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Essays in health and labour economics

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Abstract

In recent decades, there has been a process of growing precariousness and work intensification and increases in non-standard working hours. This thesis highlights the importance of working conditions for well-being. After a brief introduction, the first two chapters investigate changes in the quality of work and the health of temporary employment in the period before and after the economic crisis of 2008 in the Spanish state. There are no differences in the overall quality of work for men in temporary employment compared to permanent employment, but there is a slight worsening for women. Chapter 3 studies changes in work stress and the development of psychological problems due to the economic crisis. Higher levels of psychological problems are found among men in temporary jobs both before and after the economic crisis. However, there are no changes in these indicators for men and women, except in population subgroups among men. Using data for Catalonia, Chapter 4 analyses the extent to which working hours predict changes in self-perceived health and, in particular, the role of job satisfaction in this relationship. The results indicate that shorter working hours predict better health among women. Long working hours, between 41 and 47 hours per week (h/w), harm health in both sexes but surprisingly not in men working 48 h/w or more. Job satisfaction predicts improved self-perceived health for men only. The positive effect of job satisfaction is lower among men working 41-47 h/w compared to the standard schedule. Chapter 5 focuses on the differences between actual and desired hours (mismatches) of work in the European context. The adverse effect of working hours on mental well-being is mostly attributable to mismatches in working hours (except for men working 41-47 h/w) with differences by sex. A rewarding job positively contributes but job intensity reduces well-being. The interaction of mismatches with the job quality dimensions helps to explain previous counterintuitive findings regarding very long hours of work.

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Preface

This thesis deals with the relationship between work environment and health outcomes. After a brief introduction, the first two chapters investigate changes in work environment for temporary employment before and during the economic crisis in Spain. Chapter 2 shows the evolution of quality of work indicators for temporary employment, while Chapter 3 analyses changes in work stress and mental health. The next two chapters focus on hours worked, job quality, and their effect on health outcomes. Chapter 4 investigates if worked hours in combination with job satisfaction affect self-perceived health using longitudinal data for Catalonia. Chapter 5 shows the extent to which differences in actual and desired hours are associated with mental well-being and the role of job quality in this association, considering a wide sample of European countries.

Contents

List of figures

List of Tables

1 Introduction

In the last decades, labour precariousness has spread, jobs have intensified, and demands for more flexible working hours have increased (Green and McIntosh, 2001; Green and Tsitsianis, 2005; Greenan et al., 2014). The incorporation of new technologies and the delocalization of production in a globalized market have been identified as triggers of divergent labour market performance among the so-called "good and bad jobs" (Goos, 2009; Kalleberg, 2011).

What can be considered a good or bad job has been the object of discussion in the literature, and it is a topic closely related to the concept of job quality. The complexity of defining and measuring job quality lies in the multiple levels at which jobs can be analysed (Dahl et al., 2009; Warhurst et al., 2017), in the degree of objectivity of the indicators, and the multiple dimensions of jobs that should be taken into account. For instance, the quality of employment refers to general labour market characteristics, such as inclusion and access to the job market; it points to the institutional settings conditioning the arrangement between the employee and the employer. A close but different concept is the quality of work, which assesses the activity of work itself and the conditions under which it takes place. Job quality can be measured through surveys where employees assess specific working conditions on a predetermined scale. The subjectivist approach would rely only on employee satisfaction (often referred to as job satisfaction) as "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences" (Locke, 1976). A common practice is to construct indices of several items that point to key job dimensions and analyse the resulting system of indictors or the composite index. In this thesis, we compute different measures of job quality according to the social and occupational health models with the available information in different contexts. We provide a full empirical justification for each scenario.

Job quality contributes to overall quality of life as well as to a variety of physical and mental health outcomes (Drobnič et al., 2010; see Barnay (2016) for a recent review). Previous studies have identified a positive association between improved working conditions and health outcomes (Faragher et al., 2005; Fischer and Sousa-Poza, 2009; Cottini and Lucifora, 2013). Measuring health is a challenge. In this thesis, we focus on general health status and mental distress. General health status is usually measured by subjective self-perceived health.

This indicator has proven to be a valid and synthetic indicator of disease burden that correlates with physical function, mental distress, and well-being (Simon et al., 2005). However, some authors point out that self-perceived health can be less accurate for women than for men (Benyamini et al., 2000), although meta-analyses have found the same strength of the association among both sexes (DeSalvo et al., 2006). Other commonly used health measures are psychological distress and mental well-being. The reason to focus on these two indicators is that with the incorporation of computer and information technologies, the work environment has become more prone to stressful and demanding situations than to physically hazardous situations. In this thesis, we use two instruments: the General Health Questionnaire (GHQ-12) and the World Health Organization Well-Being Index (WHO-5). The GHQ-12 is a reliable screening instrument designed to detect emotional, mood-related problems and psychological distress at population level. No differences by gender have been reported in the literature (Goldberg, 1997). WHO-5 is also a subjective screening instrument with high clinical validity. It has been used irrespective of underlying illness in order to assess well-being over time or to compare well-being between groups. The mean WHO-5 score in the general population has been measured in different European countries, with positive variations of 10% or more meaning a great improvement in well-being (Topp et al., 2015). A problem with routine official labour surveys and statistics is that they rarely collect sufficient data on working conditions and health outcomes. Rich labour statistics are weak in providing information on health problems and vice versa. This fact constraints the possibilities of the analysis. To include health instruments in labour surveys and statistics is a preliminary general recommendation of this thesis.

Contextual factors, such as unemployment level and the probability of fast reemployment after a job loss, can also affect the association between job quality and well-being. In this sense, the well-being consequences of job insecurity are relevant in countries with flexisecurity labour policies, where rapid reemployment may reduce the anxiety associated with insecurity. Similarly, health improvements are reported in countries that promote work-life balance policies and equal treatment between part-time and regular working schedules. This thesis highlights the importance of contextual factors at the regional and national level when applicable.

Another relevant factor to considerer in our analysis is that, despite the massive incorporation of women into the labour market, a gender division of labour persists. Women are more frequently employed in atypical jobs. They also work shorter hours than men and experience poorer working conditions (Petrongolo, 2004). Traditional roles assign women the double burden of paid employment and unpaid work at home (Pfau-Effinger et al., 2009). Besides gender roles, perceptions of work and health outcomes may also differ for men and women; preferences and expectations may differ by gender (Clark, 1997). Therefore, it is necessary to stratify all analysis by gender. In this thesis, the analysis in all chapters is separated by gender.

A particular challenge analysing the relationship between employment and working conditions and health is reverse causality. There is evidence of causality in both directions; however, the dominant effects appear to be from worse working conditions affecting poor health outcomes and not vice versa (De Witte et al., 2016). We deal with reverse causality in many ways: we assess the effect of including workers with and without chronic conditions, and we regress only lagged explanatory variables on current health or restrict our sample to non-disabled people. However, causality claims using our results should be taken with care, as we cannot rule out other endogeneity biases completely.

Taking all this into account, the next two chapters deal with potential changes in the working conditions of temporary workers and consequences for health outcomes in the context of the Spanish economic crisis. Although during the crisis firms' employment adjustments first affected temporary jobs, temporary employment levels remained relatively high by European standards. To focus on temporary employment is of special interest, because the literature that relates to the quality of work and economic crisis has not considered the specific situation of temporary workers, which is a key issue in segmented labour markets such as the Spanish market.

In Chapter 2, we apply the structural equation methodology to build a quality of work index from selected dimensions and describe its evolution before and after the economic crisis for involuntary temporary employment in Spain. Our results show that, comparing 2006/07 with 2009/10, there are no differences in quality of work among male involuntary temporary workers and those with permanent contracts. However, there is an adverse widening gap across all dimensions of work quality for women during the economic crisis. There is also a shift among men and women from valuing intrinsic job quality in the pre-crisis period to an increased valuing of the work environment during the crisis period.

The effect of changes in health status is not a priori clear. Systematic reviews conclude that, as temporary workers tend to be engaged in insecure and lower quality jobs compared to their permanent counterparts, they experience a higher prevalence of work-related stress and mental health problems (Virtanen et al., 2005a). However, other meta-analyses indicate a non-significant or moderate negative association between job insecurity and mental health, although few studies report a strong association (Sverke et al., 2002; Cheng and Chan, 2008). For this reason, and in order to explore the psychosocial problems potentially associated with temporary employment, in Chapter 3 we analyse work stress and mental distress for temporary workers compared to permanent workers before and after the crisis. Moreover, we analyse the mediating role of work-stress on mental health. A limitation of previous studies on the health effects of the economic crisis is that most rely on observational studies without properly taking into account selection bias (Frasquilho et al., 2015; Parmar et al., 2016). To control for selection bias, we compute propensity scores for male and female employees considering temporary employment as the treatment group versus permanent employment as the control group. Next, we use difference-in-differences estimators stratifying by age, education level, and regional unemployment differences using propensity scores as weights. Our results indicate that employees with a temporary labour contract tend to have similar levels of high work stress and poorer mental health (only for men) than permanent employees for both periods. The economic recession does not appear to worsen these outcomes. However, when stratifying the sample, the economic recession seems to be responsible for increasing stress among older temporary workers and male university graduates, without affecting women. Regarding mental health, we only find evidence of a negative impact of the economic recession on male temporary workers with university education.

The next two chapters of the thesis deal with the association between hours worked and health outcomes. Improvements in technology have made large decreases in working hours possible during the last century in most European countries, moving from 64.4 hours per week for full-time workers in 1879 to 40.9 in 1980 (Huberman and Minns, 2007). The downward trend in hours appears, however, to slow in the last decades. The 2008 economic recession may have temporarily decreased the number of worked hours, but there are clear signs of recovery after 2015. Nevertheless, it is also true that claims for more flexible production have led to a surge in both short and long working hours as highlighted by the International Labour Organization (2018). The consequences of mismatches between actual and desired working hours imply welfare losses and lead to socially undesirable time allocation between work and leisure (Schor, 2005). Some countries have implemented policies shortening the working week, with improved health outcomes resulting in Germany, Portugal, and France (Bietenbeck and Berniell, 2017; Cygan-Rehm and Wunder, 2018; Lepinteur, 2018). Moreover, most reviews report negative effects of long working hours on a variety of health outcomes: cardiovascular disease, diabetes, subjectively reported physical health, subjective fatigue, and sleep disturbances (van der Hulst, 2003; Bannai and Tamakoshi, 2014). However, the moderate or mixed results obtained by some reviews (Fujino et al., 2006; Watanabe et al., 2016) may be due to misspecification in cross-sectional studies or to the omission of relevant confounders and interaction terms, with working conditions as an obvious candidate to reconcile these results (Ganster et al., 2018). Considering these factors, in Chapter 4 we explore the potential role of job satisfaction in the effect of either short or long hours on self-perceived health. Our analysis confronts hours of work with the available subset of working conditions from which we built a job satisfaction index using longitudinal data for the Catalan economy from 2005 to 2009. We also analyse the effect on changes in self-perceived health in changing working hours and levels of job satisfaction. To avoid reverse causality, one year lagged job satisfaction and its interaction with the number of working hours was performed in a dynamic random effects logit model, with self-perceived health as the dependent variable. A generalised ordered logit model is also estimated to test the effect of transitions to shorter, equal, or longer working hours and different levels of job satisfaction on self-perceived health. The results confirm that long working hours predict poorer self-perceived health among men and women. Among men but not among women, job satisfaction predicts improved self-perceived health with a moderate confounding role for men but not for women. We also find an interaction effect of poorer health status on job satisfaction in positions with long working hours for men and a weaker effect for women. Surprisingly, very long hours (more than 48 hours per week) seem to be protective for men. Regarding transitions, it was also found that longer working hours and lower levels of job satisfaction are associated with poorer self-perceived health for men and women. Summarising, the results confirm previous findings of an adverse effect of long hours on health status, with a moderate confounding role and interaction effects for men. The result of working more than 48 hours per week as protective for men suggests that (in)voluntariness in hours may play a role in terms of health results, which leads to the next topic of mismatches in working hours that we develop in Chapter 5.

Mismatches in working hours arise when desired hours are different from actual hours. It is clear that not all hours that the employee would like to work are feasible due to fixed costs faced by employers or search costs (Chetty et al., 2011), but there is room for a wide range of opportunities. At least conceptually, an economic system that expands consumer freedom should also remove constraints in hours of work for employees. Chapter 5 considers the health consequences of involuntary long or short working hours on mental well-being and explores the role of job quality in this relationship. Most literature analyses the effect of mismatches in job satisfaction and life satisfaction, but there are few studies on mental well-being, which is at odds given the extensive literature on hours of work and health outcomes. The review from Bassanini and Caroli (2015) concludes that it is not the work or working hours *per se* that are relevant for health outcomes, but the amount of involuntary work provided. Our objective is to estimate the association between hour mismatches and mental well-being and to investigate the confounding and moderator role of job quality in this association. We also explore whether the association differs among European countries for men and women. We run a multilevel linear regression on cross-sectional data from the European Working Conditions Survey of 2015. The results indicate that the adverse effect on well-being of short and long hours is mostly attributable to mismatches in working hours (except for men in 41-47 h/w). Women obtain worse well-being results from hour mismatches than men. A rewarding job positively contributes to well-being, but job intensity reduces well-being. The confounder and interaction terms help to explain the association between working hours with mental well-being. For men working ≥48 h/w, job intensity increases well-being for unconstrained workers, but reduces it for overemployed workers. Although the interaction effect is of small magnitude, it adds evidence of the favourable effects for well-being of having control over one's working hours.

Finally, the thesis closes with Chapter 6, which provides conclusions and future lines of research based on the main findings.

2 Quality of work of temporary workers and economic recession in Spain[1]

2.1 Introduction

While becoming unemployed is considered to decrease an individual's well-being in the long run (Clark and Oswald, 1994), permanent and temporary workers who "survive" mass layoffs may also experience diminishing well-being due to the threat of the loss of employment (Vahtera and Virtanen, 2013). For instance, losing privileges achieved in times of economic growth when workers' bargaining positions were stronger. A high quality of work is important for workers well-being. It is positively correlated with life satisfaction (Bowling et al., 2010) and a diversity of physical and psychosocial health outcomes (see Barnay (2016) for a recent review). Temporary workers tent to be engaged in low quality jobs characterised by higher job insecurity compared to their permanent counterparts. As a consequence, they experience a higher prevalence of work-related stress and mental health problems (Virtanen et al., 2005a). A working life with poor labour attachment may lead to social exclusion and even to a more stressful situation than remaining unemployed (Chandola and Zhang, 2018).

The Spanish case is particularly interesting from this perspective. During the first years of the recent economic crisis, unemployment rates skyrocketed to 26.1% in 2013 from 8.2% in 2007 (INE 2016). Although firms' adjustments first affected temporary jobs, temporary employment levels remained relatively high by European standards, decreasing slowly from 33.2% in 2006 to a 21.9% in 2013, the lowest in the last two decades. Taking this into account, our objective is to analyse if the deterioration in the Spanish labour market during the crisis has affected the self-assessed work quality among permanent and involuntary temporary workers. Literature on the Spanish case is scarce. Only Borra and Gómez-Garcia (2016) illustrate the importance of the context of labour market downturns and high unemployment rates in relation to pre-crisis job satisfaction, but their analysis does not consider the multidimensional aspects of work quality that could have been potentially affected by the recession.

[1] This manuscript has been accepted for publication at the International Journal of Manpower on January 23rd 2019.

The literature that relates the quality of work and economic crisis has not considered the specific situation of temporary workers. This is a key issue in segmented labour markets such as the Spanish one and that can offer results of interest from a comparative international perspective. In addition, we apply a methodology that allows considering the multidimensional nature of work quality in this context, an aspect also little explored in the literature so far.

We restrict our analysis to temporary employment, as the type of contract is a key factor influencing job quality (Kauhanen and Nätti, 2014). The Encuesta de Calidad de Vida en el Trabajo (ECVT) – Survey of Work Quality- covers a wide range of aspects related to working conditions and labour arrangements. However, as few questions follow standard wordings required for sound psychometric instruments, the use of one single indicator is not recommended. Thus, we use a structural equation model (SEM) to construct latent factors representing different dimensions of work quality to gain validity and test if the constructs differ between temporary and permanent employment.

2.2 Literature review

The concept of quality of life at work emerged in the 1940s from the field of psychology to address worker alienation. Early research highlights the difficulty of defining the multidimensional nature of work quality, discussing the reciprocal effects of quality of life. Scholars studied how employees manage (or fail) to accommodate, compensate for, or transfer satisfaction with work to their quality of life. Martel and Dupuis (2006) offer a critical review of the ambiguity of defining job quality despite empirical advances.

The turning point occurred in 1997, when the European Employment Strategy and the Lisbon 2000 agenda aimed to boost labour market outcomes by not only creating employment, but by promoting quality and productivity at the workplace. The complexity of the definition of job quality lies in the multiple dimensions of jobs that should be taken into account; by the degree of objectivity or subjectivity of indicators; and by the multiple levels on which jobs can be analysed. Ranging from broad labour market systems in which jobs are performed and the particular work environment at the workplace level (Dahl et al., 2009; Leschke and Watt, 2013).

International organizations and academics (see Warhurst et al. (2017) for a review) have carried out a range of projects combining information at the individual and the macroeconomic levels. Problems with some of these macro-indices of quality of employment may be the redundancy of information across indicators or dimensions and methods of weighting and aggregation. Some degree of arbitrariness in weights and the proliferation of indicators and dimensions may hide the importance of relevant working conditions that, if not handled properly, can obscure their policy implications. More importantly, in a series of publications, Muñoz de Bustillo et al. (2011) complain that these job quality indexes include dimensions that are not strictly properties of workplace performance.

From a theoretical perspective, and according to the demand-control and the effort-reward models, temporary workers are supposed to be vulnerable to poor working conditions. The demand-control model identifies job strain as the gap between the degree of control and autonomy over work and psychosocial demands (Karasek, 1979). The effort-reward imbalance model states that job strain comes from an imbalance between employee effort and perceived low compensation received for that effort, including salary (Siegrist, 1996).

In a more subjectivist framework, the quality of work is derived from the utility a worker derives from work. Job satisfaction is found to be a valid and reliable measure of subjective assessment of the overall and job dimensions (van Saane et al., 2003). Its main advantage is that it is the worker who judges his/her situation, although the use of this indicator may be criticized as being influenced by contextual factors or as being adaptive over adverse working conditions. Within this literature, several authors have considered whether the type of contract influences workers' well-being (De Cuyper et al., 2008; Kahuanen 2014). Some studies find a significantly higher rate of job satisfaction among permanent workers over temporary workers (Benavides et al., 2000; Letourneux, 1998), probably due to the greater job insecurity of temporary workers (De Cuyper and De Witte, 2007). However, robust evidence of a lower job satisfaction has only been found for casual, seasonal, or agency workers (Bardasi and Francesconi, 2004). Workers can accept this adverse situation if temporary employment can be justified as a stepping-stone to a permanent job. However, the empirical evidence on employment transitions shows the opposite (Booth et al., 2002; Güell and Petrongolo, 2007). Engagement in repeated temporary contracts in the early stages of one's working life lowers the probability of becoming a permanent employment in the years ahead (García-Pérez and Muñoz-Bullón, 2011; Sanz, 2011;García-Pérez et al., 2018).

2.3 Data and methods

2.3.1 Data and population

Our sample is drawn from four waves of the Encuesta de Calidad de Vida en el Trabajo (ECVT), a repeated cross-sectional survey carried out in Spain at an annual basis. In particular, we consider data for the period starting in 2006 and ending in 2010 (the last year when the survey was carried out). As the sample size per wave is relatively small**,** we pool surveys for 2006/07—before the crisis—and for 2009/10—after the economic crisis— to increase the number of observations and the reliability of our analysis. We discard data for 2008, because this was the year when the economic crisis was hit. The geographical scope of this survey is the entire national territory except for Ceuta and Melilla, although it is representative at the level of autonomous community (NUTS-2). The study population was restricted to salaried employees. We exclude, by design, those with voluntary temporary employment (726) and part-time contracts (in order to ease the interpretation of our results) (4,181 cases). With the objective of analysing a more homogeneous working population, we also exclude those below the age of 25 and above the age of 64 (1,023 and 71 cases, respectively) and foreign-born (1,869 cases). We also exclude cases with missing values on some variables (2,804 cases). However, weights were corrected accordingly. The final sample for the 2006/07 survey consists of 4,735 men and 2,920 women, and the 2009/10 survey consists of 4,864 men and 3,072 women.

2.3.2 Variable definition

The main explanatory variable in our analysis is the type of contract. The survey asks if the contract is permanent or temporary; if the contract is temporary, the survey asks if this contract condition is voluntary or involuntary. A dichotomous variable recodes permanent contracts as the base category with 0 and involuntary temporary as 1. As previously mentioned, those with voluntary temporary contracts are excluded from the analysis[2].

We follow a subjectivist assessment of work quality but combining elements of the demand-control and the effort-reward theories. Similar to Green and Mostafa (2010), we consider a first dimension related to intrinsic job quality that captures satisfaction with work, personal development, and the autonomy of one's work, but we also include a second dimension related to satisfaction with earnings, training provided by the company, and satisfaction with the organization of the work in the company. A third dimension includes satisfaction with working time, including satisfaction with flexibility and rest time during the workday. This inclusion is meaningful in the context of the economic crisis, as working day arrangements are said to be among the channels that firms use to accommodate demand shocks. We have also extended the model to work environment dimension to capture relationships among colleagues and superiors, echoing the social support dimension (Johnson and Hall, 1988). Prior research has found that work environment serves as a buffer against adverse effects during the economic crisis (Díaz-Chao et al., 2014). The job prospects dimension measures the degree of commitment (participation in decisions), expectations (possibilities of promotion), and recognition from superiors. Job prospects was one of the early aspects occupational psychologists highlighted as important to perceived job satisfaction; the better the fit between expectations and job reality, the greater the worker's satisfaction, and vice versa (Locke, 1969). Finally, as the literature has shown that job insecurity is a key component of job (dis)satisfaction for temporary workers (Dawson et al., 2014) and our study relies on comparing the quality of work of temporary versus permanent employment, we include satisfaction with stability as an additional dimension. Individuals were asked for their degree of satisfaction for all items in a Likert scale from 0 'not at all satisfied' to 10 'very satisfied.'

Apart from the type of contract, personal traits may also affect individual evaluations of subjective work-related emotional states (Judge et al., 2002). Unfortunately, there is no information on personality in the surveys, so we use satisfaction with life as a proxy for personal traits, as a clear association has been

[2] The sample of voluntary temporary workers is not big enough to consider them in the empirical analysis as a separate group and check whether there were differences compared to involuntary temporary workers or permanent ones.

established between both (Hahn et al., 2013). Satisfaction with life is measured based on the same metrics of the 0 to 10 Likert scale.

