsatisfactory work situation or with high levels of stress will tend to report poor mental health regardless of the type of workday. This may be indicating that there is a latent variable (not being satisfied with their work situation) affecting the responses of workers about their mental health regardless of the objective conditions (type of contract and workday) in which they find themselves.

Consequently, when assessing the impact on mental health of certain objective working conditions, it is necessary to control for the possible subjectivity of the responses through a model that allows us to capture the possible existence of unobservable heterogeneity. Results seem to confirm that this is explained by the satisfaction of each person with their work. Thus, although individuals find themselves in objectively similar work situations, subjective issues such as the fact that a worker perceives their work to be stressful or is not satisfied in their job, can make their self-reported health status vary when compared with other workers who, with the same type of work, are more satisfied in their jobs.

Table 8 shows the average marginal effects corresponding to the estimated coefficients of Models I and IV, which indicate changes in the probability of reporting poor mental health in the event of a change in an explanatory variable. Results show that, *ceteris paribus*, Class 1 civil servants have a 12.4 percent lower probability of suffering a mental disorder than those on a permanent contract, this reduction being much greater than that obtained in the standard probit model (2.3 percent). The results also differ for business owners, even if all models show that this group is exposed to a higher risk of mental distress. Being a business owner increases risk by 2.5 percent in the standard probit model, and the effect for members of Class 2 is very similar at 2 percent. But business owners within the most dissatisfied group of workers (Class 1) experience a much higher marginal effect of 9.4 percent. Once again, the need to control for unobservable heterogeneity in order to obtain unbiased conclusions about the effect of work situation on mental health is highlighted.

6- Discussion and conclusions

This article analyses the relationship between precarious work and psychological well-being. To the best of our knowledge, the research is the first that uses a method permitting to control the influence of unobservable inter-individual heterogeneity based on the establishment of different classes of people. Classes have been determined based on job satisfaction and stress. The results obtained are compatible with the idea that the way in which each person perceives their work situation influences the relationship between precarious forms of work and psychological well-being.

Among those less satisfied with their work situation, being a civil servant protects psychological well-being when compared with people on permanent contracts. For the most satisfied people, the most unstable contractual terms, and therefore those more associated with precariousness, increase the probability that problems related to mental health will appear.

Being a business owner is associated with a greater risk for psychological well-being, regardless of the person's satisfaction. Furthermore, among the less satisfied, business owners have a much greater risk of distress than permanent employees. Given that the group of business owners includes the self-employed, and it is common to find significant numbers of people who are self-employed "by necessity", this result prompts question about the extent to which mental health distress may be linked to this type of work situation (unfortunately, our data does not allow us to identify the self-employed among business owners).

Regarding workday differences, people who work continuous shifts and rotating shifts have a greater probability of obtaining a score compatible with worse psychological well-being than those who work split shifts. However, this effect disappears among people with lower satisfaction, suggesting that the precariousness of this group makes the workday less of an issue.

Comparisons between salaried employees with permanent contracts and civil servants are noticeable. When previous conditions of adaptation to the job are fulfilled, there are no differences between having a permanent contract or being a public employee. However, when these conditions are not met, civil service appears to revalue vis-à-vis open-ended contracts in the private sector. This suggests that the protective role of permanent

contracts in Spain, which has been reduced by labour market reforms, may play a different role depending on the person's satisfaction with their work. Workers who are not satisfied with their jobs may actually perceive that the permanent contract does not protect them, while satisfied permanent employees do not perceive themselves to be very different from civil servants.

Summing up, the relationship between precariousness and psychological well-being is confirmed by the analyses carried out in this article. However, it has also been concluded that when analyzing this relationship, it is necessary to take into account the way in which the person interprets their work. The way in which job insecurity affects well-being depends not only on job characteristics, but also on how these conditions are perceived.

The results of this article expand the existing knowledge about the relationship between job insecurity and mental health, adding job satisfaction as one of the important conditioning factors. In addition, given the current trend towards labour market flexibility and the growth of precarious work, it is advisable to take into account the conclusions obtained hereby in order to improve working conditions, especially the conditions of those who work in more precarious situations. In the specific case of this work, the importance of job satisfaction should also be taken into account by companies when designing their company policies regarding employment contracts.

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Annex 1

If we assume a standard normal distribution to leads to a probit specification, the log-likelihood function for individual i, assuming they belong to class j, can be written as follows:

$$\ln L_{ij}(\beta_j) = y_i \ln \Phi \left(\beta_j' x_i\right) + (1 - y_i)\left(1 - \ln \Phi \left(\beta_j' x_i\right)\right) \tag{1}$$

where β_j is a vector of parameters to be estimated; x_i is the vector of explanatory variables; y_i is a dummy variable that takes value one if the individual is at risk of suffering a mental health problem and zero otherwise; and Φ is density function of a standard normal distribution. In latent class models, the class probabilities are often parameterized as multinomial logit models. Thus, the probability of individual i belonging to class j, $P_{ij}(\delta_j)$ can be expressed as follows:

$$P_{ij}(\delta_j) = \frac{\exp(\delta_j' q_i)}{\sum_{j=1}^{J} \exp(\delta_j' q_i)}, \qquad j = 1, \dots, J, \qquad \delta_J = 0 \tag{2}$$

where q_i is the vector of individual-specific variables or an intercept; and δ_j are parameters to be estimated. Individuals belong to only a class, therefore P_{ij} is indicating the uncertainty regarding the true partition of the sample.

Under these assumptions, the unconditional likelihood function for individual i can be expressed as follows:

$$L_i(\beta, \delta) = \sum_{j=1}^{J} L_{ij}(\beta_j) P_{ij}(\delta_j), \quad 0 \le P_{ij} \le 1, \quad \sum_{j=1}^{J} P_{ij}(\delta_j) = 1 \tag{3}$$

where the weights are class probabilities. Finally, from (2) and (3) we can get the overall likelihood function:

$$\ln L(\beta, \delta) = \sum_{i=1}^{N} \ln L_i(\beta, \delta) = \sum_{i=1}^{N} \ln\left\{\sum_{j=1}^{J} L_{ij}(\beta_j) P_{ij}(\delta_j)\right\}. \tag{4}$$

Once the beta parameters have been estimated, they can be used to obtain the conditional posterior probabilities as follows:

$$P(j|i) = \frac{L_{ij}(\hat{\beta}_j) P_{ij}(\hat{\delta}_j)}{\sum_{j=1}^{J} L_{ij}(\hat{\beta}_j) P_{ij}(\hat{\delta}_j)} \tag{5}$$

Where $P(j|i)$ depends not only on the δ parameters estimated but also on the density values which, in turn, depend on the estimated β parameters. In this sense, FMM is able to classify the individuals into groups of individuals (classes) using the goodness of fit of each estimated probit as additional information (it is worth noting that we can get as many probits as the number of classes we have).