Educational mismatch—the inadequacy between education level and skills required at the workplace—is another possible source influencing satisfaction with working conditions (Johnson and Johnson, 2000). For this reason, we added self-assessed inadequacy as a covariate in four response items, from 'proper' to 'another kind of training is needed.'

Finally, socioeconomic covariates considered in the analysis include: age (coded into four categories: 25-34; 35-44; 45-54; and 55-64); having children under age 15; having people who need care at home; marital status (with not living with a partner coded as 1 or 0 otherwise); maximum education level achieved (university degree as base category followed by secondary education and primary or less); firm size (more than 50 workers as 1 and less than 50 workers as 0); economic activity (nine categories according to the CNAE-93 one-digit classification); occupation (nine categories according to the CNO-94 one-digit classification) and dummies for each of the 17 regions (NUTS-2).

2.3.3 Methods

To assess the differences in the overall quality of work and its dimensions between involuntary temporary and permanent employees, we apply a structural equation model (SEM) (Brown, 2006)[3]. To specify the measurement model, we follow the analysis driven by theory previously cited and perform a principal components analysis to explore suggestive factors congruent with theory. Reliability analysis is performed by computing Cronbach's alpha. Each dimension represents a latent factor that is derived from the observed indicator variables. Indicator variables are treated as continuous variables in the interval of 0-10 points as they were originally measured in the survey. Although indicator variables are close to the normal distribution in 0 kurtosis points and 3 of skewness, some variables exceed these limits of symmetry. This fact needs a correction, as non-normality in indicators represents a serious problem in small samples leading to poor fit (Hu and Bentler 1999). Although our sample may not be considered small, we relax the multivariate normality assumption by

[3] Both models are estimated with the statistical software Stata 13 and LAVAAN package for R v3.4.2.

estimating multivariate likelihood with robust variance. To deal with the missing problem (2,804 cases), we compute a variable taking value 1 if it is a missing value and 0 otherwise. We test the association between the missing variable and the main covariates with a Chi2 contrast. The significant associations found among some of these variables points to a missing at random (MAR) process. A predicted probability of non-missingness is obtained by applying a logistic regression on selected covariates. Computing an inverse probability on the predicted probabilities gives a higher weight to individuals with a lower probability of inclusion in the final sample (Seaman and White, 2013).

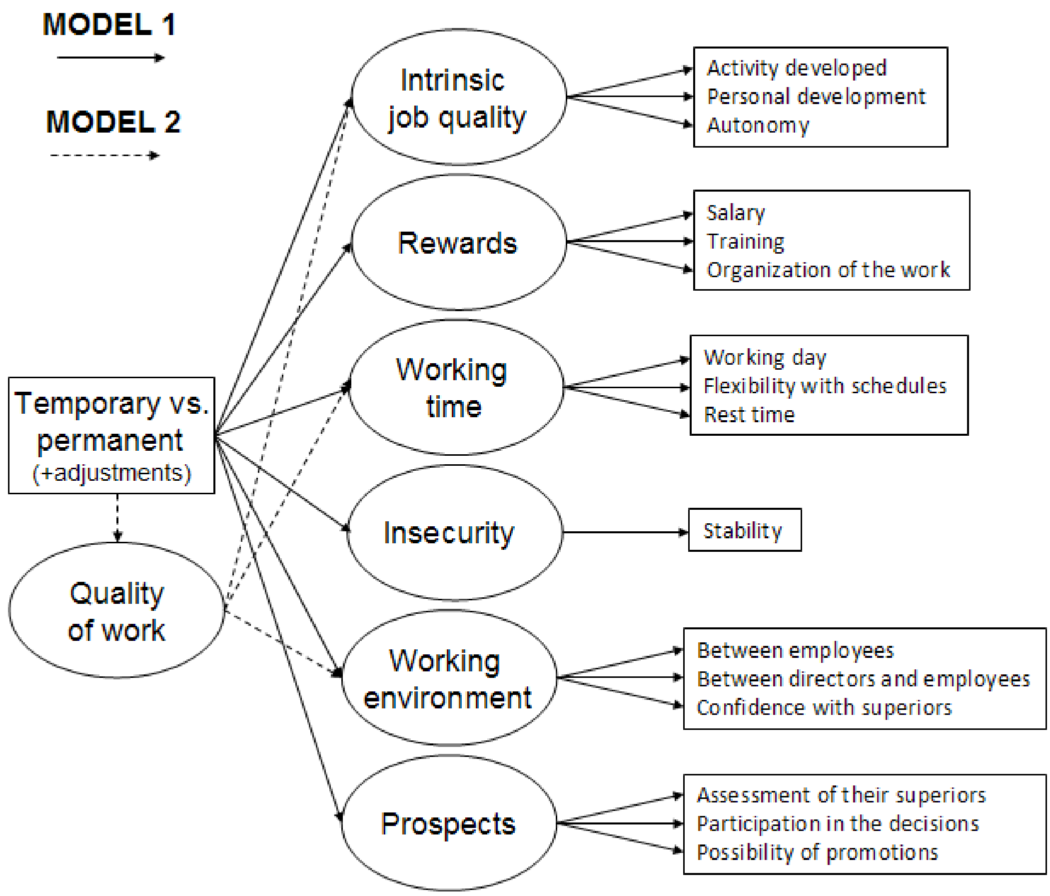
Figure 2-1 summarizes our structural equation models for involuntary temporary vs. permanent employment for each dimension and overall quality of work. We compute two SEM model types. Model 1 estimates the effect of type of contract on each dimension separately. Model 2 carries out a similar analysis for the overall quality of work and for high discriminant dimensions only (factors with correlation values above 0.85). For this reason, model 2 only considers intrinsic job quality, working-time, and work environment.

Each model is estimated for the pre-crisis and crisis periods, 2006/07 and 2009/10 respectively. Comparing the measurement and the structural parts of the periods for each model enables an interpretation of the direction and strength of the changes in involuntary temporary employment versus permanent employment. All results are stratified by gender and period.

In order to analyse the fit of the models, we compute multiple goodness of fit statistics: standardized root mean square residuals (SRMR), the root mean square of the error approximation (RMSEA), comparative fit indices (CFI) and Tucker-Lewis index (TLI) that are not reported. The obtained values are in line with reference values used by the literature (Yu, 2002) as indicative for a good fit: RMSEA<0.6, SRMR <0.8, and CFI & TLI>0.9. Due to the simplicity of their settings and the good fit performance, we do not incorporate alternative models using modification indexes.

Due to the importance of insecurity as a determinant to working conditions for temporary workers, we include the stability dimension even though it is supported by only one indicator. We correct its variance by computing a

Figure 2-1. Diagram of the structural equation models for involuntary temporary vs. permanent employment for each dimension and the overall quality of work



conservative reliability value estimated by its correlation with overall job satisfaction (0.41). The error variance is computed as var(stability)(1-ϱ); where ϱ is the estimated reliability (Brown, 2006).

Standardized factor loadings, which can be interpreted as correlations of the indicator and the factor, are reported. Squaring the factor loadings equals the amount of variance of the indicator explained by the factor; alternatively, the unique variance equals one minus this amount.

Of interest in the structural part of Model 1 is the coefficient of involuntary temporary employment for each quality of work dimension. In Model 2, of interest is the effect of involuntary temporary employment on the overall measure of quality of work. To ease the interpretation, we report unstandardized coefficients, that is, the amount of change in the quality of work dimension of moving from temporary to permanent employment, although we also report the coefficient as adjusted by the full set of covariates.

2.4 Results and discussion

Table A 2-1 in the Appendix shows that 18.1% of men and 21.0% of women were involved in involuntary temporary employment in 2006/07. These figures decrease slightly to 14.3% and 17.4% in 2009/10. At base year, temporary employment is more common at young ages, from 25 to 34, at 29.6% for men and a 30.1% for women, decreasing with age. Temporary employment is more common: among those with a primary education (24% for men and 26.1% for women); among manual and non-qualified occupations (around one-third of these workers); in small firms for men (22.5%) but without differences for women (20.5%); in the construction sector for men (41.1%) with a large decrease during the economic crisis to 16.5%; and in the public services for women (23.8%). Temporary employment decreases during the economic crisis in most categories for both sexes.

2.4.1 Measurement model

Reliability measures for each dimension in Table 2-1 show acceptable values for Cronbach's alpha, as they are around 0.75 except for rewards and prospects for 2009/10. In fact, the values tend to be higher in 2006/07 than in 2009/10.

Table 2-1. Cronbach's alpha reliability measure for each dimension

Cronbach's alpha	Men		Women	
	2006/07	2009/10	2006/07	2009/10
Intrinsic job quality	0.748	0.807	0.770	0.814
Rewards	0.687	0.581	0.660	0.580
Working time	0.764	0.720	0.744	0.727
Insecurity[a]	--	--	--	--
Work environment	0.792	0.794	0.797	0.789
Prospects	0.759	0.677	0.708	0.620

[a]Insecurity reliability value omitted as this dimension includes only indicator

Regarding Model 1, where temporary employment is related with each dimension separately, Table 2-2 shows that all standardised factor loadings are significant with few values below 0.7. Standardised factor loads can be interpreted as correlated with factor. For instance, the indicator related to the activity developed correlates with the intrinsic job quality dimension at 0.72 for the 2006/07 period, and this factor explains 52% (0.7238^2) of the variation of the activity developed. Following this procedure, it is possible to compare the contribution of each indicator to the factor across periods. The load of the personal development indicator becomes more relevant to the intrinsic job quality factor in the period 2009/10, with a value of 0.92, than in the 2006/07 period, with a value around 0.78. The overall goodness of fit is satisfactory as all RMSEA are below or slightly exceed 0.06, all CFI are above 0.90 and all SRMR are far below 0.08.

Table 2-3 shows the standardised factor loadings of the second and first order hierarchical measurement for Model 2. Second order measurement builds quality of work into three factor dimensions: intrinsic job quality, working time, and work environment. As mentioned, only highly discriminant dimensions are considered. Moreover, involuntary temporary employment, the structural part of the model, is highly correlated with the stability factor, which does not empirically guarantee identification. As in Model 1, the first order measurement relies on their respective indicators. The interpretation of the second order loadings is like those in Model 1. For instance, intrinsic job quality for men in the first period correlates with job quality at 0.98, and job quality explains 0.97 (0.98^2) of the variation in intrinsic job quality. It is worth noting that intrinsic job quality contributes to a higher degree to quality of work in period of 2006/07 than in 2009/10, while the inverse occurs for work environment, and working time remains stable across the period for both men and women. Model 2 fits the data well, as goodness of fit measured by the RMSEA are all close to 0.06, the confidence interval is below 0.008, the CFI are all above 0.95, and the SRMR far below the recommended value of 0.08.

Table 2-2. Standardized factor loadings and standard errors of the measurement model of each dimension of quality of work (Model 1) for the involuntary temporary vs. permanent employment

	Men				Women			
	2006/07		2009/10		2006/07		2009/10	
	λ[a]	sd[a]	λ[a]	sd[a]	λ[a]	sd[a]	λ[a]	sd[a]
Intrinsic job quality								
Activity developed	0.7238***	0.0184	0.8424***	0.0165	0.7157***	0.0208	0.8445***	0.0174
Personal development	0.7850***	0.0177	0.9233***	0.0123	0.8247***	0.0239	0.9178***	0.0156
Autonomy	0.6232***	0.0205	0.5671***	0.0200	0.6598***	0.0227	0.5937***	0.0316
Reward								
Salary	0.5224***	0.0198	0.4985***	0.0267	0.5476***	0.0250	0.5712***	0.0333
Training provided by the company	0.7202***	0.0215	0.6169***	0.0291	0.6547***	0.0280	0.6052***	0.0316
Organization of the work in your company	0.7537***	0.0206	0.5875***	0.0292	0.7249***	0.0281	0.5828***	0.0323
Working time								
Working day	0.7477***	0.0169	0.6752***	0.0194	0.6852***	0.0235	0.6917***	0.0246
Flexibility with schedules	0.7523***	0.0174	0.6490***	0.0223	0.7520***	0.0213	0.7146***	0.0225
Rest time in the working day	0.6772***	0.0192	0.6982***	0.0229	0.6918***	0.0238	0.7156***	0.0239
Insecurity								
Stability	0.8842***	0.0125	0.8517***	0.0124	0.8710***	0.0149	0.8442***	0.0170
Work environment								
Relationship between employees	0.5495***	0.0205	0.5636***	0.0184	0.5372***	0.0230	0.5696***	0.0253
Relationship between directors and employees	0.9406***	0.0166	0.9413***	0.0140	0.9800***	0.0182	0.8974***	0.0244
Confidence with superiors	0.7538***	0.0164	0.7789***	0.0150	0.7573***	0.0187	0.7856***	0.0208
Prospects								
The assessment of superiors of the work done	0.7148***	0.0171	0.7046***	0.0221	0.6801***	0.0230	0.6341***	0.0319
Participation in the decisions about the tasks developed	0.7528***	0.0193	0.6084***	0.0245	0.7597***	0.0234	0.5641***	0.0315
Possibility of promotions within the company	0.6924***	0.0172	0.6471***	0.0204	0.6018***	0.0227	0.5973***	0.0297

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] standardized factor load coefficient; [b] robust standard error

Table 2-3. Standardized factor loadings and standard errors of the hierarchical measurement model (Model 2) for the involuntary temporary vs. permanent employment on the overall quality of work

	Men				Women			
	2006/07		2009/10		2006/07		2009/10	
	λ[a]	sd[a]	λ[a]	sd[a]	λ[a]	sd[a]	λ[a]	sd[a]
2n order								
Intrinsic job quality	0,9858***	0,0266	0,7586***	0,0243	0,9688***	0,0315	0,7083***	0,0312
Working time	0,6438***	0,0217	0,6975***	0,0227	0,6259***	0,0294	0,6163***	0,0313
Work environment	0,6724***	0,0228	0,7791***	0,0234	0,6546***	0,0264	0,8151***	0,0295
1st order								
Intrinsic job quality								
Activity developed	0,6955***	0,0171	0,8636***	0,0126	0,6874***	0,0212	0,8573***	0,0145
Personal development	0,7599***	0,0160	0,8939***	0,0095	0,7947***	0,0191	0,8974***	0,0120
Autonomy	0,6785***	0,0175	0,5867***	0,0195	0,7172***	0,0189	0,6112***	0,0311
Working time								
Working day	0,7433***	0,0141	0,6781***	0,0181	0,6942***	0,0213	0,6897***	0,0233
Flexibility with schedules	0,7455***	0,0149	0,6472***	0,0185	0,7438***	0,0190	0,7066***	0,0199
Rest time in the working day	0,6895***	0,0172	0,6972***	0,0221	0,6912***	0,0211	0,7228***	0,0203
Work environment								
Relationship between employees	0,5648***	0,0201	0,5792***	0,0181	0,5573***	0,0217	0,5734***	0,0249
Relationship between directors and employees	0,8716***	0,0115	0,8719***	0,0123	0,9146***	0,0120	0,8543***	0,0197
Confidence with superiors	0,8119***	0,0131	0,8376***	0,0124	0,8105***	0,0142	0,8250***	0,0152

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] standardized factor load coefficient; [b] robust standard error

2.4.2 Structural coefficients

Table 2-4 shows the unstandardised regression coefficients of temporary employment on each of the five considered dimensions (Model 1) and on the overall quality of work index (Model 2, with only three dimensions: intrinsic job quality, working time, and work environment). The lower panel of the table shows adjusted coefficients to account for possible confounding effects of socioeconomic, workplace and firm characteristics.

Regarding the different dimensions of quality of work for men, temporary employment is associated with a lower satisfaction with stability by more than two points compared to permanent workers, which is the larger difference. During the first period, men in temporary employment also experience lower satisfaction levels regarding intrinsic job quality (0.22), lower rewards (0.26), and lower prospects (0.39). Conversely, they are not less satisfied with working time.

These figures decrease slightly after adjusting for individual, work and firm level covariates, but they remain statistically significant at usual levels, except for work environment, where the positive difference loses statistical significance. The lack of statistical significance of the overall quality of work by type of contract in 2006/07 (having selected the three highly discriminant factors: intrinsic job quality, working time, and work environment) may be explained by a negative satisfaction with intrinsic job quality, a positive satisfaction with work environment, and a neutral satisfaction with working time. When looking at 2009/10, the negative gap for permanent employment of intrinsic job dimensions vanishes, but the overall quality of work gap during the crisis period is not statistically significant.

The picture for women in temporary employment compared to permanent employment is quite different. All dimensions in 2006/07 turn into negative gaps in 2009/10, and those that are already negative increase in magnitude, even in the adjusted solution. Larger negative differences are due to satisfaction with insecurity (above 3 points), reward (more than 0.6 points), prospects (more than 0.5 points), working time (around 0.4 points for adjusted and unadjusted solutions), intrinsic job quality (around 0.3 points), and work environment (above 0.15 points). Regarding the structural association between involuntary temporary employment versus permanent employment on the overall quality of work (on the selected factors), there is no significant difference across periods aside from a decreasing of quality of work (around 0.30 points) in 2009/10, either unadjusted or adjusted for a wide set of covariates. Thus, the economic crisis seems to have worsened the overall quality of work for women but not for men.

The main result of our analysis is an overall lack of significance for quality of work for men in involuntary temporary employment versus permanent employment for both periods, and the worsening of quality of work for women during the economic crisis. We highlight the importance of considering the dimensions of the quality of work, because it allows us to show the different weights given to each dimension before and during the economic crisis, and its possible trade off among dimensions and their differential evolution. For men, work environments improve and are more highly weighted during the economic crisis, while rewards, intrinsic job quality, and job prospects worsen. For women, most dimensions worsen more than for men.

Table 2-4. Association between the involuntary temporary vs. permanent employment and the overall and for each dimension of the quality of work (Model 1 and Model 2) by gender and period

	Men				Women			
	2006/07 (N=4735)		2009/10 (N=4864)		2006/07 (N=2920)		2009/10 (N=3072)	
	beta[a]	sd[b]	beta[a]	sd[b]	beta[a]	sd[b]	beta[a]	sd[b]
Unadjusted[c]								
Model 2								
Quality of work	-0.8369	0.9560	-0.0287	0.0858	-0.5817	0.4765	-0.3235***	0.0982
Model 1								
Intrinsic job quality	-0.222**	0.0746	-0.1621	0.0989	-0.2549**	0.0927	-0.2846**	0.1173
Reward	-0.2667***	0.0710	-0.3635***	0.0808	-0.1335	0.0943	-0.7093***	0.1397
Working time	-0.1312	0.0911	-0.1047	0.0918	0.0645	0.0983	-0.4583***	0.1372
Insecurity	-2.3578***	0.1342	-2.8558***	0.1723	-2.6306***	0.1661	-3.4310***	0.2059
Work environment	0.0910*	0.0519	0.1173**	0.0542	0.0236	0.0552	-0.2170***	0.0743
Prospects	-0.3911***	0.1013	-0.4353***	0.0969	-0.4552***	0.1200	-0.6152***	0.1192
Adjusted[c]								
Model 2								
Quality of work	-0.2851	0.1981	0.0857	0.0859	0.0596	0.2461	-0.2990**	0.0942
Model 1								
Intrinsic job quality	-0.1613**	0.0709	-0.0376	0.0897	-0.0719	0.0853	-0.2097**	0.0921
Reward	-0.2120**	0.0721	-0.2332**	0.0812	0.0539	0.0946	-0.6386***	0.1314
Working time	0.0382	0.0943	0.0162	0.0901	0.1917*	0.1012	-0.3830***	0.1314
Insecurity	-2.2004***	0.1318	-2.5818***	0.1763	-2.4197***	0.1531	-3.2654***	0.1933
Work environment	0.0221	0.0569	0.1312**	0.0532	0.1190**	0.0574	-0.1649**	0.0689
Prospects	-0.3710***	0.1042	-0.2697**	0.0955	-0.2201*	0.1153	-0.5186***	0.1125

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] standardized coefficient; [b] robust standard error

[c]unadjusted: raw coefficients; adjusted: adjusted coefficient by including the following covariates: age, marital status, have children below 15 years, have disabled at household, education level, satisfaction with life, education level mismatch, occupation, size of the firm, economic activity, region.

The lack of overall significance of the quality of work for men in involuntary temporary employment may be related to the relevance of the unemployment of others and subjective welfare (Clark and Oswald, 1996). According to this line of argument, temporary workers who 'survive' layoffs are more at risk of dismissal than permanent workers, which directly worsens their well-being. That is, while peers' unemployment may contribute indirectly to a negative insecurity effect, it also has a positive comparison effect (Borra and Gómez-García, 2016). The 'others' unemployment' argument may partially explain why, in our measurement models, most indicators have reduced explanatory power during the economic crisis (except work environment that gain importance)—a sign that factors other than those included in quality of work matter. Job insecurity is confirmed as the main driver of the lower quality of work for temporary workers. As the literature highlights (Cheng and Chan, 2008; De Cuyper et al., 2008; Sverke et al., 2002), in the context of massive unemployment, fear of job loss increases even after adjustments. As expected, lower rewards, decreases in intrinsic job quality, and fewer job prospects are also confirmed for temporary employment compared to permanent employment, but for men the gap scarcely changes during the economic crisis and even shrinks for job prospects after adjustment. Our results show that employees put different weights on each dimension at peak and trough of the economic cycle. Intrinsic job quality contributes less, and work environment contributes more in the overall assessment. The revalorisation of work environment was previously found for the overall working population (Díaz-Chao et al., 2014). Our results stress that the revalorisation effect is stronger among temporary employees. A reinforcement of internal cohesion or accommodation attitudes seems to be at play, especially in the relationship between directors and employees, as a response to the economic crisis. This behaviour has been labelled the "inhibitor effect"—i.e., when workers who fear job loss will do whatever they can to avoid it (Catalano et al., 2011).

Contrary to men, women in involuntary temporary employment experience significantly lower quality of work than those in permanent employment. Importantly, all negative associations in the pre-crisis period increase in magnitude, those not significant in pre-crisis period become negative during the economic crisis (intrinsic job quality and reward dimensions), as do those with positive associations in the pre-crisis period (working time and work environment dimensions). Although the argument that intrinsic job quality loses explanatory importance in favour of work environment, the 'others unemployment' argument also applies. The overwhelming worsening in all dimensions exceeds both explanations. The increase in dissatisfaction with working time points out that the supply of hours may dominate over both arguments. In our sample, the perceived need for overtime hours among women increased during the economic crisis, but not for men. Getting a job or working more hours in a context of massive employment may imply harder work. An added-worker effect has been documented (Lundberg, 1985), which is much more significant for women whose labour supply increases by 21% when their partner is unemployed against a 0.7% increase experienced by men married to unemployed women. A relevant added-worker effect has also been detected for women if her partner works part-time. Larger labour supply variations are seen among those at the higher socioeconomic level (Addabbo et al., 2013). It has been reported that with declining incomes, the home production sector is a viable margin of substitution during business cycles (Aguiar et al., 2011). In Spain, there is evidence of declining household spending on items like catering, routine services of household maintenance, and outpatient services, so market working hours forgone due to the business cycle effect are reallocated to non-market production. This new economic context may lead adverse effects on work-life balance (Gash et al., 2012) besides job insecurity. Moreover, women take on additional responsibilities in terms of unpaid care work due to welfare cuts and privatisation (Buffel et al., 2015).

2.5 Conclusions

Our objective was to analyse the association between the type of contract (involuntary temporary versus permanent employment) on the quality of work before and after the economic crisis in Spain. We observe no differences by type of contract on the quality of work for men in both periods, but a decrease for women during the economic crisis and an adverse widening gap across all dimensions of quality of work. However, men in involuntary temporary employment experienced more insecurity, fewer rewards, and fewer prospects than workers in permanent positions across the periods studied. There is a shift among men in involuntary temporary employment from valuing intrinsic job quality in the pre-crisis period more the work environment during the crisis period; an 'inhibitor effect' appears to dominate. For women, this effect also holds, but we hypothesise that an 'added worker effect' for new entries (or longer hours) with harder working conditions and working-life balance may dominate over the 'inhibitor effect'.

Our analysis has several strengths: it restricts the analysis to involuntary temporary employment, the model is theory-driven and built on a parsimonious measurement model with high overall performance, and it takes into account a wide range of potential confounding variables. In the absence of instruments with known properties, latent variables may be more robust, in terms or error measurement, than observable single item response. However, our analysis also has some limitations. We have been limited by the continuity of variables across years (the last wave available of the survey was 2010), but also of some dimensions. For instance, dimensions related to the health and safety and physical environment were discarded due to the high proportion of missing values. Compositional effects of the workforce across the considered periods cannot be fully ruled out, and as previously mentioned the results cannot be interpreted in terms of causality but in terms of association between the considered variable. Nonetheless, we have partially minimized this drawback by adjusting each period for a wide set of covariates. A selection process by which 'survivor' temporary employees are presumably already more engaged with firm goals may be at play—a fact that would run against finding differences during the economic crisis period, when, in fact, we do find differences. In this sense, the adverse effects found during the economic crisis are prudent results as the excluded sub-groups population from the analysis, foreign born workers, and part-time employment (especially for women) are usually engaged in low quality jobs, so that their inclusion could make the results worse when inferred to all employee, a fact that has to be cautious regarding the external validity of the results. More generally, skewed distributions in some items and the assumed multivariate normality in SEM may lead to wrong estimations; however large samples, as in our case, tent to reduce this problem. Another hypothesis is that conditioned to the latent factor the covariance between the items that built this latent factor should be not significant, otherwise the estimation would be unstable. We look at the reproduced residual variance-covariance matrix to check this assumption and confirm that the correlation among items is enough reproduced by the model. The inclusion of further constraints (additional paths, factor covariances, and indicator error covariances) may improve the goodness of fit but it may also limit the external validity of the final model.

The extent to which the worse working conditions observed among temporary employees might extend to permanent employees remains an important research question. As labour legislation is more stringent for permanent than temporary employees, attempts to gain flexibility by promoting a Single/Unified Open-Ended Contract (SOEC) for new hires, consistent on a severance pay schedule and increasing with tenure for all types of employment, may have an adverse effect on the job security of permanent employees.

2.6 Appendix 2-1

Table A 2-1. Distribution of the sample of involuntary temporary employment by gender and period

	Men				Women			
	2006/07 (N=4735)		2009/10 (N=4864)		2006/07 (N=2920)		2009/10 (N=3072)	
	% (error)	% Temp	% (error)	% Temp	% (error)	% Temp	% (error)	% Temp
Involuntary temporary employment	0.181 (0.385)	--	0.143 (0.350)	--	0.210 (0.407)		0.174 (0.379)	--
Socioeconomics								
Age 25-34	0.317 (0.466)	0.296	0.250 (0.433)	0.228	0.358 (0.479)	0.301	0.313 (0.464)	0.260
Age 35-44	0.320 (0.467)	0.155	0.356 (0.479)	0.143	0.331 (0.471)	0.195	0.336 (0.472)	0.178
Age 45-54	0.242 (0.428)	0.105	0.259 (0.438)	0.097	0.230 (0.421)	0.139	0.256 (0.437)	0.107
Age 55-64	0.120 (0.325)	0.097	0.134 (0.341)	0.073	0.081 (0.272)	0.069	0.094 (0.293)	0.061
Living not alone	0.715 (0.451)	0.141	0.774 (0.418)	0.131	0.639 (0.48)	0.171	0.688 (0.463)	0.163
Living alone	0.285 (0.451)	0.280	0.226 (0.418)	0.185	0.361 (0.48)	0.278	0.312 (0.463)	0.199
Kids not under 14y	0.622 (0.485)	0.195	0.597 (0.491)	0.137	0.665 (0.472)	0.225	0.648 (0.478)	0.174
Kids under 14y	0.378 (0.485)	0.157	0.403 (0.491)	0.151	0.335 (0.472)	0.178	0.352 (0.478)	0.176
Having not disabled	0.951 (0.217)	0.182	0.921 (0.269)	0.143	0.945 (0.228)	0.209	0.918 (0.274)	0.175
Having disabled	0.049 (0.217)	0.152	0.079 (0.269)	0.143	0.055 (0.228)	0.216	0.082 (0.274)	0.171
Education level								
Tertiary	0.208 (0.406)	0.134	0.255 (0.436)	0.101	0.390 (0.488)	0.206	0.410 (0.492)	0.172
Secondary	0.543 (0.498)	0.171	0.588 (0.492)	0.145	0.488 (0.500)	0.200	0.498 (0.500)	0.179
Primary	0.249 (0.433)	0.240	0.157 (0.364)	0.203	0.121 (0.327)	0.261	0.092 (0.289)	0.159
Proper match of job requirements to education level								
Correct	0.783 (0.412)	0.183	0.805 (0.397)	0.134	0.728 (0.445)	0.188	0.764 (0.425)	0.161
Lower	0.169 (0.375)	0.192	0.153 (0.360)	0.188	0.232 (0.422)	0.265	0.203 (0.402)	0.221
Higher	0.024 (0.154)	0.061	0.018 (0.134)	0.046	0.015 (0.123)	0.217	0.017 (0.128)	0.217
Need other training	0.024 (0.153)	0.147	0.024 (0.154)	0.217	0.025 (0.156)	0.327	0.016 (0.126)	0.186
Satisfaction with Personal life (mean value from a 0-10 Likert Scale)	7.64 (1.79)		7.66 (1.62)		7.58 (1.91)		7.52 (1.80)	
Number of workers								
Less or 50	0.406 (0.491)	0.225	0.383 (0.486)	0.187	0.339 (0.474)	0.205	0.327 (0.469)	0.171
More than 50	0.594 (0.491)	0.150	0.617 (0.486)	0.116	0.661 (0.474)	0.212	0.673 (0.469)	0.176

Descriptive for occupation and economic activity are omitted for space reasons but are accounted for in the estimations.

3 Temporary employment, work stress and mental health before and after the Spanish economic recession[4]

3.1 Introduction

One of the most frequent adverse health effects of temporary employment reported in the literature has been the risk of developing psychosocial problems but also higher risk of occupational injuries and, in the long term, heart attacks for workers engaged in chronic temporary employment (Quinlan et al., 2001; Virtanen et al., 2005a). The economic recession initiated in 2008, which rose sharply unemployment rates across the European Mediterranean countries, fuelled job insecurity for both temporary and permanent employees.

The aim of this research is to analyse if the economic recession has additionally changed mental health and job-related stress of temporary vs. permanent employment in Spain. The analysis of the Spanish case is of particular interest for two reasons: first, the Spanish economy was shocked by a sudden sharp rise in unemployment rates, reduction of salaries and unemployment benefits, and the retrenchment of the public spending that caused a double-dip recession; and second, the Spanish labour market is characterised by a segmented labour market, with permanent employees enjoying relatively strong protection employment legislation (before the labour reform of 2012) compared to other European countries and with high rates of temporary employment. This type of contract has been extensively overused in Spain to avoid permanent contracts due to the high difference in firing costs between the two types of workers. After the burst of the economic recession, unemployment increased rapidly from less than 10% to reach 27% in 2013. While temporary employment decreased remarkably from 5.6 to 3.2 million over the same period, permanent employment remained stable around 10.8 million (INE, 2016). This situation that can be seen as a “natural experiment” because of the differential effect of the economic recession on layoffs and, as a result, on the composition of the employment by type of contract. It is worth to remark that even after the economic recession, temporary employment remained high at 23.3%, among the highest rates in Europe.

[4] This chapter is accepted for publication at the International Archives of Occupational and Environmental Health on May 23rd, 2019.

The economic recession may have increased psychosocial problems for both permanent and temporary employees at least through four ways. First, the massive layoff could lead to a rise in job insecurity due to the fear of losing the job, augmenting feelings of personal vulnerability, and probably affecting more temporary than permanent employees due to the lower firing costs for them. Second, survivor workers may be more protected towards psychosocial problems due to the positive effects of keeping their jobs in a context of increasing unemployment. Such a positive effect of 'others unemployment' has been reported for Spain (Borra and Gómez-García, 2016). Third, firm downsizing may have increased work overload, which in turn increases stress levels (Mucci et al., 2016). Last, compositional differences in health levels of permanent and temporary employment may operate, so that due to a 'healthy survivor effect' (Virtanen et al., 2005a) a reduction in temporary employment rate may dilute health differences among both types of employment.

Evidence on the health effects of the economic recession in Spain has been previously reported for the unemployed (Urbanos-Garrido and Lopez-Valcarcel, 2015), those attending primary care services (Gili et al., 2013), and for the working population (Bartoll et al., 2014). However, specific empirical evidence by type of labour contract in Spain is scarce (Sánchez-Moreno et al., 2016). To shed more light on this issue, the objective of the chapter is twofold. First, we aim to estimate the effect of temporary employment on work stress and mental health. Second, we investigate whether the economic recession worsened work stress and mental health outcomes for temporary and permanent workers. We also aim to assess the mediating role of work stress in the association between temporary employment and mental health. To estimate these effects, we apply a difference-in-differences (DiD) estimation framework with propensity score weights. To consider the possibility of heterogeneous effects, we also perform a DiD analysis by socioeconomic subgroups of employees.

3.2 Literature review

3.2.1 Temporary employment, work stress and mental health

Two main models have been proposed to explain the consequences of working conditions on psychosocial problems. The Demands-Control-Support (DCS) model explains job strain as the mismatch between high job demands and low control over one's work (Karasek and Theoerell, 1990). The Effort-Reward-Imbalance (ERI) model states that job strain comes from an imbalance between employee effort and perceived low compensation for that effort (Siegrist 1996; Siegrist et al., 2004). Both the demand-control and effort-reward imbalance models tend to be commonly referred to as models of "work stressors". For temporary workers, job insecurity is positively associated to job strain (De Cuyper et al., 2008). Both work stress and job insecurity act as potential mediators in the association between temporary employment and mental health outcomes.

Several systematic reviews have established a link between work stress and the presence of poorer mental health (Stansfeld and Candy, 2006; Bonde, 2008; Nieuwenhuijsen et al., 2010). Strikingly, some empirical evidence shows that permanent employees reported higher levels of stress, overload, and job demands, while temporary workers had lower stress, less involvement in the organisation, but much distress coming from job insecurity (Benavides and Benach, 1999; Eiken and Saksvik, 2009; Inoue et al., 2010). According to these findings, greater job insecurity induces temporary workers to have greater job strain, but the combination with fewer job demands could end with lower job strain in net terms (Parker, 2002). However, it is disputable to what extent the economic recession may have worsened this net effect on job strain. A systematic review reported job stress effects of the recent economic recession due to staff reductions combined with increased workloads leading to mood disorders, anxiety, and psychosocial distress (Mucci et al., 2016). Analogous research for Spain, shows an intensification of work activities and a notable increase in job strain exposure during the economic recession in Spain (Utzet et al., 2015). Regarding differences in work stress by socioeconomic position, higher status should provide more autonomy, stability, and control over work, but the feeling of being unable to meet work demands is also commonly reported (Damaske et al, 2016; Moen et al., 2013). In this regard, the potential mediation role of work stress on mental health will be also explored for the overall and some selected subgroups of the sample.

The association between temporary jobs and mental health is widely heterogeneous depending on the type of study, the heterogeneity of the temporary employment, and the contextual labour market settings (De Cuyper et al., 2008). The adverse health effects for temporary employment appears to be weaker with longitudinal data than in cross-sectional designs (Bamberger et al., 2012). For instance, a longitudinal study of British workers found no evidence of a significant impact of temporary contracts on workers' mental health, once controlling for background characteristics, with the exception of worsening job satisfaction among casual/seasonal workers (Bardasi and Francesconi, 2004). Regarding the effects by type of temporary job, poorer mental health has been found higher for periphery employees (e.g., seasonal, on-call or temporary agency workers) than for common fixed-term ones (e.g. project workers). A follow-up study in Sweden highlighted psychosocial distress to be sensitive to light and heavy chronic temporary employment compared to permanent jobs (Virtanen et al., 2011). Highlighting the importance of contextual labour market settings Gash et al. (2007), by analysing transitions from unemployment to employment, observe larger beneficial health effects for those getting a permanent job solely among men in Germany, but vanishing effects are reported for Spain, probably due to the high rotation of temporary contracts.

Four systematic reviews highlight a link between job insecurity and adverse health effects. An early literature review by Quinlan et al. (2001) evidenced an association between job insecurity and adverse health outcomes in 14 out of the 24 studies reviewed. Two subsequent meta-analyses (Sverke et al., 2002; Cheng and Chan, 2008) indicated that many studies found a non-significant or moderate negative association between job insecurity and mental health, but few studies reported a strong association. The negative association was more likely to occur among manual workers who were exposed to a higher degree of uncertainty over future work and hence more dependent on paid work (Sverke et al,. 2002), and was stronger among older workers who were less likely to find comparable jobs and tend to have more family obligations (Cheng and Chan, 2008). Ferrie et al. (2002), based on the Whitehall II cohort study for UK, evidence a strong association between chronic job insecurity and minor psychiatric morbidity. The mediating role of job strain is evident when, after adding job control to a set of socioeconomic covariates, the association between job insecurity and mental health outcomes increased substantially (Ferrie et al., 2005). Similar results have been found for a wider sample of European countries (Cottini and Lucifora, 2013).

As highlighted by this literature, the effects of temporary employment on mental health may also differ by socioeconomic status. In this research, we explore these differences by age, educational level and living in regions with different unemployment rates.

3.2.2 Empirical strategies

As far as we know, only one study has examined the effects of the recent economic recession on the association between mental health and temporary employment, reporting a declining gap in mental health between temporary and permanent employment during this period (Sánchez-Moreno et al., 2016). A limitation of this latter paper, and others in the literature, is that they mostly rely on observational studies without properly accounting for compositional effects and selection bias (Frasquilho et al., 2015). The review of Virtanen et al. (2005a) summarises nicely the complexities of the issue at hand, and the difficulties of achieving conclusive results, such as the presence of several confounding sources and compositional effects. Interestingly, the 'healthy hire effect' dynamics may bias results when comparing temporary and permanent employment: at one side there is the combination of the 'healthy hire effect' (i.e. the healthiest members of the labour market are the most likely to get a job) and the 'wearing off of selection' (i.e. the attenuation of the healthy effect by the accumulation of exposure to hazards) which may affect more permanent employees. On the other side, the 'healthy worker survivor effect' (i.e., the healthiest workers are the most likely to stay employed) may operate more strongly among temporary employment. Several empirical strategies have been used in the literature to deal with the reverse causality problem (i.e., a selection into temporary employment by workers with previous psychosocial problems). Such approaches ultimately depended on the study design by focusing on dynamic changes in employment status, either adjusting for prior health status or individual fixed-effects estimation in longitudinal studies (Bardasi and Francesconi, 2004; Rodriguez, 2002; Robone et al., 2011; Ehlert and Schaff, 2011), by using instrumental variables in observational and cross-sectional data (Caroli and Godard, 2016), or by sample restriction (Dooley et al,. 1987; Ferrie, 2001; Virtanen et al., 2005b). In addition of considering a wide range of potential confounders, we include a measure of physical health (diagnosed chronic ill conditions) to control for the potential self-selection of workers with ill health status (the 'healthier worker effect') on temporary contracts (Urbanos-Garrido and Lopez-Valcarcel, 2015).

The empirical strategy used in this investigation is to match exposed and unexposed populations on a set of covariates regarding the probability of being treated, computing a propensity score (PS)—in our case, of having a temporary job (Rosenbaum and Rubin 1983). This framework has been applied in evaluations of the health effects of precariousness and temporary employment (Kim et al., 2008; Quesnel-Vallée et al., 2010; Carrieri et al., 2014).

3.3 Data and Methods

3.3.1 Data and population

Our sample was drawn from two waves of the Spanish National Health Survey in 2006/07, before the economic recession, and 2011/12, during the economic recession. It is a cross-sectional and nationally representative survey of the Spanish population covering a considerable range of socioeconomic and health related indicators, including self-perceived health, mental health, chronic conditions, social support, use of health services, and lifestyles related to health. The sample is representative at regional level (NUTS2 - Nomenclature of Territorial Units for Statistics) and units are selected in a multiple-stage design: from census tracks stratified by municipality size, to households and individuals. To achieve a homogeneous salaried working population, we excluded those aged below 25 (as these ages correspond with the finalisation of the education period), those above 64 years old (the retirement age), workers with atypical working days (e.g., at night, irregular shifts, and others), and immigrants. We also excluded Ceuta and Melilla, two Spanish enclaves in Morocco, for their peculiar idiosyncratic characteristics and low representativeness in the sample. Our final sample includes 6,708 observations (3,043 men and 3,665 women) for the 2006/07 survey and 4,576 observations (2,330 men and 2,246 women) for the 2011/12 survey.

3.3.2 Methods

Treatment effects

To obtain the treatment effect of a temporary job on work stress and mental health status, the PS weighting technique is used. This technique minimises the selection bias, a problem arising in observational studies to identify the effect of the treatment group (temporary employment) and the control group (permanent employment) on average characteristics that are relevant for the outcome (work stress and mental health).

Our interest is in estimating the ATT effect (Average Treatment Effect on the Treated), that is, the average treatment effect of temporary employment on the health status of temporary workers. Let Y_{1i}, be the health outcome of subject *i* if she/he were to receive the treatment (temporary employment) and let Y_{0i} denote the health outcome of subject *i* if not. D_i is the binary treatment variable (1: temporary contract; 0: non-temporary employment). The ATT effect is defined as the expected difference:

$$ATT = E(Y_{1i} - Y_{0i} \mid D_i = 1) = E(Y_{1i} \mid D_i = 1) - E(Y_{0i} \mid D_i = 1) \qquad (3\text{-}1)$$

where the first-term of the right-hand side of equation (3-1) is the average health outcome of workers in temporary employment, while the second term is the counterfactual or unobserved potential average health outcome of temporary workers had they been in permanent employment. As the researcher cannot observe the term $Y_{0i} \mid D_i = 1$, a comparison/control group is generated to provide a consistent estimate. We estimate treatment effects by matching treated individuals (temporary employment) with untreated or control subjects (permanent employment) with a similar distribution of observable characteristics using the PS. Specifically, PS are calculated from a logistic regression estimated separately for 2006/07 and 2011/12 and distinguishing by gender. This method assumes that all relevant differences between treated and non-treated groups are captured by the observable covariates. To satisfy this assumption, it is important to include in the propensity estimation all variables known to be related to both treatment assignment and health outcomes, including quadratic and interaction terms as additional covariates (Stuart 2010). We have used the kernel matching method with an Epanechnikov distance, as it was the most effective in reducing the standardised bias across covariates. As (nearly) all possible observations are used with kernel matching, even those that may have bad matches, a common support condition to minimise this drawback is required. The common support requirement reduces the working sample to 6,236 observations (2,766 men and 3,470 women) in 2006/07 and 4,366 observations (2,206 men and 2,160 women) in 2011/12. Standard errors have been computed by bootstrapping 1,000 iterations.

To assess the performance of the PS, we compute a test of classification (c-test) of the percentage correctly classified among predicted versus treated. We also assess the validity of the covariate balance by analysing the standardised percentage in selection bias for each variable and checking the Rubins' B and R statistics. As previously explained, to control for the 'healthier worker effect' we take into account if the worker has a chronic disease in the computation of the PS.

Using PS to weight observations is recommended for small samples, as it allows the retention of most cases and does not require normality in the outcome variable. Hirano et al. (2003) show that weighting by the inverse of the PS leads to an efficient estimate of the ATT coefficient. Thus, for estimating the ATT effect the weight is defined as,

$$w_i = D_i + (1 - D_i)\frac{\hat{e}_i(X_i)}{(1-\hat{e}_i(X_i)} \qquad (3\text{-}2)$$

where $\hat{e}_i$ is the computed PS, then a treated participant receives a weight of 1, whereas a control individual ($D_i = 0$) is weighted using the term $\frac{\hat{e}_i(X_i)}{(1-\hat{e}_i(X_i)}$. In this way, both groups are weighted to represent the treatment group. This is equivalent to weight by the odds of the propensity. The PS weighting has been used in the DiD regression analysis described below.

Estimates of the incremental recession effect: Difference-in-differences

An estimate of the change of the treatment effect during the economic recession is obtained by using a DiD approach (Angrist and Krueger, 1991; Card and Krueger, 1994). In particular, we have estimated a linear regression model with pooled data of both surveys for men and women. The linear probability model leads to similar results to those obtained by running logit or probit binary regression models (Angrist and Pischke, 2008). Controlling by a set of individuals' covariates (X), the model includes three main fixed effects: one for a time trend (δ), another for being in the treatment group (λ), and the key parameter of interest or DiD effect, measured by the interaction between them (γ):

$$Y_{it} = a + \lambda D_{it} + \delta t + \gamma(D_{it}{*}t) + X'_{it}\,\beta_t + \varepsilon_{it} \quad i=1\ldots N,\ t=0,1 \qquad (3\text{-}3)$$

where $t = 0$ means 2006/07 (before the recession), $t = 1$ denotes 2011/12 (after the recession), and Y represents the health outcomes (i.e., work stress and mental health). The unbiased nature of the structural estimators depends on the parallel time-paths assumption. To make that assumption as plausible as possible, we include in X all observed covariates that may influence the outcome and relate to temporary employment before and during the recession. Under the usual hypothesis on the stochastic term ε_{it} (zero mean and independence of the regressors), the parameter λ provides information on the effects of temporary employment on outcomes before and during ($\lambda + \gamma$) the economic recession. Note that this regression is run on the reweighted sample, as previously mentioned.

Likewise, to explore the effects of temporary contracts by socioeconomic level and the contextual role of the economic cycle, we stratify the sample according to several socioeconomic subgroups for both men and women. Finally, to assess the potential mediating role of stress in the association between temporary employment and mental health, we add work stress as an extra covariate in equation (3-3) when mental health is the dependent variable.

3.3.3 Variable definition

The treatment variable considered in our analysis is to have a temporary employment coded with 1 and a non-temporary/permanent job with 0.

We measure work stress through the responses given to the question "Overall and considering the conditions in which you do your work, indicate how you consider the level of stress of your work on a scale of 1 (not stressful) to 7 (very stressful)." Supportive evidence for using a single item measure is given by its acceptable reliability and the significant correlations with domains of the DCS and ERI models with a kappa between 0.804 and 0.868 (Arapovic-Johansson et al., 2017; Elo et al., 2003). The importance of distinguishing between low and high work stress for health outcomes is present at these psychosocial occupational models. We apply Virtanen et al. (2005b) to obtain the cut-off point for high work stress by adding one standard deviation to the mean, which leaves 25% of the distribution above score 5. Accordingly, responses with values 1 to 5 are collapsed as low and medium stress, coded as 0, and response values of 6 or 7 are considered high stress, coded as 1. Hereafter we refer to high work stress as simply work stress.

Mental health is measured using the 12-item General Health Questionnaire (GHQ-12), a screening instrument designed to detect emotional, mood-related problems and psychological distress, validated for the Spanish population (Sánchez-López and Dresch 2008). GHQ-12 consists of 12 items in a Likert-type scale with four response categories (coded from 0 to 3). We used a two-point scoring method, with responses 0 and 1 recoded to 0 ("No problem") and responses 2 and 3 recoded to 1 ("With problems") and summed for all the questions defining the Goldberg index. The final instrument considers individuals reporting 3 or more mental health problems (coded with 1) to be at risk of poor mental health and 0 otherwise (Goldberg 1978).

As additional controls, we consider several socioeconomic characteristics that have been shown to be important determinants of health outcomes. Specifically, age—accounting for an imperfect measurement of health status—is categorised in three 10-year intervals from 25 to 64 allowing for a non-linear association. Based on civil status, responses given to widowed, single, divorced, and legally separated categories are collapsed into the category of "non-married," leaving married as the base category. Respondents who contribute most to their household budget are referred to as the 'main breadwinner.' Being the main breadwinner may impose a psychological distress due to family obligations and dependence on the job (Bernard 1981). Education level (based on the International Standard Classification of Education, ISCED), is classified in three categories: university, as the reference category; secondary education; and primary or less than primary education. Having children (≤7 years old) is another control that may be correlated with the working family balance. However, this control is only used in the whole analysis for women, since they carry out most of the children's care under the traditional Mediterranean family model. Household income, reported in the survey by means of several income intervals, has been first equalised to account for household size and composition and then collapsed into four categories along with a fifth category of missing values (11.4% for 2006/07 and 23.4% for 2011/12)[5]. Moreover, to control for health status and need, we consider a dummy for self-reporting diagnosed chronicity within a wide range of chronic diseases. Job characteristics are also incorporated. Working schedule is coded in four categories: full-time (base category), part-time in the mornings, part-time in the evenings and reduced

[5] Monthly net income thresholds considered are low (0-1000€); medium (1000-1575); high (1575-2725); very high (2725-4500).

working time. Occupation type is collapsed into three categories; managerial and technical staff (base category), intermediate occupations and manual workers. We also consider the activity sector (coded into nine dummies) and regional dummies for the 17 NUTS2 regions in Spain.

To explore differences by socioeconomic group, DID is further analysed by age (younger and older than 34 years old), and by education level (employees with a university degree and those with less education). Moreover to consider the contextual effects of regional economic conditions, regions are classified into two clusters of low and high unemployment rates according to their relative level compared to the national mean in 2006 using data from the Labour Force Survey (INE 2016).

3.4 Results

3.4.1 Descriptive statistics

The logistic regression used to compute the PS predicts correctly (between 76% and 82%) the conditional probability of being in temporary employment for both men and women in either period. The matching estimates successively reduce the mean standardised bias at around 90% and the Rubin's B statistic, which measures the absolute standardised difference of the mean of the PS in the treated and control groups, is well below 25% as recommended.

Table 3-1 shows the time trend of selected variables in the two periods examined and split by gender. Interestingly, the rate of temporary employment has declined significantly for women (from 29.2% to 23.5%) and men (from 22.3% to 19.3%) between 2006/07 and 2011/12. We also observe for both genders a statistically significant increase in high work stress (men: from 21.5% to 25.3%; women: from 23.2% to 30.1%), mostly driven by temporary employment among men (from 14.8% to 24.5%) and for both temporary and permanent employment among women (from 23.8% to 30.7% and from 21.8% to 28.2%). Regarding mental health, we document a decline in poor mental health in these two periods and for both genders (men: from 12.3% to 10.2%; women: from 20.9% to 17.8%) driven by having a permanent contract. It is also worth mentioning the ageing of the workforce between periods; the decrease in the reporting of chronic conditions and the increase in the share of breadwinners among women only (see Table A 3-1, Appendix 3-1 for a complete information on covariates by type of employment. See supplementary analogous results for job satisfaction from Table A 3-2 to Table A 3-4, Appendix 3-2).

Table 3-1. Selected statistics

	Mean (St.dev) Men			Mean (St.dev.) Women		
	2006/07	2011/12		2006/07	2011/12	
	N=2766	N=2206	p-value	N=3470	N=2160	p-value
High work stress	21.5 (0.411)	25.3 (0.435)	0.011	23.2 (0.422)	30.1 (0.459)	0.000
Permanent	23.5 (0.424)	25.5 (0.436)	0.220	23.8 (0.426)	30.7 (0.461)	0.000
Temporary	14.8 (0,355)	24.5 (0.431)	0.001	21.8 (0.413)	28.2 (0.451)	0.031
Poor mental health	12.3 (0,329)	10.2 (0.303)	0.049	20.9 (0.407)	17.8 (0.382)	0.015
Permanent	11.4 (0.318)	9.1 (0.287)	0.045	20.6 (0.404)	17.1 (0.376)	0.018
Temporary	15.8 (0.365)	14.7 (0.355)	0.716	21.8 (0.413)	20.0 (0.401)	0.519
Temporary employment	22.3 (0.416)	19.3 (0.395)	0.046	29.2 (0.455)	23.5 (0.424)	0.000

3.4.2 Matching estimates

Table 3-2 shows the ATT effect of temporary employment on each outcome (work stress and mental health) before and during the economic recession through PS matching. Our estimates show that having a temporary job is associated with a statistically significant increase of 4.2% in poor mental health solely among men when compared to those with permanent jobs in the pre-crisis period 2006/07. Moreover, we report a slightly higher positive association with poor mental health (5.2%) in 2011/12. For women, no significant association of temporality on health outcomes are observed in either of the periods in our data.

3.4.3 Difference-in-difference estimates

Table 3-3 reports the estimates of equation (3-1) for each health outcome for men and women for the full sample, respectively. Interestingly, we find no evidence of an incremental effect on poor mental health and work stress attributed to the economic recession. No statistically significant effects are revealed for women, confirming our previous matching estimates. Our DiD results reveal a time trend effect that seems to additionally increase high labour stress by 16.7% during the period for both permanent and temporary employment, although just for the sample of men.

Table 3-2. Matching estimates: Effects of temporary employment

	Year 2006/07					Year 2011/12				
	% Temporary	% Counter-factual Non-temporary	Impact	se	t-value	% Temporary	% Counter-factual Non-temporary	Impact	se	t-value
	$E(Y_1\|D=1)$	$E(Y_0\|D=1)$	ATT			$E(Y_1\|D=1)$	$E(Y_0\|D=1)$	ATT		
Men										
High work stress	0.1657	0.2015	-0.0358	0.0223	-1.61	0.2295	0.2157	0.0137	0.0265	0.52
Poor mental health	0.1508	0.1084	0.0424*	0.0194	2.18	0.1618	0.1101	0.0517*	0.0218	2.37
Women										
High work stress	0.2114	0.2198	-0.0084	0.0180	-0.46	0.2777	0.2865	-0.0868	0.0267	-0.32
Poor mental health	0.2282	0.2171	0.0111	0.0179	0.62	0.2179	0.2099	0.0080	0.0241	0.33

*p-value<0.05;**p-value<0.01;***p-value<0.001. Standard errors computed by bootstrapping methods (1000 iterations).
Common support option was used. Controls: age, civil status, main breadwinner, young children, education, income,
chronic diseases, working schedule, occupation type, sector of activity, and region of residence.

To investigate if the results vary among subgroups, we stratify our sample by socioeconomic variables.

Table 3-4 shows a significant negative impact of working under a temporary contract on high stress at the pre-crisis period among older men only (-4.7%). However, because of the Great Recession, high work stress levels increased among older salaried workers (7.2%) and remarkably among employees with a university degree (19.2%). It is worth mention that work-stress increases for temporary employees among older workers (20%). Table 3-4 also evidences that temporary employment increases poor mental health rates among men in the pre-crisis period, especially in the groups of older working adults (5.6%), those with a non-university degree (5.6%) and those residing in regions with a high unemployment rate (6.1%). However, we find that the economic recession only seems additionally deteriorate mental health among those with university degrees (13.9%). For women, no significant DiD estimates are found for work-stress and mental health.

Table 3-3. Difference-in-difference estimates of temporary employment

		High work stress			Poor mental health		
		(λ) Effect at base year	(δ) Time effect	(γ) Change effect	(λ) Effect at base year	(δ) Time effect	(γ) Change effect
Men	N=4972	-0.0311	0.1669*	0.0575	0.0418**	-0.0046	0.0082
		(0.0176)	(0.0695)	(0.0306)	(0.0109)	(0.0642)	(0.0269)
Women	N=5630	-0.0069	-0.0207	-0.0002	0.0138	0.0579	-0.0058
		(0.0232)	(0.0861)	(0.0355)	(0.0161)	(0.0732)	(0.0255)

*p-value<0.05;**p-value<0.01; ***p-value<0.001. Robust standard errors in parenthesis. Controls: age, civil status, main breadwinner, young children, education, income, chronic diseases, working schedule, occupation type, sector of activity, and region of residence.

Table 3-4. Difference-in-difference: stratified estimates of temporary employment

			High work stress			Poor mental health		
			(λ) Effect at base year	(δ) Time effect	(γ) Change effect	(λ) Effect at base year	(δ) Time effect	(γ) Change effect
Men								
Age	Young adults <34y	N=1219	-0.0058	0.2095	0.0124	0.0144	0.0281	0.0374
			(0.0355)	(0.1353)	(0.0651)	(0.0281)	(0.1290)	(0.0280)
	Old adults	N=3753	-0.0475*	0.2005*	0.0772**	0.0562**	-0.0965	-0.0163
			(0.0156)	(0.0716)	(0.0235)	(0.0183)	(0.0780)	(0.0258)
Education level	University	N=1265	-0.0512	0.3290	0.1922*	-0.0200	0.1530	0.1394*
			(0.0427)	(0.2391)	(0.0828)	(0.0412)	(0.2148)	(0.0572)
	Non-university	N=3707	-0.0247	0.0892	0.0250	0.0559***	-0.0993	-0.0215
			(0.0194)	(0.0866)	(0.0273)	(0.0130)	(0.0898)	(0.0327)
Regional unemployment	Low	N=2683	-0.0151	0.2281	0.0509	0.0200	0.2339	0.0335
			(0.0300)	(0.1117)	(0.0221)	(0.0178)	(0.1241)	(0.0492)
	High	N=2289	-0.0358	0.0176	0.0472	0.0607**	-0.0503	-0.0120
			(0.0211)	(0.0891)	(0.0500)	(0.0142)	(0.0515)	(0.0295)
Women								
Age	Young adults <34y	N=1502	-0.0265	-0.2327	-0.0242	0.0584	0.0868	-0.0661
			(0.0339)	(0.1757)	(0.0553)	(0.0308)	(0.1239)	(0.0472)
	Old adults	N=4128	-0.0009	0.1371	0.0248	-0.0129	0.0417	0.0242
			(0.0232)	(0.0845)	(0.0419)	(0.0165)	(0.0872)	(0.0297)
Education level	University	N=1950	-0.0490	-0.1759	0.0653	0.0524	-0.0774	-0.0748
			(0.0286)	(0.1567)	(0.0544)	(0.0417)	(0.0836)	(0.0600)
	Non-university	N=3680	0.0084	0.1543	-0.0249	0.0007	0.2220	0.0108
			(0.0281)	(0.0839)	(0.0505)	(0.0163)	(0.1360)	(0.0256)
Regional unemployment	Low	N=3243	-0.0308	-0.0462	0.0331	0.0007	0.0609	0.0406
			(0.0336)	(0.0926)	(0.0500)	(0.0244)	(0.0975)	(0.0418)
	High	N=2387	0.0205	0.1283	-0.0391	0.0306	-0.0806	-0.0386
			(0.0319)	(0.1762)	(0.0448)	(0.0223)	(0.1157)	(0.0346)

*p-value<0.05;**p-value<0.01; ***p-value<0.001. Robust standard errors in parenthesis. Controls: age, civil status, main breadwinner, young children, education, income, chronic diseases, working schedule, occupation type, sector of activity, and region of residence.

3.4.4 The mediating role of work stress

The estimates of the potential mediating role of work stress in the association between temporary employment and mental health are reported in Table 3-5. We show that the detrimental impact of the economic recession on mental health remains significant and similar in size to the estimates reported in Table 3-3 and Table 3-4, which we interpret as a sign of no or a moderate mediating role.

Table 3-5. The mediating role of work stress

		Poor mental health			
		(λ) Effect at base year	(δ) Time effect	(γ) Change effect	High work Stress
Men					
Full sample		0.0452***	-0.0226	0.0020	0.1078***
		(0.0112)	(0.0641)	(0.0287)	(0.0207)
Age	Young adults <34y	0.0152	-0.0023	0.0356	0.1448***
		(0.0300)	(0.1247)	(0.0301)	(0.0293)
	Old adults	0.0605**	-0.1145	-0.0232	0.0898**
		(0.0175)	(0.0759)	(0.0264)	(0.0244)
Education level	University	-0.0140	0.1143	0.1168*	0.1175**
		(0.0388)	(0.2207)	(0.0546)	(0.0298)
	Non-university	0.0585***	-0.1088	-0.0242	0.1057***
		(0.0142)	(0.0867)	(0.0342)	(0.0220)
Regional unemployment	Low	0.0213	0.2150	0.0293	0.0829
		(0.0179)	(0.1349)	(0.0499)	(0.0370)
	High	0.0644**	-0.0521	-0.0169	0.1041**
		(0.0149)	(0.0500)	(0.0338)	(0.0291)
Women					
Full sample		0.0145	0.0598	-0.0058	0.0943***
		(0.0156)	(0.0705)	(0.0240)	(0.0233)
Age	Young adults <34y	0.0599	0.1005	-0.0646	0.0592
		(0.0295)	(0.1249)	(0.0478)	(0.0300)
	Old adults	-0.0128	0.0266	0.0215	0.1099***
		(0.0156)	(0.0884)	(0.0266)	(0.0268)
Education level	University	0.0541	-0.0710	-0.0771	0.0365
		(0.0421)	(0.0826)	(0.0601)	(0.0286)
	Non-university	-0.0002	0.2042	0.0137	0.1153**
		(0.0167)	(0.1361)	(0.0237)	(0.0302)
Regional unemployment	Low	0.0035	0.0652	0.0375	0.0925**
		(0.0253)	(0.0933)	(0.0421)	(0.0254)
	High	0.0287	-0.0926	-0.0350	0.0930
		(0.0202)	(0.1092)	(0.0321)	(0.0415)

*p-value<0.05;**p-value<0.01; ***p-value <0.001. Robust standard errors in parenthesis. Controls: age, civil status, main breadwinner, young children, education, income, chronic diseases, working schedule, occupation, sector of activity, region of residence, and work stress.

3.5 Discussion and conclusion

This chapter aims to estimate the effect of temporary employment on work stress and mental health and to investigate whether the economic recession worsened these two health outcomes. We also aim to assess the mediating role of work stress. We use a DiD estimation framework with propensity score weights.

First, our results seem to indicate that having a temporary contract in Spain has no impact on the levels of work stress for 2006/07 and 2011/12 and both genders. This finding may be surprising, as it is expected that temporary workers may be willing to exert more effort and assume more demands, thus suffering from higher levels of labour stress, as part of a signalling strategy to step into a permanent position. However, this signalling mechanism might be weaker in countries characterised by highly segmented labour markets where the transition to permanent jobs is more constrained. We hypothesise that this could be the case in Spain, a country characterised by high rates of short, temporary contracts. Our results are also at odd with some literature that shows evidence that permanent employees reported higher levels of stress than temporary ones but these more job insecurity (Benavides and Benach, 1999; Eiken and Saksvik, 2009; Inoue et al., 2010). According to our results, only older male workers in temporary employment experience, at base line, the combination of lower levels of work stress but higher psychosocial distress.

Second, our findings show that due to the economic recession work stress has increased among some subgroups of temporary workers. In particular, we report significant effects only for older salaried workers and those with a university degree. This finding is compatible with previous research showing an intensification of work activities and a notable increase in job strain exposure during the economic recession in Spain (Utzet et al., 2015)**.** We have to bear in mind that larger drop in temporary employment was among young population so that overload felt on adult workers. Individuals with higher job status may enjoy more authority, control over work and more job stability, but at a cost of more work stress, with more time demands, greater interpersonal conflict, and greater conflict over use of authority than low status jobs (Damaske et al., 2016). This "stress of higher status" hypothesis may have intensified in the context of massive layoff for temporary employment. The increase of work stress for male employees in low regional unemployment could be related with the so called '(un)employment as a social norm'. According to which workers with high (low) employability suffer larger (smaller) decrease in well-being in low (high) regional unemployment (Clark et al., 2010). Due to the 'employment as a social norm', temporary workers may be willing to show more effort for fear to lose the job. It is worth noting that this subgroup is the only one with both a time increase in work stress and in poorer mental health.

Third, mirroring previous research that positively links temporary employment with poor mental health (Quinlan et al., 2001; Virtanen et al., 2005a), we show this same pattern and reveal that this is true in both periods (pre- and post-crisis), although only for men. As expected, we find a positive link between temporary employment and poor mental health in the pre-crisis period among older adults, as they are less likely to find comparable jobs and tend to have more family obligations (Cheng and Chan, 2008), among manual workers who experience higher employment turnover (Sverke et al., 2002), and among workers in regions with high unemployment who have fewer re-employment opportunities (Origo and Pagani 2009). Surprisingly, while we expected to find a deepening of mental health problems for temporary employees as a result of the worsening of Spain's economy, we found no significant impacts for our sample of men and women or for most of our population subgroups, with the exception of male workers. Several factors may be related to the overall lack of change in mental health. First, the 'healthy worker effect' tends to reduce observed differences among temporary and permanent employment (Virtanen et al., 2005a). Second, it has been pointed that employees may respond to the adverse working conditions with an 'inhibitor mechanism' and being more collaborative with firms goals to avoid being laid off (Catalano et al., 2011). Similarly, the negative impact on psychosocial distress due to the increase in job insecurity may be compensated by the positive effect of keeping the job (Borra and Gómez-García, 2016). We find, however, a deepening of poor mental health among male temporary workers with a university degree. It has been suggested that that non manual workers may suffer a "status inconsistency" when faced with threats of unemployment (Sverke et al., 2002) being more sensitive to changes in labour market due to the failure of expectations over work (Connelly and Gallagher, 2004) and exhibit a stronger reaction to financial stress (Sturgeon et al., 2016). Work stress had a null or moderated mediating role for these groups.

Our empirical estimates report no significant effects for salaried women regarding both outcomes. A potential explanation of this result is that women may find psychological compensation in their family role as a substitute for employment in the traditional family (Waters and Moore 2001).

As far as we know, this chapter makes several improvements to previous analyses like the reduction in bias selection from the 'healthy worker effect' due to the use of PS and DiD combination, the inclusion of a wide range of potential confounding variables, the minimisation of reverse causality by including chronic conditions as additional covariates, or the exploration of worker heterogeneity (Ojala et al., 2018). However, the research has some limitations. The analysis would benefit if the original database had a variable for past work experience or previous mental health state to avoid possible self-selection. Previous trends cannot also be ruled out as our dataset is not longitudinal. It was not possible either to consider heterogeneity in temporary employment by type or by length of the temporary contract due to the small sample size, which we believe could qualify our findings at a certain point due to the high rotation of contracts for temporary employment in Spain. Finally, to apply DiD estimators satisfactorily requires that the parallel trend assumption holds; that is, no other significant changes have occurred outside the intervention that could have impacted the treatment and controls. In particular, the labour reforms implemented in 2006 and 2010 did not significantly affect the duality in the Spanish labour market, and trends in temporary and indefinite contracts remained mostly unchanged (Ruesga, 2010). Indeed, the economic recession has not changed the overuse of temporary employment in Spain, nor the segmented labour market (Felgueroso et al., 2018). Since the economic recession, on average, most of the total new contracts have been temporary. Given the high rotation of temporary contracts, a significant proportion of the workforce swings between temporary jobs and unemployment. The economic recession appears to have tightened working conditions for both temporary and permanent male employees, but differences in poor mental health for temporary employment remain and the prospects do not appear to change in the next future.

Taking all these into account, the policy implications of our empirical analysis for Spain are clear: there is a need to strengthen reemployment policies to diminish perceived job insecurity; the government should also reinforce practices of stress prevention at the firm level to diminish adverse consequences on mental health and to actively reorient health services in support of psychosocial work problems (Nexø et al., 2018). In that respect, stakeholders should be involved in the development of legislation and guidelines aimed at preventive interventions that identify the causes of psychosocial hazards by managerial procedures and that increase literacy about mental health problems.

3.6 Appendix 3-1

Table A 3-1. Sample mean and standard deviation (sd) by type of employment

	Permanent			Temporary		
	2006/07	2011/12	p-	2006/07	2011/12	p-
Men	N=2229	N=1792	value	N=537	N=414	value
Main breadwinner	80.2 (39.9)	77.6 (41.7)	0.134	58.7 (49.3)	64.8 (47.8)	0.140
Not married	30.9 (46.2)	31.1 (46.3)	0.907	53.2 (49.9)	51 (50.1)	0.590
Age 25-34	27.7 (44.7)	22.7 (41.9)	0.015	54 (49.9)	43.4 (49.6)	0.036
Age 35-44	34.1 (47.4)	34.1 (47.4)		23.5 (42.5)	29.1 (45.5)	
Age 45-54	24.5 (43)	27.6 (44.7)		15.9 (36.6)	20.8 (40.6)	
Age 55-64	13.7 (34.4)	15.6 (36.2)		6.6 (24.8)	6.8 (25.1)	
#kids<=7	26.8 (44.5)	26.5 (44.1)	0.804	23.1 (42.2)	22.5 (41.8)	0.862
Chronic conditions	52.1 (50)	41.4 (49.3)	0.000	52.6 (50)	38.7 (48.8)	0.001
University educ.	28.7 (45.2)	25.6 (43.7)	0.071	16.7 (37.4)	19.1 (39.3)	0.139
Secondary educ.	33.2 (47.1)	37 (48.3)		25.6 (43.7)	31.5 (46.5)	
Primary & less educ.	38.1 (48.6)	37.4 (48.4)		57.6 (49.5)	49.4 (50.1)	
Managerial & tech.	26.2 (44)	26.2 (44)	0.329	17.2 (37.8)	18.1 (38.6)	0.932
Intermediary	25 (43.3)	22.6 (41.9)		13.8 (34.5)	14.3 (35.1)	
Manual	48.8 (50)	51.1 (50)		69 (46.3)	67.5 (46.9)	
Very low income*	28.9 (45.3)	20 (40)	0.000	40 (49)	33.2 (47.2)	0.000
Low	12.6 (33.2)	15.1 (35.9)		20.5 (40.4)	16 (36.7)	
High	16.5 (37.1)	9.62 (29.5)		15.7 (36.5)	7.9 (27)	
Very high	34.9 (47.7)	33.3 (47.1)		16.8 (37.4)	18.8 (39.1)	
Missing income	7.1 (25.7)	21.9 (41.4)		7.0 (25.5)	24.1 (42.8)	
Full-time	64.1 (48)	61.4 (48.7)	0.009	63.7 (48.1)	59.9 (49.1)	0.805
Part-time mornings	31.3 (46.4)	34.1 (47.4)		29.4 (45.6)	33 (47.1)	
Part-time evenings	4.1 (19.8)	3.1 (17.3)		4.7 (21.2)	4.6 (21)	
Reduced	0.5 (6.9)	1.5 (12.1)		2.2 (14.7)	2.5 (15.8)	
Women	N=2576	N=1692		N=894	N=468	
Main breadwinner	34 (47.4)	43.4 (49.6)	0.000	22.1 (41.5)	34.1 (47.5)	0.000
Not married	35.6 (47.9)	37.5 (48.4)	0.289	44.1 (49.7)	45.3 (49.8)	0.730
Age 25-34	31.7 (46.5)	24.3 (42.9)	0.000	45.5 (49.8)	41.4 (49.3)	0.062
Age 35-44	35 (47.7)	34.4 (47.5)		31.5 (46.5)	27.8 (44.9)	
Age 45-54	24.4 (43)	29 (45.4)		17.3 (37.9)	23 (42.1)	
Age 55-64	8.88 (28.5)	12.3 (32.9)		5.62 (23)	7.82 (26.9)	
#kids<=7	26.7 (44.3)	25.5 (43.6)	0.465	23.2 (42.3)	23.7 (42.6)	0.863
Chronic conditions	63.8 (48.1)	55.8 (49.7)	0.000	66.1 (47.4)	57.8 (49.4)	0.015
University educ.	38.2 (48.6)	36.9 (48.3)	0.435	27.6 (44.7)	27.7 (44.8)	0.983
Secondary educ.	33.9 (47.3)	36.2 (48.1)		30.7 (46.1)	30.1 (45.9)	
Primary & less educ.	27.9 (44.9)	26.9 (44.3)		41.7 (49.3)	42.2 (49.4)	
Managerial & tech.	25.9 (43.8)	31 (46.2)	0.005	19.5 (39.6)	21.3 (41)	0.435
Intermediary	37.7 (48.5)	32.9 (47)		19.7 (39.8)	22.4 (41.7)	
Manual	36.4 (48.1)	36.1 (48)		60.8 (48.8)	56.4 (49.6)	
Very low income*	18.4 (38.7)	15.6 (36.3)	0.000	36.9 (48.3)	33 (47.1)	0.000
Low	13.1 (33.8)	14.9 (35.6)		14.7 (35.5)	16.4 (37)	
High	18.8 (39)	12.6 (33.2)		17.4 (37.9)	8.5 (27.9)	
Very high	38.6 (48.7)	31.4 (46.4)		20.8 (40.6)	20.4 (40.4)	
Missing income	11.1 (31.5)	25.5 (43.6)		10.1 (30.2)	21.7 (41.3)	
Full-time	42.6 (49.5)	42.3 (49.4)	0.760	34.4 (47.5)	38.1 (48.6)	0.705
Part-time mornings	41.9 (49.4)	43.5 (49.6)		44.7 (49.8)	42.2 (49.4)	
Part-time evenings	6.3 (24.2)	5.9 (23.5)		9.6 (29.5)	8.5 (27.9)	
Reduced	9.2 (28.9)	8.3 (27.7)		11.3 (31.7)	11.3 (31.6)	

Descriptive for the 17 regional dummies and economic activity are omitted for space reasons, but are accounted for in the estimations.

3.7 Appendix 3-2

In this appendix, it is shown analogous analysis for job satisfaction defined in a Likert scale as low satisfaction (1-4) and high satisfaction (5-7), according to the mean value plus one standard deviation. Job satisfaction for temporary women are worse at both periods but without changes.

Table A 3-2. Selected descriptive

	Mean (St.dev)			Mean (St.dev.)		
	Men			Women		
	2006/07	2011/12		2006/07	2011/12	
	N=2766	N=2206	p-value	N=3470	N=2160	p-value
High job satisfaction	34.8 (0.476)	21.3 (0.41’)	0.000	30.8 (0.462)	19.4 (0.395)	0.000
Permanent	33.9 (0.474)	20.4 (0.403)	0.000	29.6 (0.457)	18.7 (0.390)	0.000
Temporary	38.5 (0,487)	24.9 (0.433)	0.000	34.7 (0.475)	27.8 (0.448)	0.017

Table A 3-3. Matching estimates: Effects of temporary employment for job satisfaction

	Year 2006/07					Year 2011/12				
	% Temporary	% Counter-factual Non-temporary	Impact	SE	t-value	% Temporary	% Counter-factual Non-temporary	Impact	SE	t-value
	$E(Y_1\|D=1)$	$E(Y_0\|D=1)$	ATT			$E(Y_1\|D=1)$	$E(Y_0\|D=1)$	ATT		
Men	0.3855	0.3488	0.0367	0.0275	1.33	0.2487	0.2025	0.0462	0.0265	1.74
Women	0.3434	0.3034	0.0400*	0.0204	1.96	0.2778	0.2146	0.0632*	0.0253	2.50

*p-value<0.05;**p-value<0.01;***p-value<0.001. Standard errors computed by bootstrapping methods (1000 iterations). Common support option was used. Controls: age, civil status, main breadwinner, young children, education, income, chronic diseases, working schedule, occupation type, sector of activity, and region of residence.

Table A 3-4. Difference-in-difference estimates of temporary employment for job satisfaction.

		High work stress		
		(λ) Effect at base year	(δ) Time effect	(γ) Change effect
Men	N=4972	-0.0366	-0.0.044	0.0037
		(0.0298)	(0.0780)	(0.0494)
Women	N=5630	0.0445*	-0.0747	0.0162
		(0.0178)	(0.1147)	(0.0360)

*p-value<0.05;**p-value<0.01; ***p-value<0.001. Robust standard errors in parenthesis. Controls: age, civil status, main breadwinner, young children, education, income, chronic diseases, working schedule, occupation type, sector of activity, and region of residence.

4 Worked hours, job satisfaction and self-perceived health: evidence using longitudinal data for Catalonia

4.1 Introduction

There is a considerable heterogeneity between employees regarding the combination of working hours with different job and workplace characteristics. For a high share of workers, working hours differ from the standard working week, with 20.5% of workers employed part-time and 40% with longer working hours than standard (Eurofound, 2017a). At the same time, according to some estimates, ~20% of European workers are employed in either low- or high-quality jobs (Eurfound, 2017b). Regarding the effect of working hours on health, there is mixed evidence about part-time work (Bardasi and Francesconi, 2004) and the effect on health depends on preferences for short working hours. Long working hours have adverse effect on health, but the observed association might be weakened by the omission of relevant variables such as gender and job characteristics (van der Hulst, 2003; Bannai and Tamakoshi, 2014; Ganster et al., 2018). High job control can provide job satisfaction with the opportunity to engage in challenging tasks and learn new skills (Karasek, 1979). Rewarding jobs can compensate for greater intensification and effort (Siegrist 1996) and even increase the supply of working hours. Alternatively, health gains due jobs of better quality can be offset by losses through longer working hours. Therefore, the adverse effect of working hours on health can be moderated by job satisfaction. To date, most literature has considered separately the effect of working hours and the job satisfaction on health outcomes, while neglecting the combined effect of both. We try to fill this gap by focusing on the potential confounder and modifier role of job satisfaction on the effect of working hours on health status. We construct a job satisfaction index that incorporates key elements highlighted by previous reports (for a summary of proposals see Holman (2013)) and we focus on self-perceived health, an indicator that captures both physical function and psychosocial problems (Mavaddat et al., 2011), and is a valid predictor of morbidity and mortality (Ilder and Benyamini, 1997; Pietz and Petersen, 2007).

In this chapter, we use longitudinal data from Catalonia between 2005 and 2009. Catalonia is located in the north east of Spain and has a population of 7 million people. It has mainly industrial economic activity and a gross domestic product per capita of ~€28,000. Our objective is to analyse the potential confounding and the interaction effect of job satisfaction and working hours on self-perceived health. We also analyse the effect on changes in self-perceived health of transitions between jobs demanding different working hours and providing different levels of job satisfaction.

4.2 Literature review

4.2.1 Hours of work, job satisfaction and self-perceived health

Part-time work is generally characterized by poorer working conditions, lower wages per hour and fewer prospects (O'Dorchai et al., 2007; Manning and Petrongolo, 2008; Bardasi and Gornick, 2008). Surprisingly, the adverse conditions of part-time work do not always result in lower job satisfaction and poorer health outcomes. Higher job satisfaction among part-time compared to full-time workers, has been reported, especially in women. Short working hours may also increase well-being because of a better work-life balance or being able to enjoy other social activities (Booth and van Ours, 2008, 2013). The reviews on precarious employment of Quinlan et al. (2001) and Joyce et al. (2010) did not observe a clear association between job insecurity and poor health due to being employed part-time. More recently, studies on atypical employment generally found no association between part-time employment and health (Rodriguez, 2002; Bardasi and Francesconi, 2004). For instance, Robone et al. (2011) found a positive and statistically significant relationship between health and having a part-time job among employees who reported being satisfied with the number of hours they worked and those who did not have children, with clear differences according to gender.

Several systematic reviews summarize an extensive literature on the effects of long working on health. Sparks et al. (1997) reviewed 21 studies and identified a positive association between long working hours and a variety of physiological and psychological health problems. Van der Hulst (2003) reviewed 27 studies and found an association between long working hours and cardiovascular disease, diabetes, subjectively reported physical health, subjective fatigue, and sleep disturbances. They also found evidence of negative effects on cardiovascular and immunological parameters. Bannai and Tamakoshi (2014) also found an association with metabolic syndrome, depressive state, anxiety and other psychological disorders and sleep disturbances and cognitive function. Kivimäki et al. (2015) found that employees who work long hours have a higher risk of stroke than those working standard hours, while the association with coronary heart disease is weaker. In contrast to these results, two other reviews found weak or inconsistent support for an association between long working hours and mental health measures. Fujino et al. (2006) reviewed 17 studies and found an inconsistent association between working hours and mental health and depression. Watanabe et al. (2016) performed a systematic review and meta-analysis of seven studies and found that overtime work was only associated with a small, non-significant increase in the risk of depressive disorder. In fact, employees motivated by favourable working conditions appeared not to be fatigued by overtime (Beckers et al., 2004). In the same lines, Ganster et al. (2018) highlighted a possible bias in previous research that rarely uses longitudinal studies and the potential omission of some key variable(s), as gender and working conditions among others. Indeed, if long working hours result in socioeconomic advantages, this may produce positive health outcomes that counterbalance the negative effects (Ganster et al., 2018). One study has also found that having a good job is positively correlated with the amount of working hours (Ng and Feldman, 2008).

The literature has identified an association between adverse working conditions and poor health outcomes (Faragher et al., 2005; Datta Gupta and Kristensen, 2008; Fischer and Sousa-Poza, 2009; Cottini and Lucifora, 2013), but the effect depends on the working hours regime. The Demand Control and the Effort Reward Imbalance models predicts that high job demands, but with higher job control, or higher rewards not only play a protective role against increasing physical and psychological pressure but also provide a feeling of success, merit, and self-efficiency. This active job type contrast with jobs that experience high demands and a low level of decision-making latitude, low levels of social support or job security, unsatisfactory organizational climate, and unfair rewards tended to provide higher risks of stress and job dissatisfaction (Kararek and Theorell, 1990; Siegrist, 1996). Therefore, the adverse effect of working hours on health can be moderated by job satisfaction. Moreover, it is likely that employees engaged in satisfying jobs may offer more working hours and dissatisfied workers offers less.

4.2.2 Transitions in working hours, job satisfaction and self-perceived health

To further exploit the longitudinal structure of the data, we analyse the effect of transitional states between hours and job satisfaction on health status. Prior studies have mainly focused on the health effects of job transitions across employment states and jobs of different types. The improvement in health of getting a job appears to be less than that of losing a job (Thomas et al., 2005; Flint et al., 2013). This adverse effect appears to be larger for psychological than physical health (Gebel and Voßemer, 2014) and for older men (Unger et al., 2018). An interesting issue to explore is whether transitions to employment of different characteristics matters for health outcomes. Several studies show that transitions that provide greater job satisfaction lower health risks Graetz (1993), transitions to non-standard employment are worse in terms of mental health (Llena-Nozal, 2009), and transitions from employment to poor quality jobs result in greater declines in psychological health than unemployment (Butterworth et al., 2011). Two exceptions are Gebel and Voßemer (2014) and LaMontagne et al., (2014), using panel data for Germany and Australia, find no health difference when getting a job, either permanent or temporary. To our knowledge, our study is the first exploring the combined effect of changes in hours and job satisfaction.

4.3 Data and Methods

4.3.1 Data and population

The Social Inequalities Panel from the Jaume Bofill Foundation is the first longitudinal survey in Catalonia. It was derived from a statistically representative sample of Catalan households. The initial sample consists of 2,000 households selected randomly by stratified sampling in multiple stages, with a systematic random selection of the first sample units (census tracts) and simple random selection of addresses. Our analysis considers five consecutive waves from 2005 to 2009 for which information on working conditions is available. We only consider employees aged 25 to 64 years for whom at least two consecutive waves of data are available. Since we condition health on values of the previous period, our total sample comprises 3,240 individuals.

4.3.2 Variable definition

Self-perceived health

Participants were asked about their perceived general health using the question: "How is your health in general? With five possible answers: "very good", "good", "regular", "bad" and "very bad". Due to the low sample in the lowest categories, "regular", "bad" and "very bad" was collapsed in a "poor" health category. Perceived general health has been shown to be a reliable measure of health status (Martikainen et al., 1999).

Health transitions were calculated by subtracting two consecutive states of the five categories of health status, whereby three possible changes were obtained: equal, if there were no changes in health status; improvement if there was a transition from a lower level to a higher level; and worsening, if there was a transition from a higher to a lower level.

Working hours

Participants were asked about the number of hours they worked per week. Very short working hours were categorized as ≤20 hours per week (h/w), short hours as 21-34 h/w, standard hours as 35-40 h/w, long hours as 41-47 h/w and very long hours as ≥48 h/w according to the European Community Working Time Directive (2003/88/EC).

Working hour transitions were simply calculated by subtracting number of working hours at time t-1 from number of working hours at time t and then categorize as more, less or equal hours.

Job satisfaction

The job satisfaction index is based on five key common dimensions: satisfaction with salary, satisfaction with working activity (Sousa-Poza and Sousa-Poza, 2000), satisfaction with the relationship with colleagues, satisfaction with the relationship with superiors (Siegrist, 1996), and satisfaction with working space. Participants were asked about the five dimensions in a five-item Likert scale from "very high" to "very low".

We performed a confirmatory factor analysis with job satisfaction as the latent variable expressed in the five dimensions of satisfaction as described above. A key condition for analysing job satisfaction over time is to verify the minimum requirement of invariance in form and factor loadings (weak invariance) between years by comparing the significance of the Chi-square among free and constrained parameters. Our confirmatory factor analysis showed satisfactory goodness of fit measures (Root Mean Square Error of Approximation (RMSEA) 0.047; Confirmatory Fit Index (CFI) 0.984; Standardized Root Mean Residual (SRMR) 0.016, compared with the common standard criteria (RMSEA lower than 0.08; CFI above 0.90; SRMR lower than 0.04). We used this model to predict the scores of the latent variable for the job satisfaction index to be used as input in the remaining analysis.

Job satisfaction transitions were calculated by subtracting two consecutive job satisfaction index scores. As the index is a continuous variable, obtained values can be positive, negative and zero, showing that job satisfaction has improved, worsened or kept equal between the two periods. As the number of individuals where job satisfaction is exactly the same after the transition is very reduced (62 men and 76 women), we have decided to exclude them for the analysis of transitions.

Socioeconomic variables

Socioeconomic controls include age grouped into two categories: 26-45 and 46-64; civil status as married vs non-married; number of children under 16 years old; type of family; education level in three categories (university degree, secondary and primary or less); place of birth (Catalan, from the rest of Spain, and others); type of contract (permanent, temporary, and others); occupation (8 categories); household net equivalent income in terciles; firm economic activity (10 categories) and size of municipality in terms of inhabitants (6 categories).

4.3.3 Methods

Hours of work, job satisfaction and self-perceived health in levels

In order to consider the potential confounding and moderator role of job satisfaction on working hour effects on self-perceived health, we estimate a dynamic random effects ordered logit model, with self-perceived health as the dependent variable and one year lagged values for working hours, job satisfaction and its interaction as the main independent variables. The job satisfaction and its interaction term with hours of work are sequentially introduced to the base model with hours and the rest of the covariates. Lagged values are used to avoid reverse causality, that is, to discard that contemporaneous poorer self-perceived health had an impact on contemporaneous job satisfaction. Moreover, since health status is a recursive phenomenon, we also include one year lagged self-perceived health as an explanatory variable so that the potential effects are interpretable as changes in self-perceived health. We follow Mundlak (1978) and Wooldridge (2005) that recommended that the unobserved individual random effect depend on a linear combination of the mean values of the socioeconomic time-variant covariates and on the initial value making the unobserved effects fully specified.

Let s_{it}* be the latent (unobserved) self-perceived health of worker *i* at time *t*, where i=1,…,N and t=1,…,T. s_{it} takes the value 1 if the latent variable is positive and 0 otherwise. The estimated model follows the expression:

$$s_{it}^* = a_i + \lambda\, s_{it-1} + \delta_1\, h_{it-1} + \delta_2\, jsat_{i-1t} + \delta_3\, h_{it-1} * jsat_{i-1t} + \beta\, x_{it-1} + \mu_{it}\, t + u_{it} \qquad (4\text{-}1)$$

$$a_i = \pi_0 + \pi_1\, h_{io} + \pi_2\, \bar{x}_i + \varepsilon_i \qquad (4\text{-}2)$$

where s_{it-1} stands for self-perceived health lagged on period, h_{it-1} is the lagged working hours and $jsat_{i-1t}$ is job satisfaction, $h_{it-1} * jsat_{i-1t}$ corresponds to the interaction term, x_{it-1} is the socioeconomic variables, t is period dummy, u_{it} is the serially idiosyncratic uncorrelated error term, and a_i is the random unobserved effect that depends on a common fixed effect across individuals π_0, the initial self-perceived health h_{io}, the mean values of covariates x_{it}, and ε_i is the idiosyncratic error term. A similar strategy is implemented by Robone et al. (2011).

The estimated ordered interaction coefficients in equations (4-1) and (4-2) have only qualitative content. As highlighted by Ai and Norton (2003) and Norton and Wang (2004), the interpretation of the interaction term in non-linear models is problematic as we cannot rely on standard tests of significance, and the magnitude and sign of the interaction may depend at different values of the covariates. In this analysis, we adopt the strategy to report also estimates of the linear probability model. It has been shown that the linear probability model performs optimally given the low skewness of our dependent variable (Ferrer-i-Carbonell and Frijters, 2004).

Transitions in working hours, job satisfaction and self-perceived health

We also estimate a generalized ordered logit model for health transitions (self-perceived health improving, remaining equal or worsening) with six combinations of transitional states between working hours (higher, lower or equal) and job satisfaction (higher or lower) as independent variables, controlling for changes in temporary contract employment.

$$\Delta s_{it} = \delta\, \Delta jsat_{it} + \Delta temp_{it} + \xi_i \qquad (4\text{-}3)$$

Where Δs_{it} stands for self-perceived health in the three transitions, $\Delta jsat_{it}$ for the transitional states between the combined variable for job satisfaction and working hours, $\Delta temp_{it}$ controls for changes in temporary contract employment, and ξ_i is the idiosyncratic error term.

The ordered regression assumes proportional odds irrespective of how values of the ordinal dependent variable are grouped. As this parallel assumption was rejected (Brant, 1990), we applied a generalized ordered logit model (gologit) (Williams, 2006). The gologit model simultaneously estimates as many logit regressions as values of the ordinal variable minus one. In particular, we apply a partial proportional odds model, in which some coefficients of the regressions are constrained to be the same for the variables that do not violate the parallel assumption. The advantage of doing so is that this reduces the number of coefficients to be interpreted compared to the unconstrained or multinomial regression.

For both models, computations apply individual sampling weights from base year 2005 extended for the subsequent waves in the longitudinal analysis, as recommended in previous studies (Andreass et al., 2013).

4.4 Results

Table 4-1 shows a summary of selected descriptive statistics for the key variables in our analysis. The standard working week is the most common schedule for men and women (82.1% and 68.4%, respectively). Working hours larger than 41 h/w are more common among men (10.7%), while shorter hours are more common for women (28.4%). Men and women report 82.6% and 80% of good self-perceived health (excellent and good) but only 53.5% of women in ≥48 h/w. The interested reader can find descriptive for the rest of variables in Appendix 4-1 Table A 4-1.

Table 4-1. Selected descriptive statistics

Working hours	%	Self-perceived health Excellent	Good	Poor
Men (N=1513)	100	16.0	66.6	17.4
≤20	3.2	18.5	54.4	27.1
21-34	4.0	10.0	69.6	20.4
35-40	82.1	16.2	67.2	17.6
41-47	6.4	15.7	65.3	19.0
≥48	4.3	17.0	67.6	15.4
Women (N=1727)		14.1	63.8	22.1
≤20	11.6	14.6	66.1	19.3
21-34	16.8	17.6	56.4	26.0
35-40	68.4	13.8	65.3	20.9
41-47	1.7	0.9	67.4	31.7
≥48	1.5	1.0	52.5	46.5

4.4.1 The effect of working hours, job satisfaction and its interaction on self-perceived health

Table 4-2 reports the odds ratio of the dynamic ordered logit regression for changes in poor self-perceived health on working time (base model), job satisfaction (adjusted model) and with its interaction term (interaction model). In the base model, men working long hours (41-47 h/w) are weakly associated with changes in poor self-perceived health in next period, but surprisingly, working very long hours (≥48 h/w) lowers this probability (odds ratio, OR= 0.37, 95% CI: 0.17–0.81). For women, working very short hours (≤20 h/w) is protective (OR=0.52, 95% CI: 0.32-0.88) but working long hours (41-47 h/w) worsens health status (OR=3.78, 95% CI: 1.35-10.55). Job satisfaction index in the adjusted model lowers poor self-perceived health for men in the standard 35-40 h/w (OR=0.40, 95% CI: 0.27-0.82) but not for women. Adjusting for job satisfaction moderately reinforces the significant associations of working hours found in the base model for men (OR=1.84, 95% CI: 1.07-3.15) but leaves the effect of hours almost unaltered (OR=3.81, 95% CI: 1.37-10.54). In the interaction model, the interaction term shows the difference in the odds ratio of change in poor self-perceived health (OR= 6.17, 95% CI: 1.48–25.66) among men working 41-47 h/w compared to working 35-40 h/w for a level of job satisfaction. The analogous magnitude of the linear model implies a worsening of 31% increase in poor self-perceived health next period. So that, the presence of job satisfaction widens the difference among long working hours and the standard schedule for a given level of job satisfaction. The interaction effect for women working 41-47 h/w also points to a worsening of health status compared to the standard working schedule, but the association is weaker in the linear model. No significant interaction term is observed for men and women working ≥48 h/w.

Table 4-2. Job satisfaction and working hours per week as predictors of change in poor self-perceived health

	Ordered random effects						Linear random effects	
	Base model		Adjusted model		Interaction model		Interaction model	
	OR	95%CI	OR	95%CI	OR	95%CI	beta	sd
Men								
≤20 h/w	0.69	0.27-1.77	0.70	0.28-1.72	0.73	0.26-1.60	-0.07	0.08
21-34 h/w	1.86	0.80-4.44	1.74	0.79-3.88	1.63	0.81-4.00	0.10	0.07
35-40 h/w	1		1		1		ref.	
41-47 h/w	1.73†	0.99-3.02	1.84*	1.07-3.15	1.73*	0.99-2.85	0.12*	0.05
≥48 h/w	0.37*	0.17-0.81	0.39*	0.18-0.83	0.39*	0.22-0.96	-0.16*	0.07
Job sat. (js)			0.40***	0.27-0.82	0.32***	0.24-0.58	-0.20***	0.04
≤20 h/w * js					4.17	0.24-71.20	0.27	0.26
21-34 h/w * js					2.31	0.29-18.51	0.15	0.20
41-47 h/w * js					6.17*	1.48-25.66	0.31*	0.13
≥48 h/w * js					1.01	0.16-6.58	0.03	0.17
Women								
≤20 h/w	0.52*	0.32-0.88	0.58*	0.35-0.95	0.59*	0.36-0.96	-0.11**	0.04
21-34 h/w	0.95	0.65-1.42	1.01	0.69-1.49	1.08	0.73-1.59	-0.01	0.03
35-40 h/w	1		1		1		ref.	
41-47 h/w	3.78*	1.35-10.55	3.81**	1.37-10.54	5.69***	1.99-16.31	0.26**	0.09
≥48 h/w	2.17	0.74-6.36	2.02	0.70-5.86	1.88	0.58-6.15	0.11	0.11
Job sat. (js)			1.16	0.75-1.81	1.6	0.68-1.97	0.04	0.05
≤20 h/w * js					2.13	0.57-7.93	0.11	0.12
21-34 h/w * js					0.45	0.14-1.41	-0.16	0.10
41-47 h/w * js					35.73*	1.64-709.80	0.51†	0.27
≥48 h/w * js					0.67	0.05-8.47	-0.06	0.22

† p-value <0.10; *p-value <0.05; **p-value <0.01; ***p-value<0.001; Job sat.: job satisfaction
Adjusted by age, civil status, children (<16), type of family, education level, place of birth, type of contract, occupation, household net equivalent income, firm economic activity, municipality size, year, lagged health, health at base year.

4.4.2 The effect of transitions in working hours and job satisfaction on changes in self-perceived health

We evaluated whether transitions between categories of working hours and job satisfaction are associated with changes in self-perceived health. Table 4-3 reports the frequencies and the odds ratio for each of the six transitional states considered. The most common transition was remaining in the same category of working hours (~75% of all transitions), with little differences between improved and worsening job satisfaction. For men and women employees, the probability of reporting worse self-perceived health was higher among those who worked more hours with reduced job satisfaction (OR= 2.88, 95% CI: 1.38–6.03 and OR= 2.06, 95% CI: 1.19–3.56 among men and women, respectively). Working a similar number of hours but having a lower level of job satisfaction reduces self-perceived health for men (OR= 1.45, 95% CI: 1.05–2.00), but results were not statistically significant for women. Interestingly, transitions to lower working hours did not improved self-perceived health even if job satisfaction was also reduced.

Table 4-3. Distribution and odds ratio for transitions to poorer self-perceived health of transitions in working hours and job satisfaction

	Men	Women	Men (N=1336)		Women (N=1509)	
	%	%	OR	95%CI	OR	95%CI
Transition to Equal hours and						
more job sat.	37.9	36.7	1		1	
less job sat.	40.4	35.4	1.45^{*}	1.05-2.00	1.31	0.93-1.83
More hours and						
more job sat.	4.9	7.2	0.75	0.41-1.37	0.44	0.18-1.09
less job sat.	4.8	6.3	2.88^{**}	1.38-6.03	2.06^{**}	1.19-3.56
Less hours and						
more job sat.	4.8	7.0	0.99	0.50-1.96	0.88	0.49-1.56
less job sat.	7.2	7.4	1.05	0.55-2.03	0.93	0.51-1.71

*p-value <0.05; **p-value <0.01; ***p-value<0.001: job sat.: Job satisfaction
Adjusted for changes in temporary employment.

4.5 Discussion and conclusion

A first result of this research is that very short working hours are protective for women only, but long working hours predicts poorer self-perceived health for men and women working 41-47 h/w, surprisingly, working ≥48 h/w is protective for men only. Second, job satisfaction moderately confounds and modifies the effect of working hours on health status for men but to a lesser degree for women. Third, the longitudinal structure of the data allows us to confirm that moving to a job that provides lower satisfaction has a negative effect on health status, except if the number of working hours also decreases.
Despite the low sample size in some categories when disaggregating by gender, we could identify the adverse effects of long working hours (41-47 h/w) on

health for men and women. The non-significance for women working ≥48 h/w could be due to this threshold election. One study for Australia identifies a lower threshold of 38 h/w for women once domestic and care work are taken into account (Dinh et al., 2017). However, there is a clear discontinuity for men at this cut off point. We hypothesize that the voluntariness in the long hours of work can explain this apparent surprising result, in the sense that it is the gap between the actual and desired hours to work what is relevant in terms of health status, so that involuntariness in long working hours is what worsens health status (Bassanini and Caroli, 2015).

Our data also suggests that job satisfaction significantly predicts improvement in health status among men only. Gender differences in job satisfaction have been attributed to women having lower expectations about work and focusing different aspects of work, less on wages and more in flexibility schedules, in the context of the social division of labour (Hodson, 1989; Clark, 1997). The protective effect of working very short hours on self-perceived health would confirm previous findings (Booth and van Ours, 2008, 2013). This result may be due to difficulties with work-life balance for women, while men tend to participate less in homecare and work longer hours. The need for policies aimed to improve a better work-life balance is evident when compared to some Nordic countries. These countries are characterized by stringent norms of equal treatment that incentivize engaging in part-time work, which in turn lead to lower or no difference in health effects with standard or long working hours (Bardasi and Gornick, 2008; Hardoy and Schøne, 2006; Halldén et al., 2012). Regarding the confounding and modifier effect of job satisfaction, our results partially confirm recent warnings of Ganster et al. (2018) and Ng and Feldman (2008), according to which the heterogeneity in the association between working hours and health status could be explained by possible confounding factors such as the type of work or the working environment. Nonetheless, we find a moderate effect and only among men, which again can be related to the gender differences aforementioned. More interestingly, the presence of job satisfaction more clearly widens the adverse health effect of hours of work between long working hours and the standard schedule. This significant results may shed some light on the previous mix findings of hours of work (van der Hulst et al., 2003; Bannai and Tamakoshi , 2014; Ganster et al., 2018), and previous attempts to find analogous association for the same study population (Artazcoz et al., 2007).

It is worth mentioning that in order to deal with reverse causality, we have regressed health status on one-year lagged values of our variables of interest. The use of lagged labour characteristics is a common practice in the related literature (Bardasi and Francesconi, 2004; Robone et al., 2011; Butterworth et al., 2011). However, current job satisfaction is probably related to actual health outcomes for men and women, if the combined effect of worked hours and job satisfaction have an immediate impact on health outcomes, then including lagged values instead of contemporaneous one would not allow to capture this effect. For instance, Moscone et al. (2016) uses firm level information in order to construct valid instruments to deal with the endogeneity problem in a similar context. However, this kind of information is not available in our dataset. This is a limitation of the first part of our study.

When analysing transitions, working longer hours seems to affect self-perceived health, particularly when job satisfaction has decreased compared to the previous period. Previous literature has not explicitly dealt with job satisfaction, but points to it as an important factor. For instance, Graetz (1993) reported a higher risk of poor mental health among dissatisfied workers and lower levels of mental health among satisfied workers.

There is some asymmetry between the adverse health effects of changing working hours and the level of job satisfaction. In particular, working less hours do not lead to a significant change in self-perceived health even if job satisfaction decreases. These results are consistent with those of a study among manual workers in the USA (Morefield et al., 2011) and in transitions from unemployment to employment. The positive effects of moving into work from unemployment were not as great as the negative effects of job loss (Flint et al., 2013).

In sum, the main strength of this study is that it our approach controls for unobserved individual heterogeneity together with a wide range of controls, while at the same time introducing lagged covariates in order to minimize reverse causality problems. However, there are also some limitations. For instance, Conway et al. (2017) reported non-linear adverse health effects of long working hours of ≥52 h/w among workers in the USA that we have not considered in our analysis. In fact, the sample size is quite limited for some categories, especially for individuals working more than 48 h/w, where higher health risk could be expected. In addition, the low variability in the distribution of working hours, especially for men, limits the statistical power of results in some categories. It would have been convenient to report fixed effects estimation. Unfortunately, there is no consistent estimator for an ordered logit model that can explicitly incorporate individual fixed effects, we opted to maintain the ordinal variability in the variable response and account for fixed effects by adding the mean values of the covariates. Additional robust checks based on individuals cut off points is left for future research (Baetschmann et al., 2015). Last, there are other potentially relevant aspects of the overall psychosocial working environment, such as shift work and work-family balance, that were not included in the analysis due to data limitations.

We conclude that job satisfaction moderately confounds the adverse health effects of long working hours and modifies the health risks with differences by gender. The results suggest that voluntariness in long hours can inhibit adverse effects on health status. For employees changing to longer work hours, a decrease in job satisfaction may suggest a health risk.

4.6 Appendix 4-1

Table A 4-1. Descriptive statistics

		Men N=1513		Women N=1727	
		Mean	s.d	Mean	s.d
Age	25-45	60.0	49.0	61.5	48.7
	46-64	40.0	49.0	38.5	48.7
Non-married		30.4	46.0	38.8	48.7
Children(<16)	None	28.6	45.2	57.2	49.5
	One	23.5	42.4	26.7	44.3
	Two	36.8	48.2	8.0	27.1
	Three or more	11.1	31.4	8.1	27.3
Type of family	Couple with children and others	64.0	48.0	30.5	46.1
	Couple without children	24.8	43.2	25.1	43.4
	Single	8.2	27.4	36.3	48.1
	Single-parent	3.1	17.3	8.0	27.2
Education level	University	33.0	47.0	49.9	50.0
	Secondary	36.8	48.2	25.9	43.8
	Primary or less	30.2	45.9	24.2	42.8
Place of birth	Catalonia	64.9	47.7	68.2	46.6
	Rest of Spain	20.5	40.4	18.7	39.0
	Others	14.6	35.3	13.1	33.8
Type of contract	Permanent	81.1	39.2	76.2	42.6
	Temporary	14.9	35.7	18.8	39.1
	Others	1.2	11.0	2.4	15.2
	Missing	2.7	16.3	2.6	16.0
Occupation	Manager	20.6	40.5	18.1	38.5
	Technician	25.0	43.3	34.7	47.6
	Administrative	7.8	26.9	18.2	38.6
	Shopkeeper	2.9	16.7	14.0	34.7
	Qualified worker	22.1	41.5	2.4	15.3
	Machine operator	11.5	31.9	2.0	14.1
	Non-qualified worker	9.8	29.7	9.8	29.7
	Missing	0.3	5.6	0.9	9.2
Income	Low	16.0	36.6	35.2	47.7
	Medium	36.7	36.7	32.3	46.8
	High	47.3	47.3	32.5	46.8
Economic activity	Agriculture/fisheries/extraction	1.2	11.0	1.1	10.4
	Manufacturing/production	30.9	46.2	11.3	31.7
	Construction	10.8	31.0	1.4	11.9
	Commerce and repair	10.6	30.8	8.4	27.7
	Hostelry	1.8	13.3	4.0	19.7
	Transport	8.1	27.4	6.5	24.6
	Financial mediation and Real estate	13.6	34.3	14.3	35.0
	PA/Education/Health	20.5	40.4	47.5	50.0
	Others	1.9	13.7	5.1	22.0
	Missing	0.5	6.9	0.3	5.8
Inhabitants (thousands)	< 2	4.0	19.6	5.1	21.9
	2-9.9	10.5	30.6	10.7	30.9
	10-49.9	24.0	42.7	23.4	42.3
	50-99	14.0	34.7	12.0	32.5
	100-499	24.5	43.0	19.2	39.4
	>500	23.0	42.1	29.7	45.7

5 Working hour mismatch, job quality and mental well-being across the EU-28: a multilevel approach

5.1 Introduction

According to official estimates (Eurofound, 2017b; International Labour Organization, 2018), 10.4% of employees work excessive hours–more than 48 hours per week (h/w)—and 28% work short hours –fewer than 35 h/w. Mismatches in hours of work may be due to overemployment, if the actual hours exceed desired hours, and underemployment otherwise. The mismatch between actual and desired working hours imposes a loss of welfare for the worker. The issue is relevant as recent estimates calculate that the cost of mental health problems across the 28 European countries is 4% of the GDP, or around 600 billion Euros, from which 1.6% of GDP, 260 billion Euros, are due to lower employment rates and productivity of people with mental health issues (OECD, 2018). Person environment fit theory (P-E) predicts that employee job performance and well-being will be higher where P-E fit exists, and that misfit between preferences and job characteristics will be particularly significant for employee well-being (Kristof-Brown et al., 2005). Where misfit occurs, the need for more (or less) work time reduces subjective well-being. Much literature on working hour mismatches has focused on the effects on job satisfaction, life satisfaction, and general health (see Bassanini and Caroli (2015) and Wunder (2016) for a summary of this literature). But a growing number of research is focusing on psychosocial problems, such as work stress and depressive symptoms (Constant and Otterbach, 2011; Friedland and Price, 2003; Angrave and Charlwood, 2015; De Moortel et al., 2018), and only one paper directly addresses mental health and mismatches in the European context (De Moortel et al., 2017). On the other, the psychosocial occupational models predict that higher job control and rewards buffers the impact of job demands on strain and can help enhance employees' job satisfaction with the opportunity to engage in challenging tasks and learn new skills (Karasek, 1979; Siegrist, 1996). This active job type contrast with jobs that combine high demands but low control and low rewards leading to higher dissatisfaction. Therefore, considering the role of job quality in the association between mismatches and mental health allows to analyse if this association is modified by heterogeneous jobs. It is expected that job rewards buffers (and job intensity worsens) for the negative effects of under-and overemployment on mental health. In this chapter we analyse the association between working hours mismatches with mental health and the role of job quality in this association. With this aim, we use cross-sectional data from the 2015 European Working Conditions Surveys for 28 European countries.

5.2 Literature review

Favourable evidence for constrained working hours has been found for different countries: Ham (1982) for the US; Kahn and Lang (1991) for Canada; Bryan (2007) and Stewart and Swaffield (1997) for the UK; Euwals and van Soest (1999) for the Netherlands; and Reynolds and Aletraris (2006, 2010) for Australia. Few investigations analyse psychosocial health outcomes associated with mismatches in working hours. Mixed results are found by Friedland and Price (2003), using two waves of the American Change Lives Survey and controlling for base levels, find that overemployed workers reported fewer depressive symptoms and lower levels of job satisfaction, while underemployed workers scored less in positive self-concept. Nonetheless, they also report more chronic conditions among mismatched workers. In contrast, Constant and Otterbach (2011) using data for the UK, find negative effects of working hour mismatches on mental well-being and life stress among those working different schedules. A related investigation on the health effects of working hour mismatches is that of De Moortel et al. (2017). Using two repeated cross-sectional datasets for 21 countries, these authors find an association between involuntary long working hours and mental health for men and short and long hours for women.

Mismatches are determined by worker and job characteristics, labour market settings as well as country contextual factors (Lyness et al., 2012). Human capital theory predicts that better educated would have more incentives for long working hours due to their opportunity costs (Becker, 1981). In fact, high educated workers tent to be engaged in rewarding jobs, but also in more intensive jobs (Damaske et al., 2016; Moen et al., 2013). For instance, Otterbach (2010) using cross-sectional data for 21 countries, finds that better job opportunities and an interesting job increase the probability of working the desired number of hours, while an exhausting, demanding or stressful job decreases it, with differences by gender. Nonetheless, it is common that high and low skilled workers are induced to work longer hours although for different reasons. Labour market competition in skilled occupations may encourage workers to autonomously work longer hours than they prefer (Van Echtelt et al., 2006). On the other side, economic pressures force low educated people to provide long working hours but in poor quality jobs. However, job quality is rather absent in most of the studies in working hours and working hours mismatches and health. The issue is at odds as from the seminal work of Rosen (1986) to recent studies Maestas et al. (2018) there is evidence that workers value job amenities which can have consequences in terms of well-being. There is evidence of the adverse effects of long working hours on a variety of health outcomes (Sparks et al., 1997; van der Hulst, 2003; Bannai and Tamakoshi, 2014). However, due to the weak or mixed results obtained by these systematic reviews (Watanabe et al., 2016), it has been highlighted the importance to control potential confounders (Ganster et al., 2018). The importance of job satisfaction is evident in the job quitters and stayers literature. For instance, Knaus and Otterbach (2019) using a panel for German workers, find that a lower job satisfaction is associated with increases in working hours mismatches and ultimately the probability of changing job. Only one paper incorporates the role of job quality in the mismatch analysis. De Moortel et. al (2018) using two waves of the German socioeconomic panel also finds overemployment worsens mental health but not underemployment. Adding job rewards do not change the association of mismatches and mental health and the interaction terms are not significant. Our analysis is different from De Moortel et al. (2018) in that they analyse a two year change and we differentiate mismatches across working hours, as it is usual in the literature, while they collapse mismatches across working schedule, so that we allow the interaction effects to differ among working hours, that is, that the effect of being overemployed in the rage of 35-40 h/w, for instance, may be different of that of 41-47 h/w or 48 h/w or more. Moreover, we also take into account the effect of job intensity.

Family type also influences desired hours of work, but the evidence is mixed. Dual-earner couples frequently prefer work hour reductions, especially when they have children (Steiber and Haas, 2019). Parents may identify as overemployment when they would choose to reduce their hours for better work-family balance but are unable to do so (Reynolds and Johnson, 2012). In contrast to this "overworked family," parents declare themselves as underemployed when they would prefer to work longer hours if there were a better public supply of care services (Tsang et al., 2014). In this respect, underemployment is more likely to be found in countries with lower levels of institutional care, such as Eastern and Southern European counties compared to Nordic countries. We will take account of family structure controlling by the number of children at different ages, civil status and being breadwinner.

Actual working hours may also differ from desired working hours due to the presence of market frictions and employer requirements. The most obvious scenario is seen in a competitive market where desired hours are unfeasible, for instance, due to the existence of fixed costs (Johnson, 2011); search costs that keep the worker from finding that job (Altonji and Paxson, 1988; Chetty et al., 2011); the presence of long-term contracts and wage rigidity (Kahn and Lang, 1995); work hour regulation (Rottenberg, 1995); or because long working hours are used as a screening mechanism for more productive workers (Landers et al., 1996; Sousa-Poza and Ziegler, 2003). Stewart and Swaffield (1997) also highlight that job insecurity and few job opportunities can force workers to accept undesired working hours, particularly among male workers in the UK. As proxies for labour market settings we control for tenure, occupation and economic sector.

Among the contextual factors include the level of public services, the availability of part-time employment, and the level of unemployment (Reynolds, 2004; Del Boca, 2002), so that underemployment is more common in countries with higher unemployment rates (Otterbach, 2010). Since unions fight for rewards and work hours that employees want, countries with strong unions should have fewer workers with hour mismatches. The willingness to work different hours than are available may depend on the country's tax structure. Countries with larger safety nets and income taxation can also have a larger share of workers who would like to work less (Reynolds, 2004). We include country level effects trade union density, social per capita spending and the share of unemployment and part-time employment.

The review by Bassanini and Caroli (2015) summarises the main message underlying literature on working hour mismatches. They conclude that it is not the work *per se* that is relevant for health outcomes, but not having control over the amount of work provided. Control over work has several benefits: it lessens work stress (Hall and Savery, 1986), attenuates the adverse effects on health of long working hours (Sparks et al., 1997), increases the quality of sleep, and reduces work-family conflict (Barnett et al., 1999; Kubo et al., 2013).

To our knowledge, only three investigations use cross-country estimates: Otterbach (2010), BaŞlevent and KirmanoĞlu (2014), and De Moortel et al. (2017). The first author analyses country heterogeneity using fixed effects, and the latter two use multilevel models. In our study, we investigate whether working hour mismatches can explain the association between working hours on mental well-being, and we consider the role of job characteristics in this association across the 28 European countries using random effects estimation. Country-by-country analysis is impossible in our dataset due to low sample size by country. A second option is to group countries according to criteria or adopt a welfare regime typology. However, given the multifactor nature of mismatches, country classification may poorly fit country heterogeneity. In this research, we use a multilevel technique as an efficient way to account for country variability given the sufficient number of countries to which it is applied (Bryan and Jenkins, 2016).

5.3 Methods

5.3.1 Data and population

We use cross-sectional data from the 6th European Working Conditions Survey (EWCS 2017a) carried out in 2015. This is a multi-stage, regionally stratified random sample representative of the working population in each country. We exclude workers 26 years old and younger to limit the possibility that they are not fully available for the labour market. We also exclude workers aged 59 years and older, as workers close to the retirement age have a higher possibility of adjusting undesired working hours by leaving the labour force earlier (Charles and Decicca, 2007). We also restrict our sample to workers declaring that they do not have daily limiting activities due to health problems to minimize the potential reverse causality problem. Workers with more than one regular job are also excluded, as their hour's preference for their main job may be influenced by the hours of their second job. The final sample consists of 9,345 men and 10,998 women employees.

5.3.2 Variables

Mental well-being

Mental well-being is measured with the five-item World Health Organization Well-Being Index (WHO-5). It is used as a continuous variable to detect mild psychological mental distress with respect to mean population levels (Topp et al., 2015). The index is constructed by adding the 5-item scores, from 5 "All the time" to 0 "At no time" of the 5 responses and multiplying by 4 to get a percentage; 0 represents the worse possible well-being and 100 the best possible state.

Working hours mismatches

Desired working hours are obtained through the question: Provided that you could make a free choice regarding your working hours and taking into account the need to earn a living: how many hours per week would you prefer to work at present? Actual working hours are obtained through the question: How many hours do you usually work per week in your main paid job? Hours of work are categorized as ≤20; 21-34; 35-40; 41-47; and ≥48 h/w. We use the standard schedule of 35-40 h/w as the reference category. Mismatches in working hours are simply defined as the difference between actual and desired working hours. An employee is considered overemployed if the mismatch is greater than zero, underemployed if the mismatch is lower than zero, and matched/unconstrained if the difference is zero.

Job quality

We use the dimensions of job quality provided by the EWCS. These job quality dimensions are extensively documented in EWCS (2017a), summarised as follows: i) skills and discretion as intrinsic job quality (solving unforeseen problems on their own and applying their own ideas, making decisions, participating in organisational decisions, access to training, use of technologies, and team work); ii) social environment, including social support (help and support from colleagues and managers, management quality, exposure to threats and discrimination); iii) physical environment (exposure to noise, dust, chemicals, or infectious agents; lifting heavy loads; and repetitive hand movements); iv) job prospects (belief in the possibility of career advancement, job insecurity or fears about losing their job, possibility of downsizing in the organisation; and v) job intensity / demanding job (working quickly and with tight deadlines; not having enough time to do the job; frequent disruptive interruptions; pace determinants and interdependency; and emotional demands). We exclude the dimension of working time quality, because it overlaps with the variable related to hours of work. A previous factors analysis identifies job intensity as different from the other job dimensions; consequently, job quality dimensions are reduced in two components: one component is job intensity, and the other component is obtained by confirmatory factor analysis based on intrinsic job quality, social environment, physical environment, and job prospects. The confirmatory factor analysis shows satisfactory goodness of fit: the standardized root mean residual of 0.033, lower than the common criteria of 0.04. This second component is labelled 'rewarding job.' We code tenure as 4 years or more (the base category), 2 to 3 years, and 1 year or less.

Socioeconomic characteristics
Individual variables include age, age squared, being autochthonous (base category) or immigrant, and education level. Education level consists of the ISCED classification with categories of university (base category), tertiary education, upper secondary, secondary, and primary or less. Family variables include: having children between the ages of 0-2, 3-6, 7-12, 13-17; the presence of disabled family members; the presence of relatives older than 70 years old; living in a couple or not; not being a breadwinner (base category), being a breadwinner, or declaring oneself as an equally sharing breadwinner. Place of residence considers three possibilities: living in an urban area (base category), living in a rural area, or living in an intermediate area. Monthly personal earnings in purchasing power parity are expressed in terciles. The 12.7% of missing values in this variable are imputed according to gender, age, age squared, number of adults and children at different ages in the household, civil status, education level, type of contract, occupation economic activity, and country. Information on occupation is based on the ISCO-08 at 1 digit, while activity sectors are detailed in 10 categories from the NACE revision2.

Country variables
Country contextual variables are unemployment rates; the share of part-time employment; the social protection benefits in purchasing power parity per inhabitant; and trade union density as of 2013. All sources are from Eurostat, OECD, and ILO official statistics.

5.3.3 Empirical strategy

Descriptive on actual versus desired hours and mismatches are reported with differences in mean scores of mental well-being for over- and underemployed compared to the unconstrained working schedule contrasted with t-test.

Working hours mismatches, job quality and mental well-being

The association between working hour mismatches and mental well-being is estimated with a random effects model:

$$MH_i = a_o + \delta_1 m_i + \delta_2 jrew_i + \delta_3 jint_i + \delta_4 jrej_i * m_i + \delta_5 jint_i * m_i + \delta_6 x_i + u_{1i} + \varepsilon_i \quad (5\text{-}1)$$

Here, *MH* stands for mental health WHO-5 index as a continuous variable, m_i is an index variable combining the 5 working hours categories (≤20; 21-34: 35-40: 41-47: ≥48 h/w) with the three potential situations in terms of working hour mismatches (overemployment, unconstrained, and underemployment); *jrew* stands for the rewarding job dimension and *jint* for job intensity; $jrew_i * m_i$ and $jint_i * m_i$ are the interaction terms; and x_i represents the vector of socioeconomic and country covariates and ε_i is the error term. To account for the potential confounding role of job quality dimensions, we include job rewards and intensity and the interaction terms sequentially to the base estimation. As it is common in the medical literature, the confounding role is assessed if the coefficient variation exceeds 20% after adding the potential confounding variable. The global significance of the interaction term is contrasted with the likelihood ratio test. The variability across European countries is accounted for by the random intercept u_{1i} in equation (5-1). All models are also stratified by sex. Weights for the EU28 were applied to all computations. As a robustness check country fixed effects were also estimated.

5.4 Results

Table 5-1 shows descriptive statistics of actual vs. desired working hours. From this table, we can see a consistent pattern for a desired reduction in working hours, especially for those working long hours. Working in the range of 35 and 40 h/w is the most common schedule among men and women, but more men work more than 48 h/w (17.0%) than women (6.7%). The 41.8% of men working short hours (≤20 h/w) would prefer to work the standard schedule (35-40 h/w). Similarly, 28.9% of those working 21-34 h/w would prefer to work the standard hours. The proportion of men willing to work the standard hours among those working longer hours is even greater: 47.8% of those working 41-47 h/w and 45.6% of those working >48 h/w. Women prefer to work fewer hours than men. A large majority of women are working their desired hours in the range of 5-20 h/w and 21-34 h/w (65.0% and 77.6%). However, the preferred choice among those working long hours is to work the standard hours (49.8% and 54.0% among those in the 41-47 h/w and ≥48 range, respectively). The interested reader can find descriptive for the rest of variables in Appendix 5-1, Table A 5-1.

Table 5-1. Working hours mismatches: actual vs. desired

			Desired					
Actual			<=20	21-34	35-40	41-47	>=48	Total
Men	N=9345	%						
≤20	374	4,0	48,9	6,7	41,8	0,4	2,2	100
21-34	454	4,8	4,9	58,2	28,9	1,8	6,2	100
35-40	5894	63,1	1,7	9,4	85,4	1,7	1,8	100
41-47	1035	11,1	1,4	6,7	47,8	40,9	3,2	100
≥48	1588	17,0	1,4	4,4	45,6	6,8	41,8	100
Women	N=10998							
≤20	1878	17,1	65,0	16,4	17,6	0,2	0,8	100
21-34	2308	21,0	6,8	77,6	14,7	0,4	0,5	100
35-40	5379	48,9	3,4	16,3	78,2	0,7	1,4	100
41-47	697	6,2	2,3	13,2	49,8	33,7	1,0	100
≥48	736	6,7	1,4	5,3	54,0	5,6	33,7	100

5.4.1 Working hours mismatches, job quality and mental well-being

Table 5-2 shows working hours and mismatches for over- and underemployed workers. The distribution of working hours in the upper panel of the table shows that men work longer hours than women, and it displays how the distribution of mismatches (negative values indicate underemployment and positive values indicate overemployment) increases at the extremes. Men and women working longer hours experience poorer mental well-being compared to those working the standard schedule.

When disclosing working hours by mismatches, we see that the European employees are on mean overemployed above 9 h/w for both sexes, and underemployed between 11 h/w for men and 12 h/w for women. A considerable proportion of mismatches is concentrated in the 35-40 h/w and at the extreme working schedules. Unconstrained men and women enjoy higher levels of mental well-being (71.2 men and 69.7 women) compared to those who are overemployed (65.4 men and 62.0 women) and those who are underemployed (68.0 men and 65.6 women). When comparing mental well-being by work schedule, we also observe that men and women in the unconstrained 35-40 h/w enjoy greater well-being than over- and underemployed workers. Across most categories, unconstrained women have greater well-being than over- and underemployed women, while men are concentrated in the 35-40 h/w and ≥ 48 h/w. We see more clearly now that the poorer mental well-being by long working hours, at the upper part of the Table 5-2 is attributable to overemployment, expect for men at 41-47 h/w.

Table 5-2. Distribution of working hour and mismatches, and mental well-being

	Men						Women					
	Hour mismatches			Mental well-being			Hour mismatches			Mental well-being		
	%	mean	sd	mean	sd	p-value[a]	%	mean	sd	mean	sd	p-value[a]
≤20 h/w	4.5	-11.3	12.3	70.8	19.0	0.687	13.5	-6.7	10.6	68.1	19.8	0.568
21-34 h/w	4.8	-3.9	8.4	71.1	17.9	0.491	16.5	-0.8	5.6	67.5	20.2	0.890
35-40 h/w	62.9	1.2	4.7	70.2	18.1	base	55.4	2.1	5.7	67.6	19.7	base
41-47 h/w	10.5	4.1	6.3	66.7	19.7	0.001	7.1	5.6	6.2	62.4	20.7	0.000
≥48 h/w	17.3	8.9	9.5	65.5	20.5	0.000	7.5	10.1	9.5	64.5	19.2	0.005
Under.	9.9	-11.2	8.4	68.0	19.4	0.000	13.1	-12.5	8.9	65.6	21.8	0.000
≤20 h/w	1.5	-20.4	8.4	70.6	18.6	0.590	8.8	-16.3	9.6	66.4	21.3	0.007
21-34 h/w	2.6	-12.6	5.9	68.7	18.8	0.084	13.8	-8.8	4.7	69.2	19.5	0.045
35-40 h/w	4.5	-6.3	4.7	67.2	19.2	0.001	2.1	-7.5	7.7	63.4	23.2	0.016
41-47 h/w	0.4	-7.9	4.6	68.8	21.4	0.869	0.1	-9.1	4.0	51.7	34.4	0.310
≥48 h/w	0.3	-10.8	9.1	66.6	14.9	0.362	0.0	-7.6	3.7	65.6	18.0	0.298
Uncon.	60.9	-	-	71.2	17.9	base	60.0	-	-	69.7	18.5	base
≤20 h/w	2.3	-	-	72.3	19.6	base	7.4	-	-	70.7	17.5	base
21-34 h/w	1.9	-	-	73.4	17.1	base	4.5	-	-	69.2	19.5	base
35-40 h/w	44.5	-	-	67.2	19.2	base	33.1	-	-	69.7	18.5	base
41-47 h/w	4.5	-	-	67.8	21.4	base	2.1	-	-	67.7	17.5	base
≥48 h/w	5.9	-	-	70.0	19.2	base	1.9	-	-	71.5	16.7	base
Over.	29.2	9.8	7.3	65.4	19.7	0.000	26.9	9.7	6.7	62.0	20.8	0.000
≤20 h/w	0.2	5.3	5.9	61.5	17.6	0.037	0.8	6.1	5.3	55.2	23.1	0.001
21-34 h/w	0.4	11.3	6.5	67.6	18.8	0.182	2.8	7.8	4.8	62.5	21.3	0.002
35-40 h/w	14.0	7.3	5.9	67.2	19.2	0.000	13.8	8.9	6.1	63.1	20.8	0.000
41-47 h/w	6.2	7.9	5.9	65.8	18.1	0.378	4.2	8.7	5.5	59.9	21.3	0.000
≥48 h/w	10.8	14.2	7.7	62.9	20.9	0.000	4.7	14.4	8.1	61.6	19.5	0.000
	100%						100%					

[a] p-value contrasts the difference of mean well-being in each hour schedule of underemployment and overemployment mismatches respect to its base category counterpart; sd standard deviation. Under.: underemployed; Uncon.: unconstrained; Over.: overemployed

Table 5-3 and Table 5-4 combine the effect of working hours with working hour mismatches on mental well-being. The base model shows the associations between the combined variable and mental well-being, while the adjusted model additionally adjusts for job quality, and the interaction model accounts for the interaction terms. Results for underemployed men and women working 41-47 h/w and ≥48 h/w, and overemployed men working less than 34 h/w are not shown due to the low sample sizes. For men, underemployment is negatively associated with mental well-being only among those working 35-40 h/w (-3.7 points of the well-being 0-100 WHO-5 scale). Among unconstrained workers, those in the 41-47 h/w experience a reduction in mental well-being (-3.3) and those below 20 h/w (2.2) compared to the standard schedule, but not those in ≥48 h/w schedule. It is expected that unconstrained workers tend to work their chosen number of hours, and therefore are not associated with adverse health effects. If this is not the case, it may imply that they wrongly manifest their hour preferences or that other factors may be operating. As expected, overemployed workers see reduced well-being, with the higher magnitude above 48 hours or more (-8.3). These associations remain significant after accounting for job quality dimensions, but with lower values. For instance, the overemployed at 48 or more hours reduces to -35.7%, which denotes their confounding role. Rewarding jobs see increased mental well-being (around 0.7), but job intensity reduces mental well-being (around -0.2). The likelihood ratio of the interaction terms is significant. The interaction with rewarding job in the interaction model stands for the difference in well-being in each schedule compared to the standard 35-40 h/w. For instance, being in the range of 21-34 h/w reduces well-being by -0.61 points compared to the standard schedule for rewarding jobs. Interestingly, job intensity appears to interact in a different direction for long hours: the interaction for unconstrained workers working 41-47 h/w worsens well-being (-0.25), but for those working ≥48 h/w their well-being improves (0.13). Coherently, the presence of job intensity for the overemployed at ≥48 h/w reduces well-being (-0.13) compared to the standard schedule. Nonetheless, the magnitudes of these interaction terms are of small value.

Among women, being either overemployed or underemployed reduces mental well-being across most working schedules. The adverse effects of mismatches appear to be larger than for men. Again, the confounding role of job quality implies a large reduction in these associations when, for instance, the adverse effect of working 41-47 h/w reduces from -9.9 to -6.5 points (-34%). The association of mental well-being with rewarding job (0.67) and intensity (-0.22) are close to that of men.

Table 5-3. Multilevel linear random effects of working hours, working hour mismatches and job quality dimensions on mental well-being for men

Men (N=9345)		Base		Adjusted		Interaction	
		estimates	sd	estimates	sd	estimates	sd
Underemployed	≤20 h/w	-0.190	1.810	2.468	2.430	-0.524	1.731
	21-34 h/w	-1.488	2.316	0.826	1.862	-0.393	1.514
	35-40 h/w	-3.763***	1.109	-2.531*	1.291	-2.733*	1.264
Unconstrained	≤20 h/w	2.216*	1.087	1.703	1.831	5.468***	1.209
	21-34 h/w	1.997	1.982	1.590	2.085	2.556	1.827
	35-40 h/w	base					
	41-47 h/w	-3.315***	0.948	-3.263**	1.030	-2.723*	1.350
	≥48 h/w	-0.917	0.729	-1.297	0.951	-1.517†	0.791
Overemployed	35-40 h/w	-4.453***	0.708	-2.246**	0.789	-2.319**	0.746
	41-47 h/w	-5.193***	1.359	-2.473*	1.260	-1.925	1.604
	≥48 h/w	-8.339***	1.034	-5.358***	0.858	-4.444***	0.898
Job rewards (jrew)				0.704***	0.056	0.729***	0.035
Underemployed	≤20 h/w * jrew					-0.420	0.261
	21-34 h/w * jrew					-0.183	0.240
	35-40 h/w * jrew					-0.127	0.184
Unconstrained	≤20 h/w * jrew					0.137	0.308
	21-34 h/w * jrew					-0.607**	0.214
	41-47 h/w * jrew					0.001***	0.183
	≥48 h/w * jrew					0.119	0.198
Overemployed	35-40 h/w * jrew					0.023	0.078
	41-47 h/w * jrew					-0.272	0.191
	≥48 h/w * jrew					0.158	0.121
Job intensity (jint)				-0.202***	0.015	-0.175***	0.014
Underemployed	≤20 h/w * jint					0.006	0.080
	21-34 h/w * jint					-0.106	0.124
	35-40 h/w * jint					-0.007	0.070
Unconstrained	≤20 h/w * jint					0.367*	0.169
	21-34 h/w * jint					0.040	0.078
	41-47 h/w * jint					-0.247**	0.090
	≥48 h/w * jint					0.126*	0.049
Overemployed	35-40 h/w * jint					-0.034	0.068
	41-47 h/w * jint					-0.080	0.081
	≥48 h/w * jint					-0.134**	0.043
Contextual	Trade union density	0.008	0.033	0.004	0.028	0.001	0.028
	Social spending	0.000	0.000	0.000	0.000	0.000	0.000
	Unemployment	0.107	0.153	0.316*	0.144	0.325*	0.144
	Part-time	0.043	0.088	0.097	0.077	0.099	0.077
Random effects	Sd. Constant	2.871	0.413	2.689	0.402	2.690	0.402
	Sd. Residual	18.136	0.747	16.999	0.707	16.876	0.678
LR-test						0.000	

† p-value 0.1; * p-value 0.05; ** p-value 0.01; *** p-value 0.001; sd standard deviation
All models adjusted by age, children, living with a partner, breadwinner, disabled/ill partner, older than 70 year, foreign born, urban, education level, earnings, tenure, occupation, economic sector.
LR-test comparing interaction and adjusted models
Omitted output for underemployment men and women above 40 h/w and for overemployed man below 35 h/w due to low sample size.

Table 5-4. Multilevel linear random effects of working hours, working hour mismatches and job quality dimensions on mental well-being for women

Women (N=10998)		Base		Adjusted		Interaction	
		estimates	sd	estimates	sd	estimates	sd
Underemployed	≤20 h/w	-3.026	2.120	-2.144	2.050	-1.592	2.179
	21-34 h/w	-3.918***	0.908	-2.090†	1.273	-2.157†	1.241
	35-40 h/w	-5.488***	1.247	-1.628	1.575	-0.586	1.254
Unconstrained	≤20 h/w	-0.099	2.121	-0.016	2.175	0.014	2.243
	21-34 h/w	-1.815	1.129	-1.230	0.937	-1.094	0.847
	35-40 h/w	base					
	41-47 h/w	-2.407	1.544	-1.567	1.416	-1.690	1.439
	≥48 h/w	2.490	1.591	3.058†	1.577	3.176*	1.518
Overemployed	≤20 h/w	-14.043***	3.638	-11.107***	3.184	-10.694**	3.490
	21-34 h/w	-7.683***	1.453	-5.816***	1.275	-5.925***	1.571
	35-40 h/w	-6.983***	1.188	-5.081***	1.218	-5.051***	1.251
	41-47 h/w	-9.908***	1.594	-6.581***	1.712	-5.758**	1.849
	≥48 h/w	-8.204***	0.707	-4.941***	0.818	-4.885***	1.151
Job rewards (jrew)				0.668***	0.052	0.748***	0.055
Underemployed	≤20 h/w * jrew					0.028	0.137
	21-34 h/w * jrew					-0.112	0.218
	35-40 h/w * jrew					0.070	0.160
Unconstrained	≤20 h/w * jrew					-0.449*	0.171
	21-34 h/w * jrew					-0.193	0.175
	41-47 h/w * jrew					-0.003	0.119
	≥48 h/w * jrew					-0.268	0.209
Overemployed	≤20 h/w * jrew					0.351	0.369
	21-34 h/w * jrew					0.031	0.182
	35-40 h/w * jrew					-0.112	0.097
	41-47 h/w * jrew					-0.052	0.114
	≥48 h/w * jrew					0.018	0.101
Job intensity (jint)				-0.218***	0.018	-0.193***	0.035
Underemployed	≤20 h/w * jint					-0.004	0.068
	21-34 h/w * jint					-0.090	0.071
	35-40 h/w * jint					-0.105	0.126
Unconstrained	≤20 h/w * jint					-0.015	0.045
	21-34 h/w * jint					-0.105***	0.030
	41-47 h/w * jint					0.065	0.072
	≥48 h/w * jint					0.080	0.082
Overemployed	≤20 h/w * jint					-0.059	0.098
	21-34 h/w * jint					-0.029	0.070
	35-40 h/w * jint					-0.005	0.032
	41-47 h/w * jint					-0.086	0.055
	≥48 h/w * jint					-0.019	0.096
Contextual	Trade unions	0.011	0.052	0.023	0.046	0.022	0.047
	Social spending	0.000	0.000	0.000	0.000	0.000	0.000
	Unemployment	0.083	0.163	0.330*	0.145	0.324*	0.141
	Part-time	0.158	0.112	0.194†	0.104	0.192†	0.103
Random effects	Sd Constant	3.037	0.371	2.877	0.295	2.878	0.298
	Sd Residual	18.983	0.837	17.898	0.776	17.843	0.787
LR-test						0.131	

† p-value 0.1; * p-value 0.05; ** p-value 0.01; *** p-value 0.001; sd standard deviation

All models adjusted by age, children, living with a partner, breadwinner, disabled/ill partner, older than 70 years, foreign born, urban, education level, earnings, tenure, occupation, economic sector.

LR-test comparing interaction and adjusted models

Omitted output for underemployment women above 40 h/w due to low sample size.

The likelihood ratio of the interaction terms is not significant. The interaction effects with rewarding job and job intensity for women do not add relevant information, with the exception of unconstrained workers with rewarding job. These workers see worsening well-being (-0.45) when they work ≤20 h/w; and they also see worsening well-being (-0.11) in an intense job at 21-34 h/w. Regarding the effect of contextual variables, country unemployment rates appear to contribute to better well-being for men and women.

Summarising, for women mismatches in working hours explains most of the association between working hours and mental well-being. For men, mismatches are also relevant and the effects on well-being are greater than for unconstrained workers, but there remains a significant association for unconstrained workers. Nonetheless, the values of these interaction effects are low and the final effect of working hours and mismatches on well-being dominates. The robustness check for fixed effects are reported in Appendix 5-2, obtaining results similar to the random effects estimation.

5.5 Discussion and conclusion

Using cross-sectional data in a sample of European employees, we find that working hour mismatches adversely affect mental health for over- and underemployed workers, with differences across genders. Mismatches explain most of the adverse effects of working hours among women, who in turn experience greater mental health effects than over- and underemployed men. The inclusion of job quality dimensions considerably reduces the effect of working hour mismatches on mental well-being, which is a signal of a confounding effect. In particular, the interaction effect of job quality dimensions helps to explain favourable contributions to well-being of voluntary versus involuntary long working hours for men.

The final effect on mental well-being is not negligible. If we focus on the standard schedule for the majority of the population (35-40 h/w), we observe that working hour mismatches reduce mental well-being between 2 and 5 points. These values are above those reported by Bell et al. (2012) in self-assessed health for the UK and Germany (1.2 points in our equivalent 0-100 scale), and above those reported by De Moortel et al. (2017) in involuntary long hours for mental well-being in 21 European countries (1,1 for men and 1,5 for women). Similar magnitudes are obtained by Wooden et al. (2009) when studying life satisfaction.

These authors contextualise the relative importance of working hour mismatches as the analogous contribution of disability on life satisfaction.

As noted in most of the previous literature, overemployment is a more frequent problem than underemployment, as it has an adverse effect across most working schedules. Most of under- and overemployment women experience poorer mental health compared to those unconstrained. It was expected that most associations between working hours and mental health were removed for unconstrained employees. For instance, it is worth noting that for unconstrained men and women, working ≥48 h/w is not associated with poorer mental well-being, but it is associated with being overemployed ≥48 h/w. However, some categories among unconstrained employees remain significant. For instance, working 41-47 h/w for unconstrained men is associated with poor well-being. This result is also found by Constant and Otterbach (2011) who analyse stress and depression with fixed effects panel data. In this case, long working hours appears to be a stress factor *per se*. However, due to our cross-sectional design it is possible that other factors beyond working hours may influence this association. The observed average effects could be due to unobserved personality traits and its interaction with the mismatch that explains the association. Other stressor at place could be, for instance financial problems that force employees to work long hours and are not accounted in the estimation.

A consistent confounding role for job dimensions is observed across all models, as suggested by Ganster et al.(2018). Similar positive associations for job quality dimensions are obtained by Otterbach (2010) regarding job opportunities, skills, and good social environment and negative associations for the demanding job dimension. Considering working hour mismatches and the interaction with different dimensions of job characteristics sheds light on some contradictory or mixed results found in previous literature on the negative association between long working hours and health outcomes due to specification problems, possible confounding effects of working conditions, and interaction, especially for men (Ganster et al., 2018). We observe a reduction effect of job rewards interaction on well-being only among unconstrained men working 21-34 h/w and women working ≤20 h/w (compared to the standard schedule), i.e., an increase in job rewards benefits fewer workers in these schedules than the standard schedule. The interaction term with job intensity is expected to increase the adverse effects on well-being, especially for overemployed men. We observe such effects among unconstrained men in the 41-47 h/w regime and women in the 21-34 h/w regime compared to the standard schedule. Unexpectedly, job intensity increases well-being among unconstrained men in the ≥48 h/w regime but decreases well-being among overemployed men in the ≥48 h/w regimes. It is clearer now that job intensity for men voluntarily working ≥48 h/w is good but being involuntarily overemployed is bad for mental well-being.

Additionally, countries with higher unemployment rates appear to contribute to mental well-being. Similar results are reported for De Moortel et al. (2017) and BaŞlevent and KirmanoǦlu (2014). It is suggested that unsatisfactory employment conditions are less problematic in an adverse economic context.

Besides the "good and bad job" quality divide, a working hour "mismatch divide" emerges in the sense that unconstrained workers enjoy better mental well-being across most schedules for men and women (except men in the 41-47 h/w regime). These results add evidence of the favourable consequences for employees having control over their schedules and claims of the benefits of more flexibility from the labour supply side. This organizational flexibility could reduce presenteeism of long working hours and low productivity. As long working hours is very correlated with overemployment, policies aimed at reducing long working hours reduces also overemployment and therefore the risk of poor mental health. Increasing flexibility from the employee side could be introduced in collective bargaining but also extending the individual right to request flexible working.

Due to the use of cross-sectional data, our results cannot be interpreted in terms of causality, although we restrict the sample to workers not affected by health problems. With longitudinal, a future interesting research would be to test adaptability or resolution rates of mismatches as well as if there are differences by worker skills. However, a recent study showed that the mental health penalty of under- and overemployment on mental well-being became manifest after a relatively short time (Angrave and Charlwood, 2015). On the other side, we are limited by the low sample size in some categories in order to check the sensitivity of results to alternative definitions of mismatches, for instance considering a gap between actual and desired hours below ±4 h/w for matches. The extensive literature on family economics highlights that preferences and employment status of the partner may also influence working hour mismatches and working hours supplied by the family as a whole, depending on the spouses' bargaining 'sharing rule' or altruistic/egoistic preferences. Unfortunately, we could not account for spouses' preferences due to lack of information. Moreover, our estimates are obtained on the working population only, so the results are not generalizable to the whole potential working population. We argue that there is a sufficient number of countries in the multilevel estimates, although this is disputable due to the low sample size of 28 countries and in some categories in the combined variable. Despite the limitations of this study, we draw attention to the importance of reducing the extent of work hour mismatches, thereby improving well-being.

5.6 Appendix 5-1

Table A 5-1. Descriptive

	Men (N=9345)		Women (N=10998)		Men			Women		
					Under.	Uncon.	Over.	Under.	Uncon.	Over.
Mental well-being*	69.1	18.8	67.1	19.9	68.0	71.2	65.5	65.6	69.7	62.0
Age										
28-35	24.3	42.8	24.4	42.9	31.0	24.0	22.6	25.2	24.1	24.5
36-45	33.8	47.3	34.3	47.5	35.4	33.0	35.0	35.5	34.4	33.5
46-58	41.9	49.3	41.3	49.2	33.6	43.0	42.4	39.3	41.5	42.0
Breadwinner										
Yes	83.2	37.4	39.4	48.9	20.0	10.0	11.1	61.1	54.4	46.1
No	11.3	31.6	53.1	49.9	72.9	84.0	84.8	36.4	37.0	46.3
Equally	5.5	22.9	7.5	26.3	7.1	6.0	4.1	2.5	8.6	7.6
Partner	76.3	42.6	73.9	43.9	68.1	76.7	77.8	67.4	75.0	74.9
Children <2y	8.3	27.6	7.9	27.1	11.3	8.0	8.0	7.2	7.6	9.2
Children 3-6y	13.6	34.3	14.3	35.0	15.9	12.6	15.0	14.4	13.8	15.2
Children 7-12y	19.4	39.5	21.7	41.2	18.2	18.4	21.5	24.7	20.6	22.6
Children 13-15y	10.8	31.1	12.7	33.4	8.5	10.9	11.4	16.6	12.4	11.5
Older > 70y	3.1	17.3	3.6	18.6	4.5	3.2	2.6	3.9	3.6	3.4
Ill or disabled	1.4	11.7	1.6	12.7	2.0	1.3	1.2	2.5	1.6	1.2
Immigrant	9.0	28.6	8.1	27.3	19.4	7.3	9.0	12.2	6.8	8.9
Urban	42.0	49.4	40.0	49.0	46.5	39.7	44.7	40.6	37.9	44.4
Intermediate	34.4	47.5	35.3	47.8	29.8	34.5	35.5	33.4	36.2	34.4
Rural	23.6	42.5	24.7	43.1	23.7	25.8	19.8	26.0	25.9	21.2
Education										
University	22.8	41.9	26.9	44.3	15.1	21.1	28.2	17.9	24.8	36.4
Short tertiary	14.1	34.8	16.5	37.1	13.3	12.8	16.8	15.1	15.5	19.5
High secondary	47.3	49.9	43.5	49.6	45.7	50.8	41.1	43.8	47.6	34.3
Low secondary	13.5	34.2	11.1	31.4	21.1	12.9	12.4	19.3	10.2	8.6
Primary or less	2.3	15.1	2.0	13.9	4.8	2.4	1.5	3.9	1.9	1.2
Tenure										
More than 3y	73.4	44.2	70.6	45.6	49.8	75.9	75.6	54.6	72.3	75.3
2-3y	12.5	33.0	14.2	34.9	20.0	11.2	12.6	17.8	14.4	12.0
1 or less	13.1	33.8	14.0	34.7	27.5	11.9	11.2	27.0	12.0	11.6
Missing	1.0	10.1	1.2	10.7	2.7	1.0	0.6	0.6	1.3	1.1
Income										
Low	12.6	33.1	34.4	47.5	32.4	12.2	7.6	65.1	34.4	17.8
Medium	31.8	46.6	37.8	48.4	36.5	34.1	26.2	27.0	41.2	35.9
High	55.6	49.7	27.8	44.8	31.1	53.7	66.2	7.9	24.4	46.3

Under.: underempoyed; Uncon.: unconstrained; Over.: overemployed
*mean values. Output on occupation and sector omitted

5.7 Appendix 5-2

Table A 5-2 Multilevel fixed-effects logit estimation of determinants of mismatches (over- and underemployment respect to unconstrained workers).

	Men				Women			
	Overemployed Men (N=8,416)		Underemployed Men (N=6,616)		Overemployed Women (N=9,554)		Underemployed Women (N=8,045)	
	estimates	sd	estimates	sd	estimates	sd	estimates	sd
Age								
28-35	base							
36-45	0.091	0.102	-0.014	0.110	-0.005	0.111	0.018	0.078
46-58	0.169	0.115	-0.206	0.178	0.147	0.157	-0.004	0.127
No breadwinner	base							
Breadwinner	-0.097	0.139	-0.243*	0.115	0.159	0.130	-0.042	0.152
Equally breadwinner	-0.385*	0.183	-0.055	0.153	-0.173	0.145	-0.805*	0.408
Living with a partner	-0.007	0.104	-0.073	0.260	0.202†	0.107	-0.410***	0.109
Children <2y	-0.117	0.144	0.218	0.211	0.085	0.176	-0.084	0.115
Children 3-6y	0.183*	0.080	0.085	0.239	0.053	0.101	0.031	0.142
Children 7-12y	0.158†	0.091	-0.040	0.271	0.205*	0.091	0.135	0.100
Children 13-15y	0.007	0.084	-0.210	0.165	-0.091	0.133	0.175	0.182
Older > 70y	0.073	0.175	0.145	0.142	0.169	0.188	-0.008	0.236
Ill or disabled	-0.072	0.242	0.145	0.372	-0.236	0.227	0.244	0.329
Immigrant	-0.035	0.127	0.594**	0.200	-0.084	0.247	0.072	0.152
University	base							
Short tertiary	0.515*	0.233	0.307	0.248	0.566*	0.286	0.345	0.244
High secondary	0.510*	0.203	0.412	0.260	0.460†	0.248	0.189	0.244
Low secondary	0.140	0.244	-0.004	0.265	0.223	0.218	-0.044	0.228
Primary or less	0.287	0.186	0.319†	0.172	0.102	0.268	0.219	0.214
Low income	base							
Medium income	0.092	0.101	-1.343***	0.294	0.547*	0.222	-1.183***	0.155
High income	0.325**	0.119	-1.701***	0.301	1.137***	0.309	-2.086***	0.224
Tenure ≥4 years	base							
2-3y	0.073	0.150	0.593**	0.210	-0.220*	0.089	0.163	0.137
1 or less	-0.089	0.219	0.453*	0.187	0.008	0.121	0.437*	0.187
Missing	-0.238	0.392	1.347***	0.409	0.251	0.374	-1.042**	0.385
Urban	base							
Intermediate	0.002	0.083	-0.157*	0.079	-0.039	0.084	-0.101	0.101
Rural	-0.212†	0.120	-0.216*	0.110	-0.254*	0.121	0.030	0.201
Job quality								
Job rewards	-0.033***	0.006	-0.044***	0.010	-0.025***	0.004	-0.044***	0.008
Job intensity	0.019***	0.002	0.001	0.003	0.017***	0.002	0.001	0.003

Output on occupation and sector omitted

Table A 5-3 Multilevel linear fixed- effects of working hours, working hour mismatches and job quality dimensions on mental well-being for men

Men (N=9345)		Base		Adjusted		Interaction	
		estimates	sd	estimates	Sd	estimates	Sd
Underemployed	≤20 h/w	-0.154	1.849	2.466	2.463	-0.559	1.763
	21-34 h/w	-1.419	2.343	0.854	1.880	-0.383	1.515
	35-40 h/w	-3.704**	1.114	-2.472†	1.299	-2.671*	1.274
Unconstrained	≤20 h/w	2.304*	1.090	1.762	1.828	5.523***	1.220
	21-34 h/w	2.022	2.006	1.603	2.107	2.583	1.817
	35-40 h/w	Base					
	41-47 h/w	-3.336**	0.946	-3.289**	1.028	-2.756	1.360
	≥48 h/w	-0.895	0.738	-1.279	0.962	-1.499†	0.800
Overemployed	35-40 h/w	-4.452***	0.713	-2.248**	0.793	-2.322**	0.750
	41-47 h/w	-5.170**	1.367	-2.450†	1.265	-1.907	1.617
	≥48 h/w	-8.340***	1.027	-5.362***	0.859	-4.445***	0.908
Job rewards (jrew)				0.702***	0.056	0.726***	0.035
Underemployed	≤20 h/w * jrew					-0.422	0.264
	21-34 h/w * jrew					-0.184	0.242
	35-40 h/w * jrew					-0.124	0.186
Unconstrained	≤20 h/w * jrew					0.139	0.311
	21-34 h/w * jrew					-0.607**	0.217
	41-47 h/w * jrew					0.003	0.185
	≥48 h/w * jrew					0.120	0.199
Overemployed	35-40 h/w * jrew					0.026	0.079
	41-47 h/w * jrew					-0.269	0.193
	≥48 h/w * jrew					0.160	0.122
Job intensity (jint)				-0.202***	0.014	-0.176***	0.014
Underemployed	≤20 h/w * jint					0.006	0.081
	21-34 h/w * jint					-0.107	0.125
	35-40 h/w * jint					-0.007	0.070
Unconstrained	≤20 h/w * jint					0.367*	0.169
	21-34 h/w * jint					0.041	0.079
	41-47 h/w * jint					-0.245*	0.091
	≥48 h/w * jint					0.128*	0.050
Overemployed	35-40 h/w * jint					-0.033	0.068
	41-47 h/w * jint					-0.079	0.082
	≥48 h/w * jint					-0.134**	0.043

† p-value 0.1; * p-value 0.05; ** p-value 0.01; *** p-value 0.001; sd standard deviation
All models adjusted by age, children, living with a partner, breadwinner, disabled/ill partner, older than 70 year, foreign born, urban, education level, earnings, tenure, occupation, economic sector.
Omitted output for underemployment men and women above 40 h/w and for overemployed man below 35 h/w due to low sample size.

Table A 5-4 Multilevel linear fixed effects of working hours, working hour mismatches and job quality dimensions on mental well-being for women

Women (N=10998)		Base		Adjusted		Interaction	
		estimates	sd	estimates	sd	estimates	sd
Underemployed	≤20 h/w	-2.990	2.146	-2.144	2.073	-1.557	2.200
	21-34 h/w	-3.863***	0.911	-2.040†	1.180	-2.109	1.258
	35-40 h/w	-5.455***	1.256	-1.587	1.589	-0.550	1.269
Unconstrained	≤20 h/w	-0.100	2.138	-0.013	2.196	0.022	2.269
	21-34 h/w	-1.323	1.079	-1.230	0.937	-1.053	0.865
	35-40 h/w	Base					
	41-47 h/w	-2.399	1.555	-1.406	1.416	-1.675	1.426
	≥48 h/w	2.535	1.617	3.095†	1.604	3.212*	1.544
Overemployed	≤20 h/w	-14.003***	3.612	-11.072**	3.160	-10.663**	3.479
	21-34 h/w	-7.629***	1.467	-5.755***	1.293	-5.876***	1.592
	35-40 h/w	-6.980***	1.179	-5.073***	1.209	-5.045***	1.244
	41-47 h/w	-9.879***	1.585	-6.564***	1.702	-5.763**	1.846
	≥48 h/w	-8.170***	0.708	-4.917***	0.820	-4.847***	1.163
Job rewards (jrew)				0.668***	0.053	0.748***	0.055
Underemployed	≤20 h/w * jrew					0.028	0.138
	21-34 h/w * jrew					-0.113	0.219
	35-40 h/w * jrew					0.068	0.161
Unconstrained	≤20 h/w * jrew					-0.449*	0.172
	21-34 h/w * jrew					-0.192	0.177
	41-47 h/w * jrew					-0.004	0.120
	≥48 h/w * jrew					-0.269	0.212
Overemployed	≤20 h/w * jrew					0.355	0.370
	21-34 h/w * jrew					0.033	0.183
	35-40 h/w * jrew					-0.111	0.098
	41-47 h/w * jrew					-0.047	0.115
	≥48 h/w * jrew					0.019	0.101
Job intensity (jint)				-0.217***	0.018	-0.193***	0.035
Underemployed	≤20 h/w * jint					-0.003	0.068
	21-34 h/w * jint					-0.090	0.071
	35-40 h/w * jint					-0.105	0.126
Unconstrained	≤20 h/w * jint					-0.014	0.045
	21-34 h/w * jint					-0.104**	0.030
	41-47 h/w * jint					0.065	0.072
	≥48 h/w * jint					0.078	0.082
Overemployed	≤20 h/w * jint					-0.056	0.099
	21-34 h/w * jint					-0.026	0.071
	35-40 h/w * jint					-0.004	0.031
	41-47 h/w * jint					-0.084	0.055
	≥48 h/w * jint					-0.020	0.096

† p-value 0.1; * p-value 0.05; ** p-value 0.01; *** p-value 0.001; sd standard deviation
All models adjusted by age, children, living with a partner, breadwinner, disabled/ill partner, older than 70 years, foreign born, urban, education level, earnings, tenure, occupation, economic sector.
Omitted output for underemployment women above 40 h/w due to low sample size

6 Conclusions and future research

This thesis deals with three different but interrelated topics in the fields of health and labour economics. Our analysis clearly highlights the need to pay attention to the well-being consequences of working conditions, either in the form of stress or job intensification, and of excess or short working hours that characterise our labour environment.

The first two chapters analyse the changes in working conditions before and after the economic crisis in Spain and their effects on stress and mental distress. The obtained results allow us to conclude that the quality of work of temporary female employees has worsened with the economic crisis, but this has not been the case for men. Men and women value quality of work differently before and during the economic crisis. Regarding health outcomes, a positive link between temporary employment and poor mental health has been found in the pre-crisis period among older adults, but also for manual workers who experience higher employment turnover, and among workers in regions with high unemployment who have fewer reemployment opportunities. The results seem to indicate no changes in work stress and mental distress of temporary contract workers in Spain due to the economic recession. However, work stress has increased among some subgroups of temporary workers. In particular, we find significant effects for older salaried workers and those with a university degree. Worse working conditions for women do not translate into increased mental distress. Temporary contracts impose a psychosocial burden on workers, especially on those with lower probabilities of reemployment. Taking these results into account, prevention of work stress at the firm level should actively be reinforced. Attempts to gain flexibility by promoting a single or unified open-ended contract may have an adverse effect through increasing job insecurity for permanent employees as well. Given the increasing incidence of psychological distress, official statistics and surveys should routinely collect information on health and well-being measures beyond job satisfaction. Given the lack of significance of changes in health outcomes for women, collecting better indicators of expectations of work and work-life balance is also recommended.

In Chapters 4 and 5, the analysis focuses on working hours and their effect on health outcomes. Short working hours are associated with better health status for women—a fact that can be related to the gender division of labour and the double burden of household and paid work. The adverse health effects of long working hours for men and women are also confirmed by our results. Surprisingly, very long hours—more than 48 h/w— appears to predict better health status. Going one step further, by differentiating between actual and desired working hours we find robust evidence of the role of working hours mismatches in explaining the adverse effects on mental well-being beyond working hours per se. The adverse effects on well-being are greater among women than men, both at over- and at underemployment. Job rewards correlate positively, but job intensity correlates negatively with mental well-being across all working schedules. Moving to a job that provides less job satisfaction and more hours leads to poorer health status for men and women. Moreover, we find a moderator effect of job quality for long hours, especially for men, i.e., men working long hours perform worse in health than those working a standard schedule. Unconstrained men working very long hours, above 48 hours per week, do not experience poorer mental well-being, unless they are overemployed in the presence of job intensification. Underemployment is also problematic, because it is a source of inequality and it mostly affects women engaged in short-term jobs. Working time arrangements set in the direction of closing the gap between desired and actual hours are profitable in terms of workers' well-being. For overemployed workers, time reduction should not be set unilaterally as part of an employee productivity strategy, as in this case job intensification may overcome the gains in time arrangement. Labour policies aimed at promoting flexibility on the employee side should be favoured. A broader public provision of services to families and a more equitable bargaining position in labour arrangements would allow for fewer mismatches. The obvious challenge is to find an efficient and egalitarian mechanism to reduce mismatches without simultaneously decreasing labour productivity, but no less important are the cultural values that shape social norms of consumerism and work attitudes.

A consistent finding of this thesis is that precariousness, job quality, and hours of work are relevant for well-being in terms of health outcomes. The results are nuanced according to the voluntary nature and degree of control of working conditions. Standard labour economics analysis assumes that wage is the main driver of worker well-being, but studies of labour supply obtain elasticities of little magnitude and are very sensitive to the econometric specifications. Most empirical research neglects the role of job quality in the supply of hours and ultimately in well-being. For these reasons, a first line of future research is to consider job quality as a relevant factor in the determination of labour supply.

It is also fair to recognise that the issues dealt with in this thesis correspond to a partial analysis, i.e., focusing on only part of the labour market. From a societal perspective, changes in unemployment levels or the share of temporary employment affecting consumption and output are better addressed in general models, such as job search models. Only these models have recently considered the determination of hours of work jointly with salaries. Taking this into account, a second line of future research is to incorporate job quality and constraints in worked hours in job search models. An extension of this research would be to assess if there is a trade-off between losses in worker well-being due to worse working conditions, potential gains as consumers due to lower prices, and differences across socioeconomic groups.

